



SLR-TJ – 17

Seat No.	
----------	--

Set 

P
---

**S.E. (Civil) (Part – I) Examination, 2017  
CONCRETE TECHNOLOGY (New-CBCS)**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Assume suitable data if **necessary** and mention it **clearly**.
- 3) Figures to **right** indicate **full** marks.
- 4) Use of non-programmable calculator is **allowed**.
- 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) The percentage of gypsum added during manufacturing process is  
a) 0.2                      b) 0.25 to 0.35      c) 2.5 to 3.5              d) 5 to 10
- 2) Bulking of sand is the  
a) Rodding of the sand so that it occupies minimum volume  
b) Compacting of the sand  
c) False increase in the volume of sand due to moisture  
d) Segregating sand of particular size
- 3) Water-cement ratio is not influenced by the method of  
a) Mixing                  b) Batching              c) Placing                  d) Compaction
- 4) Which of the following statement is incorrect ?  
a) Water is the most important and least expensive ingredient of concrete  
b) Mixing water is utilized in the hydration of cement and provides lubrication between fine and coarse aggregates  
c) Excess water forms a scum or laitance at the surface  
d) None of the above
- 5) An accelerator for setting and hardening of the concrete is  
a) Calcium chloride                                      b) Potassium chloride  
c) Copper sulphate                                        d) None of above

P.T.O.



- 6) If the slump of concrete is 125 mm its workability is considered to be  
a) Very high            b) High            c) Medium            d) Low
- 7) Identify the incorrect statement.  
a) According to Indian standards sand is divided in four zones  
b) Fineness modulus of sand is expressed in degrees  
c) Flaky and elongated aggregate shall be avoided for concrete work  
d) Rounded aggregate gives good workability
- 8) The choice of mix proportion of a concrete is independent of  
a) Grade designation  
b) Maximum size of aggregate  
c) Minimum water-cement ratio  
d) Batching, mixing, placing and compaction techniques
- 9) For water-cement ratio of 0.5 the water content per bag of cement is  
a) 10 kg            b) 25 kg            c) 30 kg            d) 40 kg
- 10) The minimum water content for complete hydration of cement is  
a) 0.65            b) 0.5            c) 0.35            d) 0.27
- 11) Under water concreting is done by  
a) Dripping method            b) Tremie method  
c) Cofferdam method            d) All of the above
- 12) IS provision for concrete mix design is given by  
a) IS 4031-1968            b) IS 383-1970  
c) IS 456-2000            d) IS 10262-2009
- 13) A mixer designated 400 NT indicates that  
a) It is non-tilting type mixer  
b) Its nominal mix batch capacity is 400 liters  
c) Both a) and b)  
d) It is non-tilting type mixer requiring 400 revolutions for proper mix
- 14) The strength of light weight concrete depends upon  
a) Density of concrete            b) Size of aggregates  
c) Type of cement            d) Mix proportion



Seat No.	
----------	--

**S.E. (Civil) (Part – I) Examination, 2017  
CONCRETE TECHNOLOGY (New-CBCS)**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Assume suitable data if necessary and mention it clearly.**
  - 3) **Figures to right indicate full marks.**
  - 4) **Use of non-programmable calculator is allowed.**

SECTION – I

2. Solve **any seven** of the following : **(7×4=28)**
- 1) Enlist types of cement. Write a short note on sulphate resisting cement.
  - 2) Write a brief note on bulking of the sand.
  - 3) Explain workability of concrete and enlist the methods to measure the same. Also mention the unit.
  - 4) Write in brief on admixtures and additives in concrete.
  - 5) Write a short note on compaction of concrete.
  - 6) Explain detailed procedure of elongation index and state limiting values.
  - 7) Enlist factors affecting selection of curing method.
  - 8) Draw detailed flowchart of cement manufacturing by semi dry process.
  - 9) Define Bulk density and specific gravity. If bulk density of CA is  $1700 \text{ kg/m}^3$  and specific gravity of the same is 2.80, workout the volume of CA if weight of CA in particular mixes was  $1200 \text{ kg/m}^3$  using bulk density and specific gravity.
  - 10) Explain mechanism of super plasticizer in concrete.

SECTION – II

3. Design a concrete mix of grade M20 as per IS 10262-2009. **16**
- Use following data :
- 1) Concrete is to be used for R.C.C. work.
  - 2) Exposure condition – Mild.

**Set P**



- 3) Cement to be used – OPC 43 grade.
- 4) Workability required – 100 mm slump.
- 5) Method of concrete placing – Pumping.
- 6) Mineral admixture – Nil.
- 7) Super plasticizer – Nil.
- 8) Max. size of aggregate – 20 mm [crushed angular].
- 9) Test data for material –
  - a) Specific gravity of cement = 3.15, FA = 2.60 and CA = 2.90.
  - b) Water absorption of FA = 1.4% and CA = 1%.
  - c) Moisture content of FA = 2% and CA = Nil.

**Table 1 Assumed Standard Deviation**

(Clause 9.2.4.2 and Table 11)

Grade of Concrete	Assumed Standard Deviation N/mm <sup>2</sup>
M 10 } M 15 }	3.5
M 20 } M 25 }	4.0
M 30 } M 35 } M 40 } M 45 } M 50 }	5.0



**Table 2 Maximum Water Content per Cubic  
Metre of Concrete for Nominal  
Maximum Size of Aggregate**

*(Clauses 4.2, A-5 and B-5)*

Sl No.	Nominal Maximum Size of Aggregate mm	Maximum Water Content <sup>1)</sup> kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

**Note** – These quantities of mixing water are for use in computing cementitious material contents for trial batches.

<sup>1)</sup>Water} content corresponding to saturated surface dry aggregate.

**Table 3 Volume of Coarse Aggregate<sup>1)</sup> per unit  
Volume of Total Aggregate for Different  
Zones of Fine Aggregate**

*(Clauses 4.4, A-7 and B-7)*

Sl. No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
(1)	(2)	Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

<sup>1)</sup>Volumes are based on aggregates in saturated surface dry condition.

**Set P**



**Table 4 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size**

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

SI No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	–	300	0.55	M 20
ii)	Moderate	240	0.60	M 15	300	0.50	M 25
iii)	Severe	250	0.50	M 20	320	0.45	M 30
iv)	Very severe	260	0.45	M 20	340	0.45	M 35
v)	Extreme	280	0.40	M 25	360	0.40	M 40

**Table No. 5 : Grading of Fine Aggregate**

IS Sieve Size (mm)		40	20	10	4.75	2.36	1.18	0.6	0.3	0.15	
% Passing	CA I	100	100	88	12	03	–	–	–	–	
	CA II	100	92	14	03	–	–	–	–	–	
	FA	–	–	100	89	70	35	19	08	02	



<b>Table No. 6 : Grading of Fine Aggregate</b>				
<b>IS Sieve Designations</b>	<b>Percentage Passing</b>			
	<b>Grading ZONE I</b>	<b>Grading ZONE II</b>	<b>Grading ZONE III</b>	<b>Grading ZONE IV</b>
10 mm	100	100	100	100
4.75 mm	90 – 100	90 – 100	90 – 100	90 – 100
2.36 mm	60 – 95	75 – 100	85 – 100	95 – 100
1.18 mm	30 – 70	55 – 90	75 – 100	90 – 100
600 Microns	15 – 34	35 – 59	60 – 79	80 – 100
300 Microns	5 – 20	8 – 30	12 – 40	15 – 50
150 Microns	0 – 10	0 – 10	0 – 10	0 – 10

OR

- 3. Write down the step by step procedure of concrete mix design by ACI method. **16**
- 4. Attempt **any three** of the following : **(3×4=12)**
  - 1) Write a short note on creep and enlist factors affecting it.
  - 2) Write a short note on shrinkage and enlist factors affecting it.
  - 3) Explain alkali aggregate reaction and sulphate attack on concrete.
  - 4) Write significance of permeability of concrete and factors affecting permeability.
  - 5) Write a short note on light weight concrete.
  - 6) Write a short note on quality control of concrete.

\_\_\_\_\_







SLR-TJ – 17

Seat No.	
----------	--

Set 

Q
---

**S.E. (Civil) (Part – I) Examination, 2017  
CONCRETE TECHNOLOGY (New-CBCS)**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Assume suitable data if **necessary** and mention it **clearly**.
- 3) Figures to **right** indicate **full** marks.
- 4) Use of non-programmable calculator is **allowed**.
- 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) The choice of mix proportion of a concrete is independent of
- Grade designation
  - Maximum size of aggregate
  - Minimum water-cement ratio
  - Batching, mixing, placing and compaction techniques
- 2) For water-cement ratio of 0.5 the water content per bag of cement is
- 10 kg
  - 25 kg
  - 30 kg
  - 40 kg
- 3) The minimum water content for complete hydration of cement is
- 0.65
  - 0.5
  - 0.35
  - 0.27
- 4) Under water concreting is done by
- Dripping method
  - Tremie method
  - Cofferdam method
  - All of the above
- 5) IS provision for concrete mix design is given by
- IS 4031-1968
  - IS 383-1970
  - IS 456-2000
  - IS 10262-2009

P.T.O.



- 6) A mixer designated 400 NT indicates that
- a) It is non-tilting type mixer
  - b) Its nominal mix batch capacity is 400 liters
  - c) Both a) and b)
  - d) It is non-tilting type mixer requiring 400 revolutions for proper mix
- 7) The strength of light weight concrete depends upon
- a) Density of concrete
  - b) Size of aggregates
  - c) Type of cement
  - d) Mix proportion
- 8) The percentage of gypsum added during manufacturing process is
- a) 0.2
  - b) 0.25 to 0.35
  - c) 2.5 to 3.5
  - d) 5 to 10
- 9) Bulking of sand is the
- a) Rodding of the sand so that it occupies minimum volume
  - b) Compacting of the sand
  - c) False increase in the volume of sand due to moisture
  - d) Segregating sand of particular size
- 10) Water-cement ratio is not influenced by the method of
- a) Mixing
  - b) Batching
  - c) Placing
  - d) Compaction
- 11) Which of the following statement is incorrect ?
- a) Water is the most important and least expensive ingredient of concrete
  - b) Mixing water is utilized in the hydration of cement and provides lubrication between fine and coarse aggregates
  - c) Excess water forms a scum or laitance at the surface
  - d) None of the above
- 12) An accelerator for setting and hardening of the concrete is
- a) Calcium chloride
  - b) Potassium chloride
  - c) Copper sulphate
  - d) None of above
- 13) If the slump of concrete is 125 mm its workability is considered to be
- a) Very high
  - b) High
  - c) Medium
  - d) Low
- 14) Identify the incorrect statement.
- a) According to Indian standards sand is divided in four zones
  - b) Fineness modulus of sand is expressed in degrees
  - c) Flaky and elongated aggregate shall be avoided for concrete work
  - d) Rounded aggregate gives good workability



Seat No.	
----------	--

**S.E. (Civil) (Part – I) Examination, 2017  
CONCRETE TECHNOLOGY (New-CBCS)**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Assume suitable data if necessary and mention it clearly.**
  - 3) **Figures to right indicate full marks.**
  - 4) **Use of non-programmable calculator is allowed.**

SECTION – I

2. Solve **any seven** of the following : **(7×4=28)**
- 1) Enlist types of cement. Write a short note on sulphate resisting cement.
  - 2) Write a brief note on bulking of the sand.
  - 3) Explain workability of concrete and enlist the methods to measure the same. Also mention the unit.
  - 4) Write in brief on admixtures and additives in concrete.
  - 5) Write a short note on compaction of concrete.
  - 6) Explain detailed procedure of elongation index and state limiting values.
  - 7) Enlist factors affecting selection of curing method.
  - 8) Draw detailed flowchart of cement manufacturing by semi dry process.
  - 9) Define Bulk density and specific gravity. If bulk density of CA is  $1700 \text{ kg/m}^3$  and specific gravity of the same is 2.80, workout the volume of CA if weight of CA in particular mixes was  $1200 \text{ kg/m}^3$  using bulk density and specific gravity.
  - 10) Explain mechanism of super plasticizer in concrete.

SECTION – II

3. Design a concrete mix of grade M20 as per IS 10262-2009. **16**
- Use following data :
- 1) Concrete is to be used for R.C.C. work.
  - 2) Exposure condition – Mild.

**Set Q**



- 3) Cement to be used – OPC 43 grade.
- 4) Workability required – 100 mm slump.
- 5) Method of concrete placing – Pumping.
- 6) Mineral admixture – Nil.
- 7) Super plasticizer – Nil.
- 8) Max. size of aggregate – 20 mm [crushed angular].
- 9) Test data for material –
  - a) Specific gravity of cement = 3.15, FA = 2.60 and CA = 2.90.
  - b) Water absorption of FA = 1.4% and CA = 1%.
  - c) Moisture content of FA = 2% and CA = Nil.

**Table 1 Assumed Standard Deviation**

(Clause 9.2.4.2 and Table 11)

Grade of Concrete	Assumed Standard Deviation N/mm <sup>2</sup>
M 10 } M 15 }	3.5
M 20 } M 25 }	4.0
M 30 } M 35 } M 40 } M 45 } M 50 }	5.0



**Table 2 Maximum Water Content per Cubic  
Metre of Concrete for Nominal  
Maximum Size of Aggregate**

*(Clauses 4.2, A-5 and B-5)*

Sl No.	Nominal Maximum Size of Aggregate mm	Maximum Water Content <sup>1)</sup> kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

**Note** – These quantities of mixing water are for use in computing cementitious material contents for trial batches.

<sup>1)</sup>Water} content corresponding to saturated surface dry aggregate.

**Table 3 Volume of Coarse Aggregate per unit  
Volume of Total Aggregate for Different  
Zones of Fine Aggregate**

*(Clauses 4.4, A-7 and B-7)*

Sl. No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate <sup>1)</sup> per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
(1)	(2)	Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

<sup>1)</sup>Volumes are based on aggregates in saturated surface dry condition.

**Set Q**



**Table 4 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size**

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

SI No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	–	300	0.55	M 20
ii)	Moderate	240	0.60	M 15	300	0.50	M 25
iii)	Severe	250	0.50	M 20	320	0.45	M 30
iv)	Very severe	260	0.45	M 20	340	0.45	M 35
v)	Extreme	280	0.40	M 25	360	0.40	M 40

**Table No. 5 : Grading of Fine Aggregate**

IS Sieve Size (mm)		40	20	10	4.75	2.36	1.18	0.6	0.3	0.15	
% Passing	CA I	100	100	88	12	03	–	–	–	–	
	CA II	100	92	14	03	–	–	–	–	–	
	FA	–	–	100	89	70	35	19	08	02	



<b>Table No. 6 : Grading of Fine Aggregate</b>				
<b>IS Sieve Designations</b>	<b>Percentage Passing</b>			
	<b>Grading ZONE I</b>	<b>Grading ZONE II</b>	<b>Grading ZONE III</b>	<b>Grading ZONE IV</b>
10 mm	100	100	100	100
4.75 mm	90 – 100	90 – 100	90 – 100	90 – 100
2.36 mm	60 – 95	75 – 100	85 – 100	95 – 100
1.18 mm	30 – 70	55 – 90	75 – 100	90 – 100
600 Microns	15 – 34	35 – 59	60 – 79	80 – 100
300 Microns	5 – 20	8 – 30	12 – 40	15 – 50
150 Microns	0 – 10	0 – 10	0 – 10	0 – 10

OR

- 3. Write down the step by step procedure of concrete mix design by ACI method. **16**
- 4. Attempt **any three** of the following : **(3×4=12)**
  - 1) Write a short note on creep and enlist factors affecting it.
  - 2) Write a short note on shrinkage and enlist factors affecting it.
  - 3) Explain alkali aggregate reaction and sulphate attack on concrete.
  - 4) Write significance of permeability of concrete and factors affecting permeability.
  - 5) Write a short note on light weight concrete.
  - 6) Write a short note on quality control of concrete.

\_\_\_\_\_







SLR-TJ – 17

Seat No.	
----------	--

Set 

R
---

**S.E. (Civil) (Part – I) Examination, 2017  
CONCRETE TECHNOLOGY (New-CBCS)**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Assume suitable data if **necessary** and mention it **clearly**.
- 3) Figures to **right** indicate **full** marks.
- 4) Use of non-programmable calculator is **allowed**.
- 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) An accelerator for setting and hardening of the concrete is
- a) Calcium chloride                      b) Potassium chloride  
c) Copper sulphate                      d) None of above
- 2) If the slump of concrete is 125 mm its workability is considered to be
- a) Very high              b) High              c) Medium              d) Low
- 3) Identify the incorrect statement.
- a) According to Indian standards sand is divided in four zones  
b) Fineness modulus of sand is expressed in degrees  
c) Flaky and elongated aggregate shall be avoided for concrete work  
d) Rounded aggregate gives good workability
- 4) The choice of mix proportion of a concrete is independent of
- a) Grade designation  
b) Maximum size of aggregate  
c) Minimum water-cement ratio  
d) Batching, mixing, placing and compaction techniques

P.T.O.



- 5) For water-cement ratio of 0.5 the water content per bag of cement is  
a) 10 kg                      b) 25 kg                      c) 30 kg                      d) 40 kg
- 6) The minimum water content for complete hydration of cement is  
a) 0.65                      b) 0.5                      c) 0.35                      d) 0.27
- 7) Under water concreting is done by  
a) Dripping method                      b) Tremie method  
c) Cofferdam method                      d) All of the above
- 8) IS provision for concrete mix design is given by  
a) IS 4031-1968                      b) IS 383-1970  
c) IS 456-2000                      d) IS 10262-2009
- 9) A mixer designated 400 NT indicates that  
a) It is non-tilting type mixer  
b) Its nominal mix batch capacity is 400 liters  
c) Both a) and b)  
d) It is non-tilting type mixer requiring 400 revolutions for proper mix
- 10) The strength of light weight concrete depends upon  
a) Density of concrete                      b) Size of aggregates  
c) Type of cement                      d) Mix proportion
- 11) The percentage of gypsum added during manufacturing process is  
a) 0.2                      b) 0.25 to 0.35                      c) 2.5 to 3.5                      d) 5 to 10
- 12) Bulking of sand is the  
a) Rodding of the sand so that it occupies minimum volume  
b) Compacting of the sand  
c) False increase in the volume of sand due to moisture  
d) Segregating sand of particular size
- 13) Water-cement ratio is not influenced by the method of  
a) Mixing                      b) Batching                      c) Placing                      d) Compaction
- 14) Which of the following statement is incorrect ?  
a) Water is the most important and least expensive ingredient of concrete  
b) Mixing water is utilized in the hydration of cement and provides lubrication between fine and coarse aggregates  
c) Excess water forms a scum or laitance at the surface  
d) None of the above



Seat No.	
----------	--

**S.E. (Civil) (Part – I) Examination, 2017  
CONCRETE TECHNOLOGY (New-CBCS)**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Assume suitable data if necessary and mention it clearly.**
  - 3) **Figures to right indicate full marks.**
  - 4) **Use of non-programmable calculator is allowed.**

SECTION – I

2. Solve **any seven** of the following : **(7×4=28)**
- 1) Enlist types of cement. Write a short note on sulphate resisting cement.
  - 2) Write a brief note on bulking of the sand.
  - 3) Explain workability of concrete and enlist the methods to measure the same. Also mention the unit.
  - 4) Write in brief on admixtures and additives in concrete.
  - 5) Write a short note on compaction of concrete.
  - 6) Explain detailed procedure of elongation index and state limiting values.
  - 7) Enlist factors affecting selection of curing method.
  - 8) Draw detailed flowchart of cement manufacturing by semi dry process.
  - 9) Define Bulk density and specific gravity. If bulk density of CA is  $1700 \text{ kg/m}^3$  and specific gravity of the same is 2.80, workout the volume of CA if weight of CA in particular mixes was  $1200 \text{ kg/m}^3$  using bulk density and specific gravity.
  - 10) Explain mechanism of super plasticizer in concrete.

SECTION – II

3. Design a concrete mix of grade M20 as per IS 10262-2009. **16**
- Use following data :
- 1) Concrete is to be used for R.C.C. work.
  - 2) Exposure condition – Mild.

**Set R**



- 3) Cement to be used – OPC 43 grade.
- 4) Workability required – 100 mm slump.
- 5) Method of concrete placing – Pumping.
- 6) Mineral admixture – Nil.
- 7) Super plasticizer – Nil.
- 8) Max. size of aggregate – 20 mm [crushed angular].
- 9) Test data for material –
  - a) Specific gravity of cement = 3.15, FA = 2.60 and CA = 2.90.
  - b) Water absorption of FA = 1.4% and CA = 1%.
  - c) Moisture content of FA = 2% and CA = Nil.

**Table 1 Assumed Standard Deviation**

(Clause 9.2.4.2 and Table 11)

Grade of Concrete	Assumed Standard Deviation N/mm <sup>2</sup>
M 10 } M 15 }	3.5
M 20 } M 25 }	4.0
M 30 } M 35 } M 40 } M 45 } M 50 }	5.0



**Table 2 Maximum Water Content per Cubic Metre of Concrete for Nominal Maximum Size of Aggregate**

*(Clauses 4.2, A-5 and B-5)*

SI No.	Nominal Maximum Size of Aggregate mm	Maximum Water Content <sup>1)</sup> kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

**Note** – These quantities of mixing water are for use in computing cementitious material contents for trial batches.

<sup>1)</sup>Water} content corresponding to saturated surface dry aggregate.

**Table 3 Volume of Coarse Aggregate per unit Volume of Total Aggregate for Different Zones of Fine Aggregate**

*(Clauses 4.4, A-7 and B-7)*

Sl. No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate <sup>1)</sup> per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

<sup>1)</sup>Volumes are based on aggregates in saturated surface dry condition.



**Table 4 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size**

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

SI No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	–	300	0.55	M 20
ii)	Moderate	240	0.60	M 15	300	0.50	M 25
iii)	Severe	250	0.50	M 20	320	0.45	M 30
iv)	Very severe	260	0.45	M 20	340	0.45	M 35
v)	Extreme	280	0.40	M 25	360	0.40	M 40

**Table No. 5 : Grading of Fine Aggregate**

IS Sieve Size (mm)		40	20	10	4.75	2.36	1.18	0.6	0.3	0.15	
% Passing	CA I	100	100	88	12	03	–	–	–	–	
	CA II	100	92	14	03	–	–	–	–	–	
	FA	–	–	100	89	70	35	19	08	02	



<b>Table No. 6 : Grading of Fine Aggregate</b>				
<b>IS Sieve Designations</b>	<b>Percentage Passing</b>			
	<b>Grading ZONE I</b>	<b>Grading ZONE II</b>	<b>Grading ZONE III</b>	<b>Grading ZONE IV</b>
10 mm	100	100	100	100
4.75 mm	90 – 100	90 – 100	90 – 100	90 – 100
2.36 mm	60 – 95	75 – 100	85 – 100	95 – 100
1.18 mm	30 – 70	55 – 90	75 – 100	90 – 100
600 Microns	15 – 34	35 – 59	60 – 79	80 – 100
300 Microns	5 – 20	8 – 30	12 – 40	15 – 50
150 Microns	0 – 10	0 – 10	0 – 10	0 – 10

OR

3. Write down the step by step procedure of concrete mix design by ACI method. **16**
4. Attempt **any three** of the following : **(3×4=12)**
  - 1) Write a short note on creep and enlist factors affecting it.
  - 2) Write a short note on shrinkage and enlist factors affecting it.
  - 3) Explain alkali aggregate reaction and sulphate attack on concrete.
  - 4) Write significance of permeability of concrete and factors affecting permeability.
  - 5) Write a short note on light weight concrete.
  - 6) Write a short note on quality control of concrete.

---







SLR-TJ – 17

Seat No.	
----------	--

Set 

S
---

**S.E. (Civil) (Part – I) Examination, 2017  
CONCRETE TECHNOLOGY (New-CBCS)**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Assume suitable data if **necessary** and mention it **clearly**.
- 3) Figures to **right** indicate **full** marks.
- 4) Use of non-programmable calculator is **allowed**.
- 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) The minimum water content for complete hydration of cement is  
a) 0.65                      b) 0.5                      c) 0.35                      d) 0.27
- 2) Under water concreting is done by  
a) Dripping method                      b) Tremie method  
c) Cofferdam method                      d) All of the above
- 3) IS provision for concrete mix design is given by  
a) IS 4031-1968                      b) IS 383-1970  
c) IS 456-2000                      d) IS 10262-2009
- 4) A mixer designated 400 NT indicates that  
a) It is non-tilting type mixer  
b) Its nominal mix batch capacity is 400 liters  
c) Both a) and b)  
d) It is non-tilting type mixer requiring 400 revolutions for proper mix
- 5) The strength of light weight concrete depends upon  
a) Density of concrete                      b) Size of aggregates  
c) Type of cement                      d) Mix proportion

P.T.O.



- 6) The percentage of gypsum added during manufacturing process is  
a) 0.2                      b) 0.25 to 0.35      c) 2.5 to 3.5              d) 5 to 10
- 7) Bulking of sand is the  
a) Rodding of the sand so that it occupies minimum volume  
b) Compacting of the sand  
c) False increase in the volume of sand due to moisture  
d) Segregating sand of particular size
- 8) Water-cement ratio is not influenced by the method of  
a) Mixing                      b) Batching              c) Placing                      d) Compaction
- 9) Which of the following statement is incorrect ?  
a) Water is the most important and least expensive ingredient of concrete  
b) Mixing water is utilized in the hydration of cement and provides lubrication between fine and coarse aggregates  
c) Excess water forms a scum or laitance at the surface  
d) None of the above
- 10) An accelerator for setting and hardening of the concrete is  
a) Calcium chloride                      b) Potassium chloride  
c) Copper sulphate                      d) None of above
- 11) If the slump of concrete is 125 mm its workability is considered to be  
a) Very high                      b) High                      c) Medium                      d) Low
- 12) Identify the incorrect statement.  
a) According to Indian standards sand is divided in four zones  
b) Fineness modulus of sand is expressed in degrees  
c) Flaky and elongated aggregate shall be avoided for concrete work  
d) Rounded aggregate gives good workability
- 13) The choice of mix proportion of a concrete is independent of  
a) Grade designation  
b) Maximum size of aggregate  
c) Minimum water-cement ratio  
d) Batching, mixing, placing and compaction techniques
- 14) For water-cement ratio of 0.5 the water content per bag of cement is  
a) 10 kg                      b) 25 kg                      c) 30 kg                      d) 40 kg
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) Examination, 2017  
CONCRETE TECHNOLOGY (New-CBCS)**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Assume suitable data if necessary and mention it clearly.**
  - 3) **Figures to right indicate full marks.**
  - 4) **Use of non-programmable calculator is allowed.**

SECTION – I

2. Solve **any seven** of the following : **(7×4=28)**
- 1) Enlist types of cement. Write a short note on sulphate resisting cement.
  - 2) Write a brief note on bulking of the sand.
  - 3) Explain workability of concrete and enlist the methods to measure the same. Also mention the unit.
  - 4) Write in brief on admixtures and additives in concrete.
  - 5) Write a short note on compaction of concrete.
  - 6) Explain detailed procedure of elongation index and state limiting values.
  - 7) Enlist factors affecting selection of curing method.
  - 8) Draw detailed flowchart of cement manufacturing by semi dry process.
  - 9) Define Bulk density and specific gravity. If bulk density of CA is  $1700 \text{ kg/m}^3$  and specific gravity of the same is 2.80, workout the volume of CA if weight of CA in particular mixes was  $1200 \text{ kg/m}^3$  using bulk density and specific gravity.
  - 10) Explain mechanism of super plasticizer in concrete.

SECTION – II

3. Design a concrete mix of grade M20 as per IS 10262-2009. **16**
- Use following data :
- 1) Concrete is to be used for R.C.C. work.
  - 2) Exposure condition – Mild.

**Set S**



- 3) Cement to be used – OPC 43 grade.
- 4) Workability required – 100 mm slump.
- 5) Method of concrete placing – Pumping.
- 6) Mineral admixture – Nil.
- 7) Super plasticizer – Nil.
- 8) Max. size of aggregate – 20 mm [crushed angular].
- 9) Test data for material –
  - a) Specific gravity of cement = 3.15, FA = 2.60 and CA = 2.90.
  - b) Water absorption of FA = 1.4% and CA = 1%.
  - c) Moisture content of FA = 2% and CA = Nil.

**Table 1 Assumed Standard Deviation**

(Clause 9.2.4.2 and Table 11)

Grade of Concrete	Assumed Standard Deviation N/mm <sup>2</sup>
M 10 } M 15 }	3.5
M 20 } M 25 }	4.0
M 30 } M 35 } M 40 } M 45 } M 50 }	5.0



**Table 2 Maximum Water Content per Cubic Metre of Concrete for Nominal Maximum Size of Aggregate**

*(Clauses 4.2, A-5 and B-5)*

SI No.	Nominal Maximum Size of Aggregate mm	Maximum Water Content <sup>1)</sup> kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

**Note** – These quantities of mixing water are for use in computing cementitious material contents for trial batches.

<sup>1)</sup>Water content corresponding to saturated surface dry aggregate.

**Table 3 Volume of Coarse Aggregate per unit Volume of Total Aggregate for Different Zones of Fine Aggregate**

*(Clauses 4.4, A-7 and B-7)*

Sl. No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate <sup>1)</sup> per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

<sup>1)</sup>Volumes are based on aggregates in saturated surface dry condition.



**Table 4 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size**

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

SI No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	–	300	0.55	M 20
ii)	Moderate	240	0.60	M 15	300	0.50	M 25
iii)	Severe	250	0.50	M 20	320	0.45	M 30
iv)	Very severe	260	0.45	M 20	340	0.45	M 35
v)	Extreme	280	0.40	M 25	360	0.40	M 40

**Table No. 5 : Grading of Fine Aggregate**

IS Sieve Size (mm)		40	20	10	4.75	2.36	1.18	0.6	0.3	0.15	
% Passing	CA I	100	100	88	12	03	–	–	–	–	
	CA II	100	92	14	03	–	–	–	–	–	
	FA	–	–	100	89	70	35	19	08	02	



<b>Table No. 6 : Grading of Fine Aggregate</b>				
<b>IS Sieve Designations</b>	<b>Percentage Passing</b>			
	<b>Grading ZONE I</b>	<b>Grading ZONE II</b>	<b>Grading ZONE III</b>	<b>Grading ZONE IV</b>
10 mm	100	100	100	100
4.75 mm	90 – 100	90 – 100	90 – 100	90 – 100
2.36 mm	60 – 95	75 – 100	85 – 100	95 – 100
1.18 mm	30 – 70	55 – 90	75 – 100	90 – 100
600 Microns	15 – 34	35 – 59	60 – 79	80 – 100
300 Microns	5 – 20	8 – 30	12 – 40	15 – 50
150 Microns	0 – 10	0 – 10	0 – 10	0 – 10

OR

3. Write down the step by step procedure of concrete mix design by ACI method. **16**
4. Attempt **any three** of the following : **(3×4=12)**
  - 1) Write a short note on creep and enlist factors affecting it.
  - 2) Write a short note on shrinkage and enlist factors affecting it.
  - 3) Explain alkali aggregate reaction and sulphate attack on concrete.
  - 4) Write significance of permeability of concrete and factors affecting permeability.
  - 5) Write a short note on light weight concrete.
  - 6) Write a short note on quality control of concrete.

---







SLR-TJ – 18

Seat No.	
----------	--

Set	P
-----	---

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017**  
**STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

**(14×1=14)**

- 1) In theory of bending which of the following assumption is made ?
  - a) the material of the beam is perfectly homogeneous
  - b) the stress induced is proportional strain within elastic limit
  - c) the value of E is constant for the material
  - d) all the above
- 2) For the span of a beam in pure bending, following condition exists
  - a) Zero BM
  - b) Zero SF
  - c) Varying BM
  - d) Varying SF
- 3) The deformation per unit length is called as
  - a) strain
  - b) stress
  - c) shear stress
  - d) compressive stress
- 4) Temperature stress developed in a bar depends on
  - a) Co-efficient of linear expansion
  - b) Change of temperature
  - c) Young's modulus
  - d) All of above
- 5) \_\_\_\_\_ loading induces, direct and bending stress at the section.
  - a) Uniformly distributed
  - b) Eccentric
  - c) Both a and b
  - d) None of the above
- 6) The diameter of the kernal of circular section is
  - a)  $d/2$
  - b)  $d/3$
  - c)  $d/4$
  - d)  $d/6$
- 7) For the same material, length and given torque a hollow shaft weighs \_\_\_\_\_ solid shaft.
  - a) less than
  - b) more than
  - c) equal to
  - d) none of the above

P.T.O.



- 8) The shafts are designed on the basis of
- strength
  - rigidity
  - either of the above
  - both (a) & (b)
- 9) The stress due to suddenly applied load is \_\_\_\_\_ times as that of gradually applied load.
- two
  - three
  - four
  - five
- 10) If  $\sigma_p$  is proof stress or maximum stress to which the bar is stressed up to the elastic limit, then modulus of resilience is equal to
- $\sigma_p / 2E$
  - $\sigma_p^2 / 2E$
  - $\sigma_p / 4E$
  - $\sigma_p^2 / 4E$
- 11) Two beams of equal cross sectional area are subjected to equal bending moment. If one beam has square cross section and other has circular section, then
- Both beams will be equally strong
  - Circular section beam will stronger
  - Square section beam will stronger
  - The strength of beam depends on the nature of loading
- 12) A cantilever beam is loaded uniformly throughout its length. The shape of shear force diagram will be
- right angle triangle
  - an isosceles triangle
  - a rectangle
  - none of these
- 13) Polar moment of inertia of the cross section of a shaft of diameter  $d$  is
- $\frac{\pi d^3}{32}$
  - $\frac{\pi d^4}{32}$
  - $\frac{\pi d^3}{64}$
  - $\frac{\pi d^4}{64}$
- 14) Longitudinal stress act \_\_\_\_\_ to the longitudinal axis of the shell.
- parallel
  - perpendicular
  - either of the above
  - none of the above
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017  
STRUCTURAL MECHANICS – I**

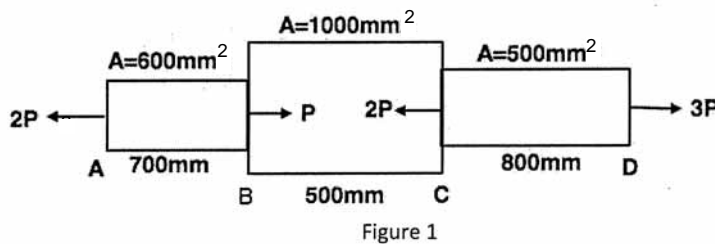
Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

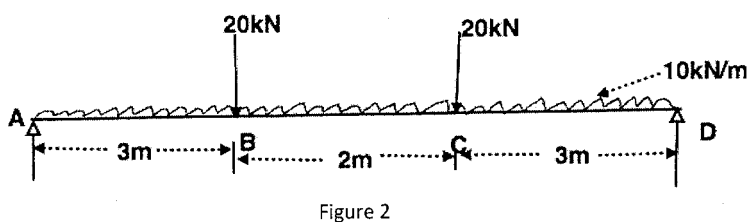
- Instructions :** 1) In Section – I solve **any three** questions, in Section – II solve **any three** questions.  
2) Assume suitable data if **necessary** and mention it clearly.  
3) Figures to the **right** indicate **full** marks.

SECTION – I

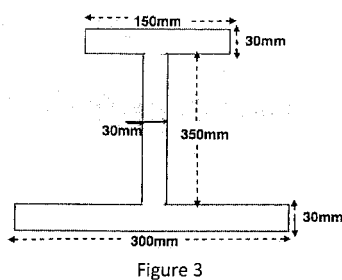
2. A member ABCD is subjected to point loads as shown in Figure 1 in the multiples of P. Determine the minimum P value required to produce total elongation of member ABCD of 1 mm. Take Modulus of Elasticity of Steel as 200 GPa. 10



3. a) Explain Point of Contra-flexure. 2  
b) Draw Shear Force and Bending Moment diagram for the Beam shown in Figure 2 below. Show all the calculations. 7



4. A simply supported beam of 10 m long is subjected to 10 kN/m UDL load. Find the maximum tensile and compressive stress and their locations for the I – Section given in the Figure 3 below. 9



Set P



5. Determine the maximum and minimum stresses at the base of a vertical brick hollow square chimney of inside dimensions of  $500 \text{ mm} \times 500 \text{ mm}$  and thickness of  $500 \text{ mm}$ . The height of chimney is  $12 \text{ m}$ . Take wind pressure perpendicular to chimney face as  $1300 \text{ N/m}^2$  and weight density of brick is  $20 \text{ kN/m}^3$ .

9

## SECTION – II

6. Answer the following questions :

10

- Define terms proof resilience and modulus of resilience.
- Explain the term equivalent section.
- Circumferential and Longitudinal Stress in Thin Cylinders.
- Expression for Strain Energy due to bending.
- Write Torsion Equation and give details of terminology.

7. The T-shaped cross section shown in figure 4 of beam is subjected to vertical shear force of  $100 \text{ KN}$ . Calculate shear stress at neutral axis and at the junction of web and flange.

9

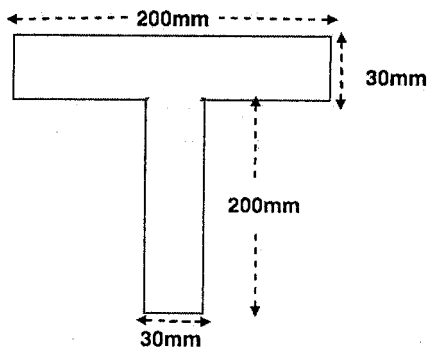


Figure 4

8. A hollow shaft is to transmit  $300 \text{ KW}$  at  $80 \text{ r.p.m.}$  If the shear stress is not to exceed  $60 \text{ N/mm}^2$  and internal diameter is  $0.6$  times external diameter, find the external and internal diameter assuming that maximum torque is  $1.4$  times the mean.

9

9. Find the moment of resistance of a flitched beam with a Timber part of  $200 \text{ mm}$  wide and  $250 \text{ mm}$  deep reinforced with two flitches each side by  $200 \text{ mm}$  by  $15 \text{ mm}$  in section. Horizontal CG of timber and steel part passes through same line. Consider allowable stress in timber is  $7 \text{ N/mm}^2$  and allowable stress in steel as  $120 \text{ N/mm}^2$ .

Take  $E_{\text{steel}} = 20E_{\text{timber}}$

9



SLR-TJ – 18

Seat No.	
----------	--

Set	Q
-----	---

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017**  
**STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

**(14×1=14)**

- 1) The shafts are designed on the basis of
  - a) strength
  - b) rigidity
  - c) either of the above
  - d) both (a) & (b)
- 2) The stress due to suddenly applied load is \_\_\_\_\_ times as that of gradually applied load.
  - a) two
  - b) three
  - c) four
  - d) five
- 3) If  $\sigma_p$  is proof stress or maximum stress to which the bar is stressed up to the elastic limit, then modulus of resilience is equal to
  - a)  $\sigma_p / 2E$
  - b)  $\sigma_p^2 / 2E$
  - c)  $\sigma_p / 4E$
  - d)  $\sigma_p^2 / 4E$
- 4) Two beams of equal cross sectional area are subjected to equal bending moment. If one beam has square cross section and other has circular section, then
  - a) Both beams will be equally strong
  - b) Circular section beam will stronger
  - c) Square section beam will stronger
  - d) The strength of beam depends on the nature of loading
- 5) A cantilever beam is loaded uniformly throughout its length. The shape of shear force diagram will be
  - a) right angle triangle
  - b) an isosceles triangle
  - c) a rectangle
  - d) none of these

P.T.O.



- 6) Polar moment of inertia of the cross section of a shaft of diameter  $d$  is
- a)  $\frac{\pi d^3}{32}$                       b)  $\frac{\pi d^4}{32}$                       c)  $\frac{\pi d^3}{64}$                       d)  $\frac{\pi d^4}{64}$
- 7) Longitudinal stress act \_\_\_\_\_ to the longitudinal axis of the shell.
- a) parallel    b) perpendicular  
c) either of the above    d) none of the above
- 8) In theory of bending which of the following assumption is made ?
- a) the material of the beam is perfectly homogeneous  
b) the stress induced is proportional strain within elastic limit  
c) the value of  $E$  is constant for the material  
d) all the above
- 9) For the span of a beam in pure bending, following condition exists
- a) Zero BM                      b) Zero SF                      c) Varying BM                      d) Varying SF
- 10) The deformation per unit length is called as
- a) strain    b) stress  
c) shear stress    d) compressive stress
- 11) Temperature stress developed in a bar depends on
- a) Co-efficient of linear expansion  
b) Change of temperature  
c) Young's modulus  
d) All of above
- 12) \_\_\_\_\_ loading induces, direct and bending stress at the section.
- a) Uniformly distributed    b) Eccentric  
c) Both a and b    d) None of the above
- 13) The diameter of the kernal of circular section is
- a)  $d/2$                       b)  $d/3$                       c)  $d/4$                       d)  $d/6$
- 14) For the same material, length and given torque a hollow shaft weighs \_\_\_\_\_ solid shaft.
- a) less than    b) more than  
c) equal to    d) none of the above
-



Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017  
STRUCTURAL MECHANICS – I**

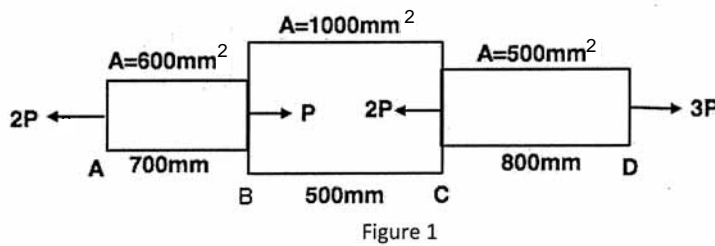
Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

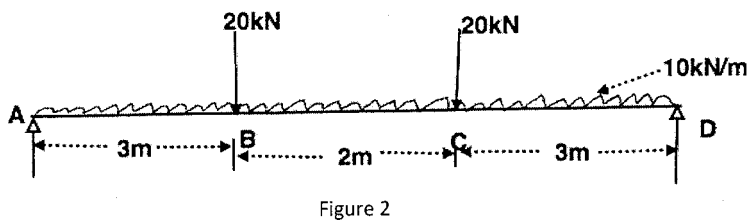
- Instructions :** 1) In Section – I solve **any three** questions, in Section – II solve **any three** questions.  
2) Assume suitable data if **necessary** and mention it clearly.  
3) Figures to the **right** indicate **full** marks.

SECTION – I

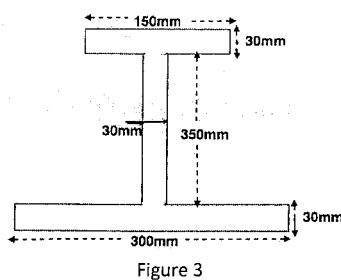
2. A member ABCD is subjected to point loads as shown in Figure 1 in the multiples of P. Determine the minimum P value required to produce total elongation of member ABCD of 1 mm. Take Modulus of Elasticity of Steel as 200 GPa. 10



3. a) Explain Point of Contra-flexure. 2  
b) Draw Shear Force and Bending Moment diagram for the Beam shown in Figure 2 below. Show all the calculations. 7



4. A simply supported beam of 10 m long is subjected to 10 kN/m UDL load. Find the maximum tensile and compressive stress and their locations for the I – Section given in the Figure 3 below. 9



Set Q



5. Determine the maximum and minimum stresses at the base of a vertical brick hollow square chimney of inside dimensions of  $500 \text{ mm} \times 500 \text{ mm}$  and thickness of  $500 \text{ mm}$ . The height of chimney is  $12 \text{ m}$ . Take wind pressure perpendicular to chimney face as  $1300 \text{ N/m}^2$  and weight density of brick is  $20 \text{ kN/m}^3$ .

9

## SECTION – II

6. Answer the following questions :

10

- Define terms proof resilience and modulus of resilience.
- Explain the term equivalent section.
- Circumferential and Longitudinal Stress in Thin Cylinders.
- Expression for Strain Energy due to bending.
- Write Torsion Equation and give details of terminology.

7. The T-shaped cross section shown in figure 4 of beam is subjected to vertical shear force of  $100 \text{ KN}$ . Calculate shear stress at neutral axis and at the junction of web and flange.

9

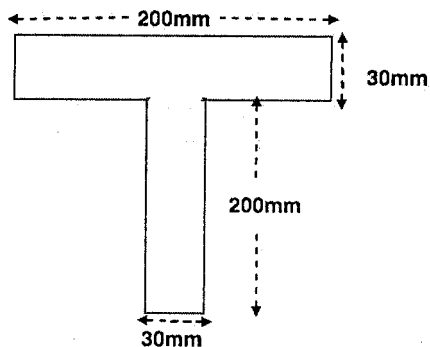


Figure 4

8. A hollow shaft is to transmit  $300 \text{ KW}$  at  $80 \text{ r.p.m.}$  If the shear stress is not to exceed  $60 \text{ N/mm}^2$  and internal diameter is  $0.6$  times external diameter, find the external and internal diameter assuming that maximum torque is  $1.4$  times the mean.

9

9. Find the moment of resistance of a flitched beam with a Timber part of  $200 \text{ mm}$  wide and  $250 \text{ mm}$  deep reinforced with two flitches each side by  $200 \text{ mm}$  by  $15 \text{ mm}$  in section. Horizontal CG of timber and steel part passes through same line. Consider allowable stress in timber is  $7 \text{ N/mm}^2$  and allowable stress in steel as  $120 \text{ N/mm}^2$ .

Take  $E_{\text{steel}} = 20E_{\text{timber}}$

9





SLR-TJ – 18

Seat No.	
-------------	--

Set	R
-----	---

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017**  
**STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

**Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(14×1=14)

- 1) \_\_\_\_\_ loading induces, direct and bending stress at the section.
  - a) Uniformly distributed
  - b) Eccentric
  - c) Both a and b
  - d) None of the above
- 2) The diameter of the kernal of circular section is
  - a)  $d/2$
  - b)  $d/3$
  - c)  $d/4$
  - d)  $d/6$
- 3) For the same material, length and given torque a hollow shaft weighs \_\_\_\_\_ solid shaft.
  - a) less than
  - b) more than
  - c) equal to
  - d) none of the above
- 4) The shafts are designed on the basis of
  - a) strength
  - b) rigidity
  - c) either of the above
  - d) both (a) & (b)
- 5) The stress due to suddenly applied load is \_\_\_\_\_ times as that of gradually applied load.
  - a) two
  - b) three
  - c) four
  - d) five
- 6) If  $\sigma_p$  is proof stress or maximum stress to which the bar is stressed up to the elastic limit, then modulus of resilience is equal to
  - a)  $\sigma_p / 2E$
  - b)  $\sigma_p^2 / 2E$
  - c)  $\sigma_p / 4E$
  - d)  $\sigma_p^2 / 4E$

P.T.O.



- 7) Two beams of equal cross sectional area are subjected to equal bending moment. If one beam has square cross section and other has circular section, then
- Both beams will be equally strong
  - Circular section beam will stronger
  - Square section beam will stronger
  - The strength of beam depends on the nature of loading
- 8) A cantilever beam is loaded uniformly throughout its length. The shape of shear force diagram will be
- right angle triangle
  - an isosceles triangle
  - a rectangle
  - none of these
- 9) Polar moment of inertia of the cross section of a shaft of diameter  $d$  is
- $\frac{\pi d^3}{32}$
  - $\frac{\pi d^4}{32}$
  - $\frac{\pi d^3}{64}$
  - $\frac{\pi d^4}{64}$
- 10) Longitudinal stress act \_\_\_\_\_ to the longitudinal axis of the shell.
- parallel
  - perpendicular
  - either of the above
  - none of the above
- 11) In theory of bending which of the following assumption is made ?
- the material of the beam is perfectly homogeneous
  - the stress induced is proportional strain within elastic limit
  - the value of  $E$  is constant for the material
  - all the above
- 12) For the span of a beam in pure bending, following condition exists
- Zero BM
  - Zero SF
  - Varying BM
  - Varying SF
- 13) The deformation per unit length is called as
- strain
  - stress
  - shear stress
  - compressive stress
- 14) Temperature stress developed in a bar depends on
- Co-efficient of linear expansion
  - Change of temperature
  - Young's modulus
  - All of above
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017  
STRUCTURAL MECHANICS – I**

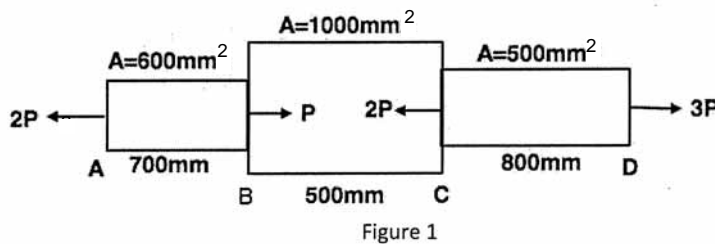
Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

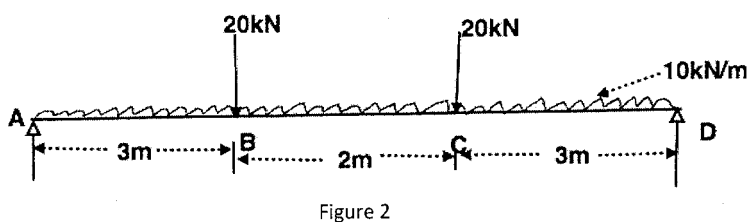
- Instructions :** 1) In Section – I solve **any three** questions, in Section – II solve **any three** questions.  
2) Assume suitable data if **necessary** and mention it clearly.  
3) Figures to the **right** indicate **full** marks.

SECTION – I

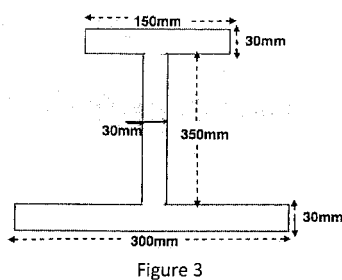
2. A member ABCD is subjected to point loads as shown in Figure 1 in the multiples of P. Determine the minimum P value required to produce total elongation of member ABCD of 1 mm. Take Modulus of Elasticity of Steel as 200 GPa. 10



3. a) Explain Point of Contra-flexure. 2  
b) Draw Shear Force and Bending Moment diagram for the Beam shown in Figure 2 below. Show all the calculations. 7



4. A simply supported beam of 10 m long is subjected to 10 kN/m UDL load. Find the maximum tensile and compressive stress and their locations for the I – Section given in the Figure 3 below. 9



Set R



5. Determine the maximum and minimum stresses at the base of a vertical brick hollow square chimney of inside dimensions of  $500 \text{ mm} \times 500 \text{ mm}$  and thickness of  $500 \text{ mm}$ . The height of chimney is  $12 \text{ m}$ . Take wind pressure perpendicular to chimney face as  $1300 \text{ N/m}^2$  and weight density of brick is  $20 \text{ kN/m}^3$ .

9

## SECTION – II

6. Answer the following questions :

10

- Define terms proof resilience and modulus of resilience.
- Explain the term equivalent section.
- Circumferential and Longitudinal Stress in Thin Cylinders.
- Expression for Strain Energy due to bending.
- Write Torsion Equation and give details of terminology.

7. The T-shaped cross section shown in figure 4 of beam is subjected to vertical shear force of  $100 \text{ KN}$ . Calculate shear stress at neutral axis and at the junction of web and flange.

9

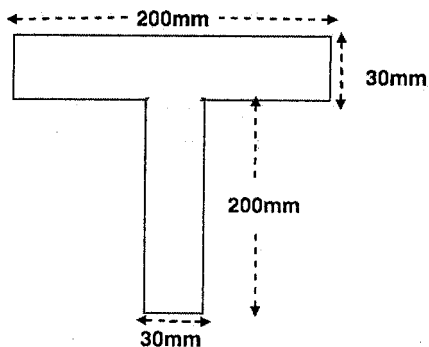


Figure 4

8. A hollow shaft is to transmit  $300 \text{ KW}$  at  $80 \text{ r.p.m.}$  If the shear stress is not to exceed  $60 \text{ N/mm}^2$  and internal diameter is  $0.6$  times external diameter, find the external and internal diameter assuming that maximum torque is  $1.4$  times the mean.

9

9. Find the moment of resistance of a flitched beam with a Timber part of  $200 \text{ mm}$  wide and  $250 \text{ mm}$  deep reinforced with two flitches each side by  $200 \text{ mm}$  by  $15 \text{ mm}$  in section. Horizontal CG of timber and steel part passes through same line. Consider allowable stress in timber is  $7 \text{ N/mm}^2$  and allowable stress in steel as  $120 \text{ N/mm}^2$ .

Take  $E_{\text{steel}} = 20E_{\text{timber}}$

9



SLR-TJ – 18

Seat No.	
----------	--

Set	S
-----	---

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017**  
**STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

**(14×1=14)**

- 1) If  $\sigma_p$  is proof stress or maximum stress to which the bar is stressed up to the elastic limit, then modulus of resilience is equal to
  - a)  $\sigma_p / 2E$
  - b)  $\sigma_p^2 / 2E$
  - c)  $\sigma_p / 4E$
  - d)  $\sigma_p^2 / 4E$
- 2) Two beams of equal cross sectional area are subjected to equal bending moment. If one beam has square cross section and other has circular section, then
  - a) Both beams will be equally strong
  - b) Circular section beam will stronger
  - c) Square section beam will stronger
  - d) The strength of beam depends on the nature of loading
- 3) A cantilever beam is loaded uniformly throughout its length. The shape of shear force diagram will be
  - a) right angle triangle
  - b) an isosceles triangle
  - c) a rectangle
  - d) none of these
- 4) Polar moment of inertia of the cross section of a shaft of diameter d is
  - a)  $\frac{\pi d^3}{32}$
  - b)  $\frac{\pi d^4}{32}$
  - c)  $\frac{\pi d^3}{64}$
  - d)  $\frac{\pi d^4}{64}$
- 5) Longitudinal stress act \_\_\_\_\_ to the longitudinal axis of the shell.
  - a) parallel
  - b) perpendicular
  - c) either of the above
  - d) none of the above

P.T.O.



- 6) In theory of bending which of the following assumption is made ?
- the material of the beam is perfectly homogeneous
  - the stress induced is proportional strain within elastic limit
  - the value of E is constant for the material
  - all the above
- 7) For the span of a beam in pure bending, following condition exists
- Zero BM
  - Zero SF
  - Varying BM
  - Varying SF
- 8) The deformation per unit length is called as
- strain
  - stress
  - shear stress
  - compressive stress
- 9) Temperature stress developed in a bar depends on
- Co-efficient of linear expansion
  - Change of temperature
  - Young's modulus
  - All of above
- 10) \_\_\_\_\_ loading induces, direct and bending stress at the section.
- Uniformly distributed
  - Eccentric
  - Both a and b
  - None of the above
- 11) The diameter of the kernal of circular section is
- $d/2$
  - $d/3$
  - $d/4$
  - $d/6$
- 12) For the same material, length and given torque a hollow shaft weighs \_\_\_\_\_ solid shaft.
- less than
  - more than
  - equal to
  - none of the above
- 13) The shafts are designed on the basis of
- strength
  - rigidity
  - either of the above
  - both (a) & (b)
- 14) The stress due to suddenly applied load is \_\_\_\_\_ times as that of gradually applied load.
- two
  - three
  - four
  - five
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017  
STRUCTURAL MECHANICS – I**

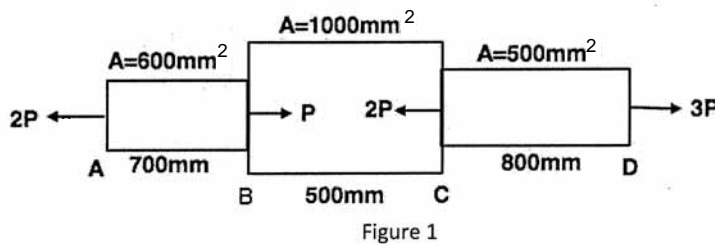
Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

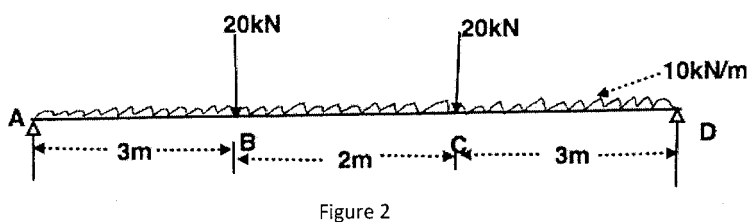
- Instructions :** 1) In Section – I solve **any three** questions, in Section – II solve **any three** questions.  
2) Assume suitable data if **necessary** and mention it clearly.  
3) Figures to the **right** indicate **full** marks.

SECTION – I

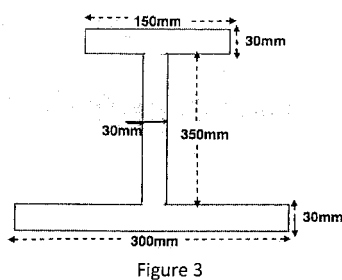
2. A member ABCD is subjected to point loads as shown in Figure 1 in the multiples of P. Determine the minimum P value required to produce total elongation of member ABCD of 1 mm. Take Modulus of Elasticity of Steel as 200 GPa. 10



3. a) Explain Point of Contra-flexure. 2  
b) Draw Shear Force and Bending Moment diagram for the Beam shown in Figure 2 below. Show all the calculations. 7



4. A simply supported beam of 10 m long is subjected to 10 kN/m UDL load. Find the maximum tensile and compressive stress and their locations for the I – Section given in the Figure 3 below. 9



Set S



5. Determine the maximum and minimum stresses at the base of a vertical brick hollow square chimney of inside dimensions of  $500 \text{ mm} \times 500 \text{ mm}$  and thickness of  $500 \text{ mm}$ . The height of chimney is  $12 \text{ m}$ . Take wind pressure perpendicular to chimney face as  $1300 \text{ N/m}^2$  and weight density of brick is  $20 \text{ kN/m}^3$ .

9

## SECTION – II

6. Answer the following questions :

10

- Define terms proof resilience and modulus of resilience.
- Explain the term equivalent section.
- Circumferential and Longitudinal Stress in Thin Cylinders.
- Expression for Strain Energy due to bending.
- Write Torsion Equation and give details of terminology.

7. The T-shaped cross section shown in figure 4 of beam is subjected to vertical shear force of  $100 \text{ KN}$ . Calculate shear stress at neutral axis and at the junction of web and flange.

9

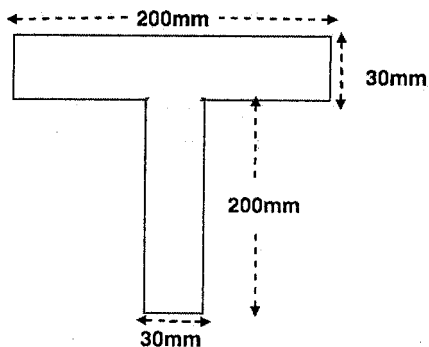


Figure 4

8. A hollow shaft is to transmit  $300 \text{ KW}$  at  $80 \text{ r.p.m.}$  If the shear stress is not to exceed  $60 \text{ N/mm}^2$  and internal diameter is  $0.6$  times external diameter, find the external and internal diameter assuming that maximum torque is  $1.4$  times the mean.

9

9. Find the moment of resistance of a flitched beam with a Timber part of  $200 \text{ mm}$  wide and  $250 \text{ mm}$  deep reinforced with two flitches each side by  $200 \text{ mm}$  by  $15 \text{ mm}$  in section. Horizontal CG of timber and steel part passes through same line. Consider allowable stress in timber is  $7 \text{ N/mm}^2$  and allowable stress in steel as  $120 \text{ N/mm}^2$ .

Take  $E_{\text{steel}} = 20E_{\text{timber}}$

9





**SLR-TJ – 19**

<b>Seat No.</b>	
-----------------	--

**Set**

<b>P</b>
----------

**S.E. (Civil) (Part – I) (CBCS) Examination, 2017  
SURVEYING – I (New)**

Day and Date : Saturday, 16-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*
- 2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw neat sketches wherever required.*
- 5) *Assume suitable data if necessary.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :
- 1) With decrease in viscosity of a liquid, the sensitivity of the bubble tube.  
a) decreases  
b) increases  
c) remains same  
d) none of the above
- 2) Which of the following type of levelling cannot be done with dumpy level ?  
a) differential      b) reciprocal      c) trigonometric      d) profile
- 3) When level tube is out of adjustment by an angle 'e' and if the telescope is rotated through 180°, it becomes  
a) 4e                  b) 3e                  c) 2e                  d) - e
- 4) The characteristic of the Gale's table is that the independent coordinates of all points are brought to the  
a) First Quadrant                  b) Second Quadrant  
c) Third Quadrant                  d) Fourth Quadrant
- 5) The face left position is also called as  
a) Telescope inverted                  b) Telescope reversed  
c) Telescope normal                  d) None of these

**P.T.O.**



- 6) The multiplying constant is denoted by  
a)  $f/i$                       b)  $f+i$                       c)  $i/f$                       d)  $ixf$
- 7) For approximate determination of elevation in reconnaissance surveying, the instrument used is  
a) Hand level              b) Dumpy level      c) Auto Level              d) All of these
- 8) The process of keeping the plane table into a fixed direction so that a line representing a direction on the plan is parallel to its direction on the ground is called  
a) Centering              b) Orientation      c) Leveling              d) Resection
- 9) The principle of Plane table surveying is  
a) Parallelism              b) Triangulation      c) Traversing              d) None of these
- 10) Pick up the correct statement  
a) The Prismoidal correction is always positive  
b) If the mass-haul diagram rises, it shows filling  
c) The vertical distance between a minimum point on the mass-haul diagram and the next maximum point is equal to the volume of the cutting  
d) The curvature correction is positive when the eccentricity is on the inside of the curve
- 11) Electronic distance measurement instrument are use  
a) X-rays                      b) Sound waves      c) Light waves              d) Magnetic flux
- 12) One hectare of an area is equivalent to  
a)  $10^2 \text{ m}^2$                       b)  $10^4 \text{ m}^2$                       c)  $10^6 \text{ m}^2$                       d)  $10^9 \text{ m}^2$
- 13) For determining the area of a figure bounded by straight lines, the figure is generally converted into a network of  
a) Squares                      b) Triangles              c) Rectangles              d) Polygon
- 14) In setting up the plane table, the operation which is done first is  
a) Leveling    b) Centering  
c) Orientation    d) Resection
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (CBCS) Examination, 2017  
SURVEYING – I (New)**

Day and Date : Saturday, 16-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section – I.  
2) Solve **any three** questions from Section – II.  
3) Figures to the **right** indicate **full** marks.  
4) Draw **neat** sketches **wherever** required.  
5) Assume **suitable** data **if necessary**.

SECTION – I

2. a) While carrying out permanent adjustments of a Dumpy Level by two peg method, following observations are made : 6

When instrument 'E' is midway between 'C' and 'D', 100 m apart;

Reading at 'C' = 2.000 m and

Reading at 'D' = 3.000 m

Instrument at 'F' in line of CD such that CF = 120 m and DF = 20 m;

Reading at 'C' = 1.500 m and

Reading at 'D' = 2.750 m

Check whether the instrument needs Permanent adjustment or not ? And whether the line of sight is inclined upward or downward ? If adjustment is needed, what should be the correct reading at 'C' ?

- b) When Reciprocal Levelling is done ? Describe the method with a neat sketch. 4



3. a) Following table gives the values of lengths and bearings of four lines of a closed traverse ABCDE. Determine the length and bearing for the remaining line EA. 5

Line	Bearing	Length(m)
AB	85° 30'	194.1
BC	15° 00'	201.2
CD	285° 30'	165.4
DE	195° 30'	172.6
EA	?	?

- b) What are the fundamental lines of a theodolite ? What is the relation between them ? 4
4. a) How using theodolite reduced level of top of a tower whose base is accessible, can be determined ? 5
- b) What are the different rules of balancing a closed traverse ? Explain their suitability. 4
5. Write short notes on : 9
- i) Abney level
  - ii) Box Sextant
  - iii) Methods of sounding.

#### SECTION – II

6. a) Enumerate type of EDM'S ? Explain any one. 5
- b) Give the uses of Total station. 4
7. a) Give advantage and disadvantage of Plane table Surveying. 5
- b) List different accessories used for plane table surveying with their uses. 4

**Set P**



8. a) The following perpendicular offsets are taken from a chain line to an irregular boundary. Calculate the area between the Chain line and irregular boundary by
- i) Trapezoidal rule and
  - ii) Simpson’s rule.

5

<b>Distance(m)</b>	0	10	20	30	40	60	80	120	160
<b>Offset(m)</b>	2.50	3.80	4.60	5.20	6.10	4.70	5.80	3.90	2.20

- b) An embankment of 8 m width and side slopes 1.5:1 is required to be made on a ground which is level in a direction transverse to the center line, The central heights at 32 m intervals are as follows. Calculate the volume of earth work according to
- I) The Trapezoidal formula
  - II) Prismoidal formula
- 0.90, 1.25, 2.15, 2.50, 1.85, 1.35, and 0.85 m.

5

9. a) Define – two point problem and three point problem.

5

- b) What is Electromagnetic waves ? Give its Spectrum diagram.

4

---





SLR-TJ – 19

Seat No.	
----------	--

Set	Q
-----	---

**S.E. (Civil) (Part – I) (CBCS) Examination, 2017  
SURVEYING – I (New)**

Day and Date : Saturday, 16-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Draw **neat** sketches **wherever** required.
  - 5) Assume **suitable** data **if necessary**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) The process of keeping the plane table into a fixed direction so that a line representing a direction on the plan is parallel to its direction on the ground is called
  - a) Centering
  - b) Orientation
  - c) Leveling
  - d) Resection
- 2) The principle of Plane table surveying is
  - a) Parallelism
  - b) Triangulation
  - c) Traversing
  - d) None of these
- 3) Pick up the correct statement
  - a) The Prismoidal correction is always positive
  - b) If the mass-haul diagram rises, it shows filling
  - c) The vertical distance between a minimum point on the mass-haul diagram and the next maximum point is equal to the volume of the cutting
  - d) The curvature correction is positive when the eccentricity is on the inside of the curve
- 4) Electronic distance measurement instrument are use
  - a) X-rays
  - b) Sound waves
  - c) Light waves
  - d) Magnetic flux
- 5) One hectare of an area is equivalent to
  - a)  $10^2 \text{ m}^2$
  - b)  $10^4 \text{ m}^2$
  - c)  $10^6 \text{ m}^2$
  - d)  $10^9 \text{ m}^2$

P.T.O.



- 6) For determining the area of a figure bounded by straight lines, the figure is generally converted into a network of
- a) Squares                      b) Triangles                      c) Rectangles                      d) Polygon
- 7) In setting up the plane table, the operation which is done first is
- a) Leveling    b) Centering  
c) Orientation    d) Resection
- 8) With decrease in viscosity of a liquid, the sensitivity of the bubble tube.
- a) decreases    b) increases  
c) remains same    d) none of the above
- 9) Which of the following type of levelling cannot be done with dumpy level ?
- a) differential                      b) reciprocal                      c) trigonometric                      d) profile
- 10) When level tube is out of adjustment by an angle 'e' and if the telescope is rotated through  $180^\circ$ , it becomes
- a)  $4e$     b)  $3e$     c)  $2e$     d)  $-e$
- 11) The characteristic of the Gale's table is that the independent coordinates of all points are brought to the
- a) First Quadrant    b) Second Quadrant  
c) Third Quadrant    d) Fourth Quadrant
- 12) The face left position is also called as
- a) Telescope inverted    b) Telescope reversed  
c) Telescope normal    d) None of these
- 13) The multiplying constant is denoted by
- a)  $f/i$     b)  $f+i$     c)  $i/f$     d)  $ixf$
- 14) For approximate determination of elevation in reconnaissance surveying, the instrument used is
- a) Hand level                      b) Dumpy level                      c) Auto Level                      d) All of these
-





Seat No.	
----------	--

**S.E. (Civil) (Part – I) (CBCS) Examination, 2017  
SURVEYING – I (New)**

Day and Date : Saturday, 16-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Solve **any three** questions from Section – I.
  - 2) Solve **any three** questions from Section – II.
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Draw **neat** sketches **wherever** required.
  - 5) Assume **suitable** data **if necessary**.

SECTION – I

2. a) While carrying out permanent adjustments of a Dumpy Level by two peg method, following observations are made :

6

When instrument 'E' is midway between 'C' and 'D', 100 m apart;

Reading at 'C' = 2.000 m and

Reading at 'D' = 3.000 m

Instrument at 'F' in line of CD such that CF = 120 m and DF = 20 m;

Reading at 'C' = 1.500 m and

Reading at 'D' = 2.750 m

Check whether the instrument needs Permanent adjustment or not ? And whether the line of sight is inclined upward or downward ? If adjustment is needed, what should be the correct reading at 'C' ?

- b) When Reciprocal Levelling is done ? Describe the method with a neat sketch. 4

Set Q



3. a) Following table gives the values of lengths and bearings of four lines of a closed traverse ABCDE. Determine the length and bearing for the remaining line EA. 5

Line	Bearing	Length(m)
AB	85° 30'	194.1
BC	15° 00'	201.2
CD	285° 30'	165.4
DE	195° 30'	172.6
EA	?	?

- b) What are the fundamental lines of a theodolite ? What is the relation between them ? 4
4. a) How using theodolite reduced level of top of a tower whose base is accessible, can be determined ? 5
- b) What are the different rules of balancing a closed traverse ? Explain their suitability. 4
5. Write short notes on : 9
- i) Abney level
  - ii) Box Sextant
  - iii) Methods of sounding.

#### SECTION – II

6. a) Enumerate type of EDM'S ? Explain any one. 5
- b) Give the uses of Total station. 4
7. a) Give advantage and disadvantage of Plane table Surveying. 5
- b) List different accessories used for plane table surveying with their uses. 4



8. a) The following perpendicular offsets are taken from a chain line to an irregular boundary. Calculate the area between the Chain line and irregular boundary by
- i) Trapezoidal rule and
  - ii) Simpson’s rule.

5

<b>Distance(m)</b>	0	10	20	30	40	60	80	120	160
<b>Offset(m)</b>	2.50	3.80	4.60	5.20	6.10	4.70	5.80	3.90	2.20

- b) An embankment of 8 m width and side slopes 1.5:1 is required to be made on a ground which is level in a direction transverse to the center line, The central heights at 32 m intervals are as follows. Calculate the volume of earth work according to
- I) The Trapezoidal formula
  - II) Prismoidal formula
- 0.90, 1.25, 2.15, 2.50, 1.85, 1.35, and 0.85 m.

5

9. a) Define – two point problem and three point problem.

5

- b) What is Electromagnetic waves ? Give its Spectrum diagram.

4

---





SLR-TJ – 19

Seat No.	
----------	--

Set	R
-----	---

**S.E. (Civil) (Part – I) (CBCS) Examination, 2017  
SURVEYING – I (New)**

Day and Date : Saturday, 16-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Draw **neat** sketches **wherever** required.
  - 5) Assume **suitable** data **if necessary**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) The face left position is also called as
  - a) Telescope inverted
  - b) Telescope reversed
  - c) Telescope normal
  - d) None of these
- 2) The multiplying constant is denoted by
  - a)  $f/i$
  - b)  $f+i$
  - c)  $i/f$
  - d)  $ixf$
- 3) For approximate determination of elevation in reconnaissance surveying, the instrument used is
  - a) Hand level
  - b) Dumpy level
  - c) Auto Level
  - d) All of these
- 4) The process of keeping the plane table into a fixed direction so that a line representing a direction on the plan is parallel to its direction on the ground is called
  - a) Centering
  - b) Orientation
  - c) Leveling
  - d) Resection
- 5) The principle of Plane table surveying is
  - a) Parallelism
  - b) Triangulation
  - c) Traversing
  - d) None of these
- 6) Pick up the correct statement
  - a) The Prismoidal correction is always positive
  - b) If the mass-haul diagram rises, it shows filling
  - c) The vertical distance between a minimum point on the mass-haul diagram and the next maximum point is equal to the volume of the cutting
  - d) The curvature correction is positive when the eccentricity is on the inside of the curve

P.T.O.



- 7) Electronic distance measurement instrument are use  
a) X-rays                      b) Sound waves   c) Light waves           d) Magnetic flux
- 8) One hectare of an area is equivalent to  
a)  $10^2 \text{ m}^2$                       b)  $10^4 \text{ m}^2$                       c)  $10^6 \text{ m}^2$                       d)  $10^9 \text{ m}^2$
- 9) For determining the area of a figure bounded by straight lines, the figure is generally converted into a network of  
a) Squares                      b) Triangles                      c) Rectangles                      d) Polygon
- 10) In setting up the plane table, the operation which is done first is  
a) Leveling    b) Centering  
c) Orientation    d) Resection
- 11) With decrease in viscosity of a liquid, the sensitivity of the bubble tube.  
a) decreases    b) increases  
c) remains same    d) none of the above
- 12) Which of the following type of levelling cannot be done with dumpy level ?  
a) differential                      b) reciprocal                      c) trigonometric                      d) profile
- 13) When level tube is out of adjustment by an angle 'e' and if the telescope is rotated through  $180^\circ$ , it becomes  
a)  $4e$     b)  $3e$     c)  $2e$     d)  $-e$
- 14) The characteristic of the Gale's table is that the independent coordinates of all points are brought to the  
a) First Quadrant    b) Second Quadrant  
c) Third Quadrant    d) Fourth Quadrant
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (CBCS) Examination, 2017  
SURVEYING – I (New)**

Day and Date : Saturday, 16-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Solve **any three** questions from Section – I.
  - 2) Solve **any three** questions from Section – II.
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Draw **neat** sketches **wherever** required.
  - 5) Assume **suitable** data **if necessary**.

SECTION – I

2. a) While carrying out permanent adjustments of a Dumpy Level by two peg method, following observations are made :

6

When instrument 'E' is midway between 'C' and 'D', 100 m apart;

Reading at 'C' = 2.000 m and

Reading at 'D' = 3.000 m

Instrument at 'F' in line of CD such that CF = 120 m and DF = 20 m;

Reading at 'C' = 1.500 m and

Reading at 'D' = 2.750 m

Check whether the instrument needs Permanent adjustment or not ? And whether the line of sight is inclined upward or downward ? If adjustment is needed, what should be the correct reading at 'C' ?

- b) When Reciprocal Levelling is done ? Describe the method with a neat sketch. 4

Set R



3. a) Following table gives the values of lengths and bearings of four lines of a closed traverse ABCDE. Determine the length and bearing for the remaining line EA. 5

Line	Bearing	Length(m)
AB	85° 30'	194.1
BC	15° 00'	201.2
CD	285° 30'	165.4
DE	195° 30'	172.6
EA	?	?

- b) What are the fundamental lines of a theodolite ? What is the relation between them ? 4
4. a) How using theodolite reduced level of top of a tower whose base is accessible, can be determined ? 5
- b) What are the different rules of balancing a closed traverse ? Explain their suitability. 4
5. Write short notes on : 9
- i) Abney level
  - ii) Box Sextant
  - iii) Methods of sounding.

#### SECTION – II

6. a) Enumerate type of EDM'S ? Explain any one. 5
- b) Give the uses of Total station. 4
7. a) Give advantage and disadvantage of Plane table Surveying. 5
- b) List different accessories used for plane table surveying with their uses. 4

**Set R**





8. a) The following perpendicular offsets are taken from a chain line to an irregular boundary. Calculate the area between the Chain line and irregular boundary by
- i) Trapezoidal rule and
  - ii) Simpson’s rule.

5

<b>Distance(m)</b>	0	10	20	30	40	60	80	120	160
<b>Offset(m)</b>	2.50	3.80	4.60	5.20	6.10	4.70	5.80	3.90	2.20

- b) An embankment of 8 m width and side slopes 1.5:1 is required to be made on a ground which is level in a direction transverse to the center line, The central heights at 32 m intervals are as follows. Calculate the volume of earth work according to
- I) The Trapezoidal formula
  - II) Prismoidal formula
- 0.90, 1.25, 2.15, 2.50, 1.85, 1.35, and 0.85 m.

5

9. a) Define – two point problem and three point problem.

5

- b) What is Electromagnetic waves ? Give its Spectrum diagram.

4

---





SLR-TJ – 19

Seat No.	
----------	--

Set	S
-----	---

**S.E. (Civil) (Part – I) (CBCS) Examination, 2017  
SURVEYING – I (New)**

Day and Date : Saturday, 16-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Draw **neat** sketches **wherever** required.
  - 5) Assume **suitable** data **if necessary**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) Pick up the correct statement
  - a) The Prismoidal correction is always positive
  - b) If the mass-haul diagram rises, it shows filling
  - c) The vertical distance between a minimum point on the mass-haul diagram and the next maximum point is equal to the volume of the cutting
  - d) The curvature correction is positive when the eccentricity is on the inside of the curve
- 2) Electronic distance measurement instrument are use
  - a) X-rays
  - b) Sound waves
  - c) Light waves
  - d) Magnetic flux
- 3) One hectare of an area is equivalent to
  - a)  $10^2 \text{ m}^2$
  - b)  $10^4 \text{ m}^2$
  - c)  $10^6 \text{ m}^2$
  - d)  $10^9 \text{ m}^2$
- 4) For determining the area of a figure bounded by straight lines, the figure is generally converted into a network of
  - a) Squares
  - b) Triangles
  - c) Rectangles
  - d) Polygon
- 5) In setting up the plane table, the operation which is done first is
  - a) Leveling
  - b) Centering
  - c) Orientation
  - d) Resection
- 6) With decrease in viscosity of a liquid, the sensitivity of the bubble tube.
  - a) decreases
  - b) increases
  - c) remains same
  - d) none of the above

P.T.O.



- 7) Which of the following type of levelling cannot be done with dumpy level ?  
a) differential      b) reciprocal      c) trigonometric      d) profile
- 8) When level tube is out of adjustment by an angle 'e' and if the telescope is rotated through  $180^\circ$ , it becomes  
a)  $4e$       b)  $3e$       c)  $2e$       d)  $-e$
- 9) The characteristic of the Gale's table is that the independent coordinates of all points are brought to the  
a) First Quadrant      b) Second Quadrant  
c) Third Quadrant      d) Fourth Quadrant
- 10) The face left position is also called as  
a) Telescope inverted      b) Telescope reversed  
c) Telescope normal      d) None of these
- 11) The multiplying constant is denoted by  
a)  $f/i$       b)  $f+i$       c)  $i/f$       d)  $ixf$
- 12) For approximate determination of elevation in reconnaissance surveying, the instrument used is  
a) Hand level      b) Dumpy level      c) Auto Level      d) All of these
- 13) The process of keeping the plane table into a fixed direction so that a line representing a direction on the plan is parallel to its direction on the ground is called  
a) Centering      b) Orientation      c) Leveling      d) Resection
- 14) The principle of Plane table surveying is  
a) Parallelism      b) Triangulation      c) Traversing      d) None of these
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (CBCS) Examination, 2017  
SURVEYING – I (New)**

Day and Date : Saturday, 16-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Solve **any three** questions from Section – I.
  - 2) Solve **any three** questions from Section – II.
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Draw **neat** sketches **wherever** required.
  - 5) Assume **suitable** data **if necessary**.

SECTION – I

2. a) While carrying out permanent adjustments of a Dumpy Level by two peg method, following observations are made :

6

When instrument 'E' is midway between 'C' and 'D', 100 m apart;

Reading at 'C' = 2.000 m and

Reading at 'D' = 3.000 m

Instrument at 'F' in line of CD such that CF = 120 m and DF = 20 m;

Reading at 'C' = 1.500 m and

Reading at 'D' = 2.750 m

Check whether the instrument needs Permanent adjustment or not ? And whether the line of sight is inclined upward or downward ? If adjustment is needed, what should be the correct reading at 'C' ?

- b) When Reciprocal Levelling is done ? Describe the method with a neat sketch. 4

Set S



3. a) Following table gives the values of lengths and bearings of four lines of a closed traverse ABCDE. Determine the length and bearing for the remaining line EA. 5

Line	Bearing	Length(m)
AB	85° 30'	194.1
BC	15° 00'	201.2
CD	285° 30'	165.4
DE	195° 30'	172.6
EA	?	?

- b) What are the fundamental lines of a theodolite ? What is the relation between them ? 4
4. a) How using theodolite reduced level of top of a tower whose base is accessible, can be determined ? 5
- b) What are the different rules of balancing a closed traverse ? Explain their suitability. 4
5. Write short notes on : 9
- i) Abney level
  - ii) Box Sextant
  - iii) Methods of sounding.

#### SECTION – II

6. a) Enumerate type of EDM'S ? Explain any one. 5
- b) Give the uses of Total station. 4
7. a) Give advantage and disadvantage of Plane table Surveying. 5
- b) List different accessories used for plane table surveying with their uses. 4

**Set S**



8. a) The following perpendicular offsets are taken from a chain line to an irregular boundary. Calculate the area between the Chain line and irregular boundary by
- i) Trapezoidal rule and
  - ii) Simpson’s rule.

5

<b>Distance(m)</b>	0	10	20	30	40	60	80	120	160
<b>Offset(m)</b>	2.50	3.80	4.60	5.20	6.10	4.70	5.80	3.90	2.20

- b) An embankment of 8 m width and side slopes 1.5:1 is required to be made on a ground which is level in a direction transverse to the center line, The central heights at 32 m intervals are as follows. Calculate the volume of earth work according to
- I) The Trapezoidal formula
  - II) Prismoidal formula
- 0.90, 1.25, 2.15, 2.50, 1.85, 1.35, and 0.85 m.

5

9. a) Define – two point problem and three point problem.

5

- b) What is Electromagnetic waves ? Give its Spectrum diagram.

4

---







SLR-TJ – 20

Seat No.	
-------------	--

Set 

P
---

**S.E. (Civil) (Part – I) (New CBCS) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017  
Time : 3.00 p.m. to 7.00 p.m.

Max. Marks : 70

**Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.

2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

3) **All the questions are compulsory.**

4) **Figures on right indicate full marks.**

5) **Draw neat diagram wherever necessary.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Write “**Correct**” or “**Incorrect**” for following sentences.

1) Less than one air change means no ventilation at all \_\_\_\_\_

2) Holdfast are fixed on door shutters \_\_\_\_\_

3) Earthing means fitting electric meter below ground \_\_\_\_\_

4) P, Q and S are types of ‘Taps’ \_\_\_\_\_

5) Thermal insulation causes discomfort in summer season \_\_\_\_\_

6) Base contains metallic oxide \_\_\_\_\_

P.T.O.



- 7) Blistering is defect in brick masonry \_\_\_\_\_
- 8) Mortar contains coarse aggregate \_\_\_\_\_
- 9) Cavity walls for houses are constructed to increase heat transfer \_\_\_\_\_
- 10) Door to a room is provided for its ventilation \_\_\_\_\_
- 11) Combined footing is used for single column \_\_\_\_\_
- 12) Thickness of stretcher bond is more than header bond \_\_\_\_\_
- 13) Skirting is provided in window sill \_\_\_\_\_
- 14) Stretcher bond is the one in which all the bricks are laid as header on the faces of walls \_\_\_\_\_

\_\_\_\_\_



Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (New CBCS) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any seven** questions. **28**
- a) Explain single stack system with neat sketch.
  - b) Write detailed requirement of good building stone.
  - c) Explain intercepting Trap with sketch. Also give importance of water seal.
  - d) Explain any two types of pointing with sketch.
  - e) Write note on “Ventilation of building” with neat sketch.
  - f) What is the need for rain water harvesting ? And write in detail about rain water harvesting.
  - g) Enlist different types of arches. Draw neat sketch of any one type.
  - h) Distinguish between load bearing and framed structure.
  - i) What are factors that affect choice of flooring material ?
  - j) Write a detailed note on fixtures and fastenings used in doors and windows.

SECTION – II

3. Attempt **all**. **28**
- A) Design and draw to scale 1 : 30, plan and vertical section for doglegged folded R.C.C. staircase for a bungalow.
- a) Height to be climbed = 3000 mm
  - b) Width of flight = 1000 mm
  - c) R.C.C. parapet railing – 8 mm thick.
- Reinforcement details are not to be shown  
(Write step by step calculation on sheet with pencil only)

OR

Set P



Design and draw to scale 1 : 30, plan and vertical section for open well R.C.C. Staircase for public building.

- a) Vertical height to be covered = 3600 mm
- b) Width of flight = 1500 mm
- c) R.C.C. pardi for railing = 100 mm thick.

Reinforcement details are not to be shown

(Write step by step calculation on sheet with pencil only)

B) Draw plan of alternate layers and elevation of

- 1) One brick and
- 2) One and half brick thick wall in English B.B. Masonry to the scale of 1 : 10  
Assume standard brick size and mortar joint thickness as  
10 cm × 10 cm × 20 cm.

OR

Draw to a scale of 1 : 10, sectional plan, elevation and sectional elevation of a double leaf framed and panelled door for following data.

(All dimensions are in mm)

- a) Clear opening = 1000 × 2100
- b) Cross section of frame = 100 × 75
- c) Vertical styles = 100 × 40
- d) Top rail = 100 × 40
- e) Lock rail = 150 × 40
- f) Bottom rail = 200 × 40
- g) Frieze rail = 100 × 40

Panels = 6 numbers (25 mm thick)

---



SLR-TJ – 20

Seat No.	
-------------	--

Set 

Q
---

**S.E. (Civil) (Part – I) (New CBCS) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017  
Time : 3.00 p.m. to 7.00 p.m.

Max. Marks : 70

**Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.

2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

3) **All the questions are compulsory.**

4) **Figures on right indicate full marks.**

5) **Draw neat diagram wherever necessary.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Write “**Correct**” or “**Incorrect**” for following sentences.

- 1) Mortar contains coarse aggregate \_\_\_\_\_
- 2) Cavity walls for houses are constructed to increase heat transfer \_\_\_\_\_
- 3) Door to a room is provided for its ventilation \_\_\_\_\_
- 4) Combined footing is used for single column \_\_\_\_\_
- 5) Thickness of stretcher bond is more than header bond \_\_\_\_\_
- 6) Skirting is provided in window sill \_\_\_\_\_
- 7) Stretcher bond is the one in which all the bricks are laid as header on the faces of walls \_\_\_\_\_

P.T.O.



- 8) Less than one air change means no ventilation at all \_\_\_\_\_
- 9) Holdfast are fixed on door shutters \_\_\_\_\_
- 10) Earthing means fitting electric meter below ground \_\_\_\_\_
- 11) P, Q and S are types of 'Taps' \_\_\_\_\_
- 12) Thermal insulation causes discomfort in summer season \_\_\_\_\_
- 13) Base contains metallic oxide \_\_\_\_\_
- 14) Blistering is defect in brick masonry \_\_\_\_\_

\_\_\_\_\_



Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (New CBCS) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any seven** questions. **28**
- a) Explain single stack system with neat sketch.
  - b) Write detailed requirement of good building stone.
  - c) Explain intercepting Trap with sketch. Also give importance of water seal.
  - d) Explain any two types of pointing with sketch.
  - e) Write note on “Ventilation of building” with neat sketch.
  - f) What is the need for rain water harvesting ? And write in detail about rain water harvesting.
  - g) Enlist different types of arches. Draw neat sketch of any one type.
  - h) Distinguish between load bearing and framed structure.
  - i) What are factors that affect choice of flooring material ?
  - j) Write a detailed note on fixtures and fastenings used in doors and windows.

SECTION – II

3. Attempt **all**. **28**
- A) Design and draw to scale 1 : 30, plan and vertical section for doglegged folded R.C.C. staircase for a bungalow.
- a) Height to be climbed = 3000 mm
  - b) Width of flight = 1000 mm
  - c) R.C.C. parapet railing – 8 mm thick.
- Reinforcement details are not to be shown  
(Write step by step calculation on sheet with pencil only)

OR

**Set Q**



Design and draw to scale 1 : 30, plan and vertical section for open well R.C.C. Staircase for public building.

- a) Vertical height to be covered = 3600 mm
- b) Width of flight = 1500 mm
- c) R.C.C. pardi for railing = 100 mm thick.

Reinforcement details are not to be shown

(Write step by step calculation on sheet with pencil only)

- B) Draw plan of alternate layers and elevation of
- 1) One brick and
  - 2) One and half brick thick wall in English B.B. Masonry to the scale of 1 : 10  
Assume standard brick size and mortar joint thickness as  
10 cm × 10 cm × 20 cm.

OR

Draw to a scale of 1 : 10, sectional plan, elevation and sectional elevation of a double leaf framed and panelled door for following data.

(All dimensions are in mm)

- a) Clear opening = 1000 × 2100
- b) Cross section of frame = 100 × 75
- c) Vertical styles = 100 × 40
- d) Top rail = 100 × 40
- e) Lock rail = 150 × 40
- f) Bottom rail = 200 × 40
- g) Frieze rail = 100 × 40

Panels = 6 numbers (25 mm thick)

---





SLR-TJ – 20

Seat No.	
-------------	--

Set 

R
---

**S.E. (Civil) (Part – I) (New CBCS) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017  
Time : 3.00 p.m. to 7.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
- 3) **All the questions are compulsory.**
- 4) **Figures on right indicate full marks.**
- 5) **Draw neat diagram wherever necessary.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Write “**Correct**” or “**Incorrect**” for following sentences.

- 1) Thermal insulation causes discomfort in summer season \_\_\_\_\_
- 2) Base contains metallic oxide \_\_\_\_\_
- 3) Blistering is defect in brick masonry \_\_\_\_\_
- 4) Mortar contains coarse aggregate \_\_\_\_\_
- 5) Cavity walls for houses are constructed to increase heat transfer \_\_\_\_\_
- 6) Door to a room is provided for its ventilation \_\_\_\_\_

P.T.O.



- 7) Combined footing is used for single column \_\_\_\_\_
- 8) Thickness of stretcher bond is more than header bond \_\_\_\_\_
- 9) Skirting is provided in window sill \_\_\_\_\_
- 10) Stretcher bond is the one in which all the bricks are laid as header on the faces of walls \_\_\_\_\_
- 11) Less than one air change means no ventilation at all \_\_\_\_\_
- 12) Holdfast are fixed on door shutters \_\_\_\_\_
- 13) Earthing means fitting electric meter below ground \_\_\_\_\_
- 14) P, Q and S are types of 'Taps' \_\_\_\_\_  
\_\_\_\_\_



Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (New CBCS) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any seven** questions. **28**
- a) Explain single stack system with neat sketch.
  - b) Write detailed requirement of good building stone.
  - c) Explain intercepting Trap with sketch. Also give importance of water seal.
  - d) Explain any two types of pointing with sketch.
  - e) Write note on “Ventilation of building” with neat sketch.
  - f) What is the need for rain water harvesting ? And write in detail about rain water harvesting.
  - g) Enlist different types of arches. Draw neat sketch of any one type.
  - h) Distinguish between load bearing and framed structure.
  - i) What are factors that affect choice of flooring material ?
  - j) Write a detailed note on fixtures and fastenings used in doors and windows.

SECTION – II

3. Attempt **all**. **28**
- A) Design and draw to scale 1 : 30, plan and vertical section for doglegged folded R.C.C. staircase for a bungalow.
- a) Height to be climbed = 3000 mm
  - b) Width of flight = 1000 mm
  - c) R.C.C. parapet railing – 8 mm thick.
- Reinforcement details are not to be shown  
(Write step by step calculation on sheet with pencil only)

OR

Set R



Design and draw to scale 1 : 30, plan and vertical section for open well R.C.C. Staircase for public building.

- a) Vertical height to be covered = 3600 mm
- b) Width of flight = 1500 mm
- c) R.C.C. pardi for railing = 100 mm thick.

Reinforcement details are not to be shown

(Write step by step calculation on sheet with pencil only)

B) Draw plan of alternate layers and elevation of

- 1) One brick and
- 2) One and half brick thick wall in English B.B. Masonry to the scale of 1 : 10  
Assume standard brick size and mortar joint thickness as  
10 cm × 10 cm × 20 cm.

OR

Draw to a scale of 1 : 10, sectional plan, elevation and sectional elevation of a double leaf framed and panelled door for following data.

(All dimensions are in mm)

- a) Clear opening = 1000 × 2100
- b) Cross section of frame = 100 × 75
- c) Vertical styles = 100 × 40
- d) Top rail = 100 × 40
- e) Lock rail = 150 × 40
- f) Bottom rail = 200 × 40
- g) Frieze rail = 100 × 40

Panels = 6 numbers (25 mm thick)

---



SLR-TJ – 20

Seat No.	
-------------	--

Set 

S
---

**S.E. (Civil) (Part – I) (New CBCS) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017  
Time : 3.00 p.m. to 7.00 p.m.

Max. Marks : 70

**Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.

2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

3) **All the questions are compulsory.**

4) **Figures on right indicate full marks.**

5) **Draw neat diagram wherever necessary.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Write “**Correct**” or “**Incorrect**” for following sentences.

1) Door to a room is provided for its ventilation \_\_\_\_\_

2) Combined footing is used for single column \_\_\_\_\_

3) Thickness of stretcher bond is more than header bond \_\_\_\_\_

4) Skirting is provided in window sill \_\_\_\_\_

5) Stretcher bond is the one in which all the bricks are laid as header on the faces of walls \_\_\_\_\_

6) Less than one air change means no ventilation at all \_\_\_\_\_

P.T.O.



- 7) Holdfast are fixed on door shutters \_\_\_\_\_
- 8) Earthing means fitting electric meter below ground \_\_\_\_\_
- 9) P, Q and S are types of 'Taps' \_\_\_\_\_
- 10) Thermal insulation causes discomfort in summer season \_\_\_\_\_
- 11) Base contains metallic oxide \_\_\_\_\_
- 12) Blistering is defect in brick masonry \_\_\_\_\_
- 13) Mortar contains coarse aggregate \_\_\_\_\_
- 14) Cavity walls for houses are constructed to increase heat transfer \_\_\_\_\_

\_\_\_\_\_



Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (New CBCS) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

SECTION – I

2. Attempt **any seven** questions. **28**
- a) Explain single stack system with neat sketch.
  - b) Write detailed requirement of good building stone.
  - c) Explain intercepting Trap with sketch. Also give importance of water seal.
  - d) Explain any two types of pointing with sketch.
  - e) Write note on “Ventilation of building” with neat sketch.
  - f) What is the need for rain water harvesting ? And write in detail about rain water harvesting.
  - g) Enlist different types of arches. Draw neat sketch of any one type.
  - h) Distinguish between load bearing and framed structure.
  - i) What are factors that affect choice of flooring material ?
  - j) Write a detailed note on fixtures and fastenings used in doors and windows.

SECTION – II

3. Attempt **all**. **28**
- A) Design and draw to scale 1 : 30, plan and vertical section for doglegged folded R.C.C. staircase for a bungalow.
- a) Height to be climbed = 3000 mm
  - b) Width of flight = 1000 mm
  - c) R.C.C. parapet railing – 8 mm thick.
- Reinforcement details are not to be shown  
(Write step by step calculation on sheet with pencil only)

OR

**Set S**



Design and draw to scale 1 : 30, plan and vertical section for open well R.C.C. Staircase for public building.

- a) Vertical height to be covered = 3600 mm
- b) Width of flight = 1500 mm
- c) R.C.C. pardi for railing = 100 mm thick.

Reinforcement details are not to be shown

(Write step by step calculation on sheet with pencil only)

- B) Draw plan of alternate layers and elevation of
- 1) One brick and
  - 2) One and half brick thick wall in English B.B. Masonry to the scale of 1 : 10  
Assume standard brick size and mortar joint thickness as  
10 cm × 10 cm × 20 cm.

OR

Draw to a scale of 1 : 10, sectional plan, elevation and sectional elevation of a double leaf framed and panelled door for following data.

(All dimensions are in mm)

- a) Clear opening = 1000 × 2100
- b) Cross section of frame = 100 × 75
- c) Vertical styles = 100 × 40
- d) Top rail = 100 × 40
- e) Lock rail = 150 × 40
- f) Bottom rail = 200 × 40
- g) Frieze rail = 100 × 40

Panels = 6 numbers (25 mm thick)

---





SLR-TJ – 21

Seat No.	
----------	--

Set	P
-----	---

**S.E. (Civil) (Part – I) (New) (CBCS) Examination, 2017  
FLUID MECHANICS – I**

Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

**Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. 3. **Each** question carries **one** mark.

2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

3) **Assume suitable data if necessary and state it clearly.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternative :

14

- 1) Specific gravity of water is taken as  
a) 0.001                      b) 0.01                      c) 0.1                      d) 1.0
- 2) What is the weight of 8 m<sup>3</sup> of water in KN ?  
a) 1.22                      b) 12.2                      c) 70                      d) 78.5
- 3) Newton's law of viscosity is a relation between  
a) Pressure, velocity, temperature      b) Shear stress and rate of shear strain  
c) Shear stress and velocity              d) Rate of shear strain and temperature
- 4) Bulk modulus of fluid \_\_\_\_\_ as pressure increases.  
a) Remains same      b) Decreases      c) Increases      d) Can't say
- 5) A flow in which each liquid particle has definite path and the paths of individual particles do not cross each other, is called \_\_\_\_\_  
a) Steady flow      b) Uniform flow      c) Streamline flow      d) Turbulent flow
- 6) When body is placed over a liquid, it will float if \_\_\_\_\_  
a) Gravitational force is equal to the upthrust of the liquid  
b) Gravitational force is less than the upthrust of the liquid  
c) Gravitational force is more than the upthrust of the liquid  
d) None of the above

P.T.O.



- 7) When a body floating in a liquid, is given a small angular displacement, is start oscillating about a point is known as \_\_\_\_\_
- a) Centre of pressure                      b) Centre of gravity  
c) Centre of buoyancy                      d) Metacentre
- 8) The head loss in turbulent flow in pipe flow
- a) Varies inversely as the velocity  
b) Varies inversely as square of velocity  
c) Varies inversely as square of diameter  
d) Varies approximately as square of velocity
- 9) In network of pipes
- a) The head loss around each elementary circuit must be zero  
b) The head loss in all circuit is same  
c) Elementary circuits are replaced by equivalent pipes  
d) None of the above
- 10) Turbulent boundary layer thickness is proportional to
- a)  $\frac{1}{x^{1/5}}$                       b)  $x^{1/5}$                       c)  $x^{2/5}$                       d)  $x^{4/5}$
- 11) In turbulent flow, the friction factor 'f' for rough pipe depends upon
- a) The relative roughness only  
b) The Reynold's number only  
c) The size of pipe and discharge only  
d) The Reynold's number relative roughness only
- 12) The Pitot-static tube measures
- a) Dynamic pressure  
b) Static pressure  
c) Difference between dynamic and static pressure  
d) Total pressure
- 13) A mouthpiece is
- a) Circular hole provided in tank  
b) Rectangular hole provided in tank  
c) A short tube fitted to circular orifice  
d) Both a) and b)
- 14) In Euler's equation of motion following forces are considered
- a) Pressure                      b) Fluid weight                      c) Both a) and b)                      d) Viscous
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (New) (CBCS) Examination, 2017  
FLUID MECHANICS – I**

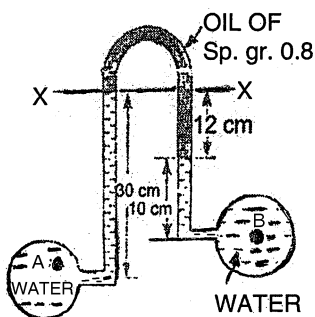
Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) Attempt **all** questions from Section I. Q. 5 from Section II is **compulsory**. Solve **any two** questions from Q. 6, 7 and 8.  
2) **Assume** suitable data if necessary and state it **clearly**.

SECTION – I

- 2. a) A certain liquid is having specific gravity 0.72. Calculate its mass density, weight density and weight per lit. of liquid. 4
- b) If surface tension of water and mercury at 20°C is 0.073575 N/m and 0.51 N/m respectively. Calculate capillary effect in millimeters (mm) for glass tube of 4 mm diameter is immersed in water and mercury. (mass density of water is 998 kg/m<sup>3</sup> and mercury 13600 kg/m<sup>3</sup>). Assume ( $\theta$  for water is 0 degree and for mercury 130 degree). 4
- 3. Attempt **any two** : 10
  - a) How will you compute the horizontal and vertical components of total force acting on curve surface which is in the form of quadrant of circle ?
  - b) A rectangular plate of 2 m wide and 3m deep is placed vertically in water such that its top edge is 2.5 m below the free water surface. Find the total pressure and centre of pressure.
  - c) The pressure head in pipe A is 2 m of water, read the manometer and find the pressure in pipe B.





4. Attempt **any two** : **10**
- a) The velocity potential function  $\phi = 5(x^2 - y^2)$ . Calculate velocity components at the point (4, 5).
  - b) Explain velocity potential and stream function with their properties.
  - c) Define :
    - i) Steady flow
    - ii) Non uniform flow
    - iii) Two dimensional flow
    - iv) Turbulent flow.

### SECTION – II

5. a) With neat sketch, explain concept of H.G.L. and T.E.L. **3**
- b) What are the major and minor losses in pipe network ? Enlist with formulaes. **4**
- c) Explain characteristics of laminar and turbulent boundary layer. **3**
6. a) With neat sketch, derive an expression for discharge through venturimeter. **3**
- b) A pipe 300 m long has a slope of 1 in 100 and tapers from 1.2 m diameter at the high end to 0.6 m diameter at the low end. Quantity of water flowing is 5400 litres per minute. If the pressure at the high end is 68.67 k Pa. Find the pressure at the low end. Neglect losses. **6**
7. a) What is meant by water hammer ? How to avoid it ? **3**
- b) Obtain the condition for maximum efficiency in transmission of power through a pipeline. **6**
8. a) Explain Prandtl's mixing length theory. **3**
- b) What is meant by boundary layer separation ? What are the methods to control it ? Explain them with neat sketches. **6**



SLR-TJ – 21

Seat No.	
----------	--

Set	Q
-----	---

**S.E. (Civil) (Part – I) (New) (CBCS) Examination, 2017  
FLUID MECHANICS – I**

Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

**Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. 3. **Each** question carries **one** mark.

2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

3) **Assume suitable data if necessary and state it clearly.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternative :

14

- 1) The head loss in turbulent flow in pipe flow
  - a) Varies inversely as the velocity
  - b) Varies inversely as square of velocity
  - c) Varies inversely as square of diameter
  - d) Varies approximately as square of velocity
- 2) In network of pipes
  - a) The head loss around each elementary circuit must be zero
  - b) The head loss in all circuit is same
  - c) Elementary circuits are replaced by equivalent pipes
  - d) None of the above
- 3) Turbulent boundary layer thickness is proportional to
  - a)  $\frac{1}{x^{1/5}}$
  - b)  $x^{1/5}$
  - c)  $x^{2/5}$
  - d)  $x^{4/5}$
- 4) In turbulent flow, the friction factor 'f' for rough pipe depends upon
  - a) The relative roughness only
  - b) The Reynold's number only
  - c) The size of pipe and discharge only
  - d) The Reynold's number relative roughness only

P.T.O.



- 5) The Pitot-static tube measures
- Dynamic pressure
  - Static pressure
  - Difference between dynamic and static pressure
  - Total pressure
- 6) A mouthpiece is
- Circular hole provided in tank
  - Rectangular hole provided in tank
  - A short tube fitted to circular orifice
  - Both a) and b)
- 7) In Euler's equation of motion following forces are considered
- Pressure
  - Fluid weight
  - Both a) and b)
  - Viscous
- 8) Specific gravity of water is taken as
- 0.001
  - 0.01
  - 0.1
  - 1.0
- 9) What is the weight of  $8 \text{ m}^3$  of water in KN ?
- 1.22
  - 12.2
  - 70
  - 78.5
- 10) Newton's law of viscosity is a relation between
- Pressure, velocity, temperature
  - Shear stress and rate of shear strain
  - Shear stress and velocity
  - Rate of shear strain and temperature
- 11) Bulk modulus of fluid \_\_\_\_\_ as pressure increases.
- Remains same
  - Decreases
  - Increases
  - Can't say
- 12) A flow in which each liquid particle has definite path and the paths of individual particles do not cross each other, is called \_\_\_\_\_
- Steady flow
  - Uniform flow
  - Streamline flow
  - Turbulent flow
- 13) When body is placed over a liquid, it will float if \_\_\_\_\_
- Gravitational force is equal to the upthrust of the liquid
  - Gravitational force is less than the upthrust of the liquid
  - Gravitational force is more than the upthrust of the liquid
  - None of the above
- 14) When a body floating in a liquid, is given a small angular displacement, is start oscillating about a point is known as \_\_\_\_\_
- Centre of pressure
  - Centre of gravity
  - Centre of buoyancy
  - Metacentre
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (New) (CBCS) Examination, 2017  
FLUID MECHANICS – I**

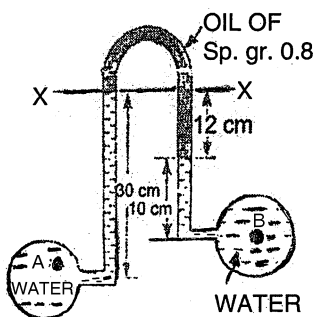
Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) Attempt **all** questions from Section I. Q. 5 from Section II is **compulsory**. Solve **any two** questions from Q. 6, 7 and 8.  
2) **Assume** suitable data if necessary and state it **clearly**.

SECTION – I

- 2. a) A certain liquid is having specific gravity 0.72. Calculate its mass density, weight density and weight per lit. of liquid. 4
- b) If surface tension of water and mercury at 20°C is 0.073575 N/m and 0.51 N/m respectively. Calculate capillary effect in millimeters (mm) for glass tube of 4 mm diameter is immersed in water and mercury. (mass density of water is 998 kg/m<sup>3</sup> and mercury 13600 kg/m<sup>3</sup>). Assume ( $\theta$  for water is 0 degree and for mercury 130 degree). 4
- 3. Attempt **any two** : 10
  - a) How will you compute the horizontal and vertical components of total force acting on curve surface which is in the form of quadrant of circle ?
  - b) A rectangular plate of 2 m wide and 3m deep is placed vertically in water such that its top edge is 2.5 m below the free water surface. Find the total pressure and centre of pressure.
  - c) The pressure head in pipe A is 2 m of water, read the manometer and find the pressure in pipe B.





4. Attempt **any two** : **10**
- a) The velocity potential function  $\phi = 5(x^2 - y^2)$ . Calculate velocity components at the point (4, 5).
  - b) Explain velocity potential and stream function with their properties.
  - c) Define :
    - i) Steady flow
    - ii) Non uniform flow
    - iii) Two dimensional flow
    - iv) Turbulent flow.

### SECTION – II

5. a) With neat sketch, explain concept of H.G.L. and T.E.L. **3**
- b) What are the major and minor losses in pipe network ? Enlist with formulaes. **4**
- c) Explain characteristics of laminar and turbulent boundary layer. **3**
6. a) With neat sketch, derive an expression for discharge through venturimeter. **3**
- b) A pipe 300 m long has a slope of 1 in 100 and tapers from 1.2 m diameter at the high end to 0.6 m diameter at the low end. Quantity of water flowing is 5400 litres per minute. If the pressure at the high end is 68.67 k Pa. Find the pressure at the low end. Neglect losses. **6**
7. a) What is meant by water hammer ? How to avoid it ? **3**
- b) Obtain the condition for maximum efficiency in transmission of power through a pipeline. **6**
8. a) Explain Prandtl's mixing length theory. **3**
- b) What is meant by boundary layer separation ? What are the methods to control it ? Explain them with neat sketches. **6**
-





SLR-TJ – 21

Seat No.	
----------	--

Set	R
-----	---

**S.E. (Civil) (Part – I) (New) (CBCS) Examination, 2017  
FLUID MECHANICS – I**

Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

**Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. 3. **Each** question carries **one** mark.

2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

3) **Assume suitable data if necessary and state it clearly.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternative :

14

- 1) A flow in which each liquid particle has definite path and the paths of individual particles do not cross each other, is called \_\_\_\_\_  
a) Steady flow      b) Uniform flow      c) Streamline flow      d) Turbulent flow
- 2) When body is placed over a liquid, it will float if \_\_\_\_\_  
a) Gravitational force is equal to the upthrust of the liquid  
b) Gravitational force is less than the upthrust of the liquid  
c) Gravitational force is more than the upthrust of the liquid  
d) None of the above
- 3) When a body floating in a liquid, is given a small angular displacement, is start oscillating about a point is known as \_\_\_\_\_  
a) Centre of pressure      b) Centre of gravity  
c) Centre of buoyancy      d) Metacentre
- 4) The head loss in turbulent flow in pipe flow  
a) Varies inversely as the velocity  
b) Varies inversely as square of velocity  
c) Varies inversely as square of diameter  
d) Varies approximately as square of velocity

P.T.O.



- 5) In network of pipes
- The head loss around each elementary circuit must be zero
  - The head loss in all circuit is same
  - Elementary circuits are replaced by equivalent pipes
  - None of the above
- 6) Turbulent boundary layer thickness is proportional to
- $\frac{1}{X^{1/5}}$
  - $X^{1/5}$
  - $X^{2/5}$
  - $X^{4/5}$
- 7) In turbulent flow, the friction factor 'f' for rough pipe depends upon
- The relative roughness only
  - The Reynold's number only
  - The size of pipe and discharge only
  - The Reynold's number relative roughness only
- 8) The Pitot-static tube measures
- Dynamic pressure
  - Static pressure
  - Difference between dynamic and static pressure
  - Total pressure
- 9) A mouthpiece is
- Circular hole provided in tank
  - Rectangular hole provided in tank
  - A short tube fitted to circular orifice
  - Both a) and b)
- 10) In Euler's equation of motion following forces are considered
- Pressure
  - Fluid weight
  - Both a) and b)
  - Viscous
- 11) Specific gravity of water is taken as
- 0.001
  - 0.01
  - 0.1
  - 1.0
- 12) What is the weight of 8 m<sup>3</sup> of water in KN ?
- 1.22
  - 12.2
  - 70
  - 78.5
- 13) Newton's law of viscosity is a relation between
- Pressure, velocity, temperature
  - Shear stress and rate of shear strain
  - Shear stress and velocity
  - Rate of shear strain and temperature
- 14) Bulk modulus of fluid \_\_\_\_\_ as pressure increases.
- Remains same
  - Decreases
  - Increases
  - Can't say
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (New) (CBCS) Examination, 2017  
FLUID MECHANICS – I**

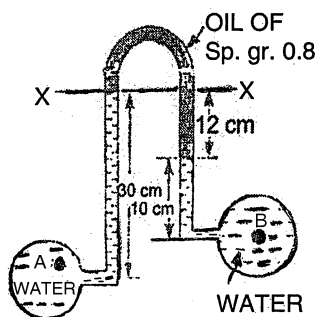
Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) Attempt **all** questions from Section I. Q. 5 from Section II is **compulsory**. Solve **any two** questions from Q. 6, 7 and 8.  
2) **Assume** suitable data if necessary and state it **clearly**.

SECTION – I

- 2. a) A certain liquid is having specific gravity 0.72. Calculate its mass density, weight density and weight per lit. of liquid. 4
- b) If surface tension of water and mercury at 20°C is 0.073575 N/m and 0.51 N/m respectively. Calculate capillary effect in millimeters (mm) for glass tube of 4 mm diameter is immersed in water and mercury. (mass density of water is 998 kg/m<sup>3</sup> and mercury 13600 kg/m<sup>3</sup>). Assume ( $\theta$  for water is 0 degree and for mercury 130 degree). 4
- 3. Attempt **any two** : 10
  - a) How will you compute the horizontal and vertical components of total force acting on curve surface which is in the form of quadrant of circle ?
  - b) A rectangular plate of 2 m wide and 3m deep is placed vertically in water such that its top edge is 2.5 m below the free water surface. Find the total pressure and centre of pressure.
  - c) The pressure head in pipe A is 2 m of water, read the manometer and find the pressure in pipe B.





4. Attempt **any two** : **10**
- a) The velocity potential function  $\phi = 5(x^2 - y^2)$ . Calculate velocity components at the point (4, 5).
- b) Explain velocity potential and stream function with their properties.
- c) Define :
- i) Steady flow
  - ii) Non uniform flow
  - iii) Two dimensional flow
  - iv) Turbulent flow.

### SECTION – II

5. a) With neat sketch, explain concept of H.G.L. and T.E.L. **3**
- b) What are the major and minor losses in pipe network ? Enlist with formulaes. **4**
- c) Explain characteristics of laminar and turbulent boundary layer. **3**
6. a) With neat sketch, derive an expression for discharge through venturimeter. **3**
- b) A pipe 300 m long has a slope of 1 in 100 and tapers from 1.2 m diameter at the high end to 0.6 m diameter at the low end. Quantity of water flowing is 5400 litres per minute. If the pressure at the high end is 68.67 k Pa. Find the pressure at the low end. Neglect losses. **6**
7. a) What is meant by water hammer ? How to avoid it ? **3**
- b) Obtain the condition for maximum efficiency in transmission of power through a pipeline. **6**
8. a) Explain Prandtl's mixing length theory. **3**
- b) What is meant by boundary layer separation ? What are the methods to control it ? Explain them with neat sketches. **6**



SLR-TJ – 21

Seat No.	
----------	--

Set	<b>S</b>
-----	----------

**S.E. (Civil) (Part – I) (New) (CBCS) Examination, 2017  
FLUID MECHANICS – I**

Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

**Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. 3. **Each** question carries **one** mark.

2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

3) **Assume suitable data if necessary and state it clearly.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternative :

**14**

1) Turbulent boundary layer thickness is proportional to

- a)  $\frac{1}{x^{1/5}}$       b)  $x^{1/5}$       c)  $x^{2/5}$       d)  $x^{4/5}$

2) In turbulent flow, the friction factor 'f' for rough pipe depends upon

- a) The relative roughness only  
b) The Reynold's number only  
c) The size of pipe and discharge only  
d) The Reynold's number relative roughness only

3) The Pitot-static tube measures

- a) Dynamic pressure  
b) Static pressure  
c) Difference between dynamic and static pressure  
d) Total pressure

4) A mouthpiece is

- a) Circular hole provided in tank  
b) Rectangular hole provided in tank  
c) A short tube fitted to circular orifice  
d) Both a) and b)

P.T.O.



- 5) In Euler's equation of motion following forces are considered  
a) Pressure                      b) Fluid weight      c) Both a) and b)      d) Viscous
- 6) Specific gravity of water is taken as  
a) 0.001                      b) 0.01                      c) 0.1                      d) 1.0
- 7) What is the weight of 8 m<sup>3</sup> of water in KN ?  
a) 1.22                      b) 12.2                      c) 70                      d) 78.5
- 8) Newton's law of viscosity is a relation between  
a) Pressure, velocity, temperature      b) Shear stress and rate of shear strain  
c) Shear stress and velocity                      d) Rate of shear strain and temperature
- 9) Bulk modulus of fluid \_\_\_\_\_ as pressure increases.  
a) Remains same      b) Decreases      c) Increases      d) Can't say
- 10) A flow in which each liquid particle has definite path and the paths of individual particles do not cross each other, is called \_\_\_\_\_  
a) Steady flow      b) Uniform flow      c) Streamline flow      d) Turbulent flow
- 11) When body is placed over a liquid, it will float if \_\_\_\_\_  
a) Gravitational force is equal to the upthrust of the liquid  
b) Gravitational force is less than the upthrust of the liquid  
c) Gravitational force is more than the upthrust of the liquid  
d) None of the above
- 12) When a body floating in a liquid, is given a small angular displacement, is start oscillating about a point is known as \_\_\_\_\_  
a) Centre of pressure                      b) Centre of gravity  
c) Centre of buoyancy                      d) Metacentre
- 13) The head loss in turbulent flow in pipe flow  
a) Varies inversely as the velocity  
b) Varies inversely as square of velocity  
c) Varies inversely as square of diameter  
d) Varies approximately as square of velocity
- 14) In network of pipes  
a) The head loss around each elementary circuit must be zero  
b) The head loss in all circuit is same  
c) Elementary circuits are replaced by equivalent pipes  
d) None of the above
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (New) (CBCS) Examination, 2017  
FLUID MECHANICS – I**

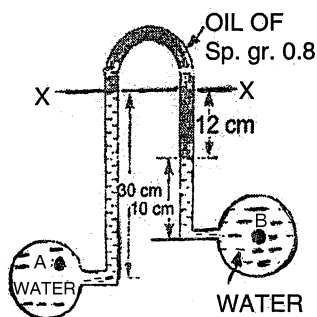
Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) Attempt **all** questions from Section I. Q. 5 from Section II is **compulsory**. Solve **any two** questions from Q. 6, 7 and 8.  
2) **Assume** suitable data if necessary and state it **clearly**.

SECTION – I

- 2. a) A certain liquid is having specific gravity 0.72. Calculate its mass density, weight density and weight per lit. of liquid. 4
- b) If surface tension of water and mercury at 20°C is 0.073575 N/m and 0.51 N/m respectively. Calculate capillary effect in millimeters (mm) for glass tube of 4 mm diameter is immersed in water and mercury. (mass density of water is 998 kg/m<sup>3</sup> and mercury 13600 kg/m<sup>3</sup>). Assume ( $\theta$  for water is 0 degree and for mercury 130 degree). 4
- 3. Attempt **any two** : 10
  - a) How will you compute the horizontal and vertical components of total force acting on curve surface which is in the form of quadrant of circle ?
  - b) A rectangular plate of 2 m wide and 3m deep is placed vertically in water such that its top edge is 2.5 m below the free water surface. Find the total pressure and centre of pressure.
  - c) The pressure head in pipe A is 2 m of water, read the manometer and find the pressure in pipe B.





4. Attempt **any two** : **10**
- a) The velocity potential function  $\phi = 5(x^2 - y^2)$ . Calculate velocity components at the point (4, 5).
  - b) Explain velocity potential and stream function with their properties.
  - c) Define :
    - i) Steady flow
    - ii) Non uniform flow
    - iii) Two dimensional flow
    - iv) Turbulent flow.

### SECTION – II

5. a) With neat sketch, explain concept of H.G.L. and T.E.L. **3**
- b) What are the major and minor losses in pipe network ? Enlist with formulaes. **4**
- c) Explain characteristics of laminar and turbulent boundary layer. **3**
6. a) With neat sketch, derive an expression for discharge through venturimeter. **3**
- b) A pipe 300 m long has a slope of 1 in 100 and tapers from 1.2 m diameter at the high end to 0.6 m diameter at the low end. Quantity of water flowing is 5400 litres per minute. If the pressure at the high end is 68.67 k Pa. Find the pressure at the low end. Neglect losses. **6**
7. a) What is meant by water hammer ? How to avoid it ? **3**
- b) Obtain the condition for maximum efficiency in transmission of power through a pipeline. **6**
8. a) Explain Prandtl's mixing length theory. **3**
- b) What is meant by boundary layer separation ? What are the methods to control it ? Explain them with neat sketches. **6**





SLR-TJ – 22

Seat No.	
-------------	--

Set	<b>P</b>
-----	----------

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017  
ENGINEERING GEOLOGY**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Q. 6 and Q. 11 are **compulsory**.  
4) Figures to the **right** indicate **full** marks.  
5) **Draw** neat-labelled diagrams **wherever** necessary.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) Basalt is a \_\_\_\_\_ rock.
  - a) Plutonic, acidic
  - b) Volcanic, acidic
  - c) Plutonic, basic
  - d) Volcanic, basic
- 2) The inner core is \_\_\_\_\_ in nature.
  - a) gaseous
  - b) solid
  - c) liquid
  - d) semi-solid
- 3) Himalaya is the best example of \_\_\_\_\_ mountain.
  - a) fold
  - b) fault
  - c) relict
  - d) volcanic
- 4) In \_\_\_\_\_ texture, large and well-developed crystals are surrounded by fine grains.
  - a) granitic
  - b) graphic
  - c) porphyritic
  - d) trachytic
- 5) Which of the following statement is true ?
  - a) Horst fault – central block is down thrown
  - b) Graben fault – peripheral blocks are down thrown
  - c) Normal fault – hanging moves towards gravity
  - d) None of these

P.T.O.



- 6) Marble is formed by thermal metamorphism of \_\_\_\_\_  
a) Basalt                      b) Shale                      c) Limestone                      d) Sandstone
- 7) Mica group minerals are characterized by \_\_\_\_\_  
a) pearly luster, 1 set cleavage, foliated form  
b) pearly luster, 2 set cleavages, foliated form  
c) pearly luster, 1 set cleavage, fibrous form  
d) pearly luster, 3 set cleavages, foliated form
- 8) SIAL consists of \_\_\_\_\_  
a) Granite                      b) Gabbro                      c) Marble                      d) Basalt
- 9) Slope treatment, giving proper drainage and construction of retaining wall are prevention methods of \_\_\_\_\_  
a) landslides                      b) earthquake  
c) tsunamis                      d) volcano
- 10) The leakage of the water from the reservoir takes place when the water table is \_\_\_\_\_ type.  
a) effluent                      b) influent                      c) confluent                      d) all of these
- 11) Tsunamis are generated by activity of \_\_\_\_\_ below the ocean.  
a) volcano                      b) earthquake  
c) tunneling                      d) all of these
- 12) Drill water loss indicates a \_\_\_\_\_  
a) leaky zone                      b) hard zone  
c) tight zone                      d) saturated zone
- 13) The most efficient, cheaper and rapid method of determination of sub-surface geology is \_\_\_\_\_  
a) seismic method                      b) gravity method  
c) magnetic method                      d) electric resistivity method
- 14) Which of the following is true ?  
a) Granite – high crushing strength, low porosity  
b) Vesicular basalt – high crushing strength, low porosity  
c) Limestone – composition  $\text{CaCO}_3$ , high durability  
d) Marble – composition  $\text{CaCO}_3$ , high permeability
-



Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017**  
**ENGINEERING GEOLOGY**

Day and Date : Saturday, 23-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions:** 1) **Q. 6 and Q. 11 are compulsory.**  
2) **Figures to the right indicate full marks.**  
3) **Draw neat-labelled diagrams wherever necessary.**

SECTION – I

2. A) Define joints. Describe columnar joints. **6**  
B) Define Fold. Describe in detail recumbent and isoclinal folds. **6**

OR

3. A) Define Metamorphic rocks. Describe two types of metamorphism. **6**  
B) Describe physical properties and chemical properties of Felspar group minerals. **6**

4. Define landslide. Describe types of landslide. **7**

OR

5. Define seismic waves. Add a note on characteristics of seismic waves. **7**

6. Write notes on (**any three**) : **9**

- a) Vesicular structure  
b) Moh's scale of Hardness of minerals  
c) Acidic and basic lava  
d) Angular unconformity  
e) Sub-divisions of Geology.



## SECTION – II

7. A) What are dams ? Describe two types of concrete dams. **6**  
B) What are building stones ? Add a note on their compressive strength and durability. **6**
- OR
8. A) Define reservoir. Add a note on silting process. **6**  
B) Define tunnels. Explain desirable and undesirable geological conditions of tunneling through folds. **6**
9. Explain in detail various methods of preliminary geological investigation. **7**
- OR
10. Define Bridges. Describe various types of bridges. **7**
11. Write notes on (**any three**) : **9**
- a) Porosity and permeability of rocks
  - b) RQD
  - c) Tunnels in basalts
  - d) Reservoir induced Seismicity
  - e) Dams on Faults.
-



SLR-TJ – 22

Seat No.	
-------------	--

Set	<b>Q</b>
-----	----------

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017  
ENGINEERING GEOLOGY**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Q. 6 and Q. 11 are **compulsory**.  
4) Figures to the **right** indicate **full** marks.  
5) **Draw neat-labelled diagrams wherever necessary.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) SIAL consists of \_\_\_\_\_  
a) Granite                      b) Gabbro                      c) Marble                      d) Basalt
- 2) Slope treatment, giving proper drainage and construction of retaining wall are prevention methods of \_\_\_\_\_  
a) landslides                      b) earthquake  
c) tsunamis                      d) volcano
- 3) The leakage of the water from the reservoir takes place when the water table is \_\_\_\_\_ type.  
a) effluent                      b) influent                      c) confluent                      d) all of these
- 4) Tsunamis are generated by activity of \_\_\_\_\_ below the ocean.  
a) volcano                      b) earthquake  
c) tunneling                      d) all of these
- 5) Drill water loss indicates a \_\_\_\_\_  
a) leaky zone                      b) hard zone  
c) tight zone                      d) saturated zone

P.T.O.





Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017**  
**ENGINEERING GEOLOGY**

Day and Date : Saturday, 23-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions:** 1) **Q. 6 and Q. 11 are compulsory.**  
2) **Figures to the right indicate full marks.**  
3) **Draw neat-labelled diagrams wherever necessary.**

SECTION – I

2. A) Define joints. Describe columnar joints. **6**  
B) Define Fold. Describe in detail recumbent and isoclinal folds. **6**

OR

3. A) Define Metamorphic rocks. Describe two types of metamorphism. **6**  
B) Describe physical properties and chemical properties of Felspar group minerals. **6**

4. Define landslide. Describe types of landslide. **7**

OR

5. Define seismic waves. Add a note on characteristics of seismic waves. **7**

6. Write notes on (**any three**) : **9**

- a) Vesicular structure  
b) Moh's scale of Hardness of minerals  
c) Acidic and basic lava  
d) Angular unconformity  
e) Sub-divisions of Geology.



## SECTION – II

7. A) What are dams ? Describe two types of concrete dams. **6**  
B) What are building stones ? Add a note on their compressive strength and durability. **6**
- OR
8. A) Define reservoir. Add a note on silting process. **6**  
B) Define tunnels. Explain desirable and undesirable geological conditions of tunneling through folds. **6**
9. Explain in detail various methods of preliminary geological investigation. **7**
- OR
10. Define Bridges. Describe various types of bridges. **7**
11. Write notes on (**any three**) : **9**
- a) Porosity and permeability of rocks
  - b) RQD
  - c) Tunnels in basalts
  - d) Reservoir induced Seismicity
  - e) Dams on Faults.
-





SLR-TJ – 22

Seat No.	
-------------	--

Set	<b>R</b>
-----	----------

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017  
ENGINEERING GEOLOGY**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Q. 6 and Q. 11 are **compulsory**.  
4) Figures to the **right** indicate **full** marks.  
5) **Draw** neat-labelled diagrams **wherever** necessary.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

**14**

- 1) Which of the following statement is true ?
  - a) Horst fault – central block is down thrown
  - b) Graben fault – peripheral blocks are down thrown
  - c) Normal fault – hanging moves towards gravity
  - d) None of these
- 2) Marble is formed by thermal metamorphism of \_\_\_\_\_
  - a) Basalt
  - b) Shale
  - c) Limestone
  - d) Sandstone
- 3) Mica group minerals are characterized by \_\_\_\_\_
  - a) pearly luster, 1 set cleavage, foliated form
  - b) pearly luster, 2 set cleavages, foliated form
  - c) pearly luster, 1 set cleavage, fibrous form
  - d) pearly luster, 3 set cleavages, foliated form
- 4) SIAL consists of \_\_\_\_\_
  - a) Granite
  - b) Gabbro
  - c) Marble
  - d) Basalt
- 5) Slope treatment, giving proper drainage and construction of retaining wall are prevention methods of \_\_\_\_\_
  - a) landslides
  - b) earthquake
  - c) tsunamis
  - d) volcano

P.T.O.



- 6) The leakage of the water from the reservoir takes place when the water table is \_\_\_\_\_ type.  
a) effluent                      b) influent                      c) confluent                      d) all of these
- 7) Tsunamis are generated by activity of \_\_\_\_\_ below the ocean.  
a) volcano    b) earthquake  
c) tunneling    d) all of these
- 8) Drill water loss indicates a \_\_\_\_\_  
a) leaky zone    b) hard zone  
c) tight zone    d) saturated zone
- 9) The most efficient, cheaper and rapid method of determination of sub-surface geology is \_\_\_\_\_  
a) seismic method    b) gravity method  
c) magnetic method    d) electric resistivity method
- 10) Which of the following is true ?  
a) Granite – high crushing strength, low porosity  
b) Vesicular basalt – high crushing strength, low porosity  
c) Limestone – composition  $\text{CaCO}_3$ , high durability  
d) Marble – composition  $\text{CaCO}_3$ , high permeability
- 11) Basalt is a \_\_\_\_\_ rock.  
a) Plutonic, acidic    b) Volcanic, acidic  
c) Plutonic, basic    d) Volcanic, basic
- 12) The inner core is \_\_\_\_\_ in nature.  
a) gaseous                      b) solid                      c) liquid                      d) semi-solid
- 13) Himalaya is the best example of \_\_\_\_\_ mountain.  
a) fold                      b) fault                      c) relict                      d) volcanic
- 14) In \_\_\_\_\_ texture, large and well-developed crystals are surrounded by fine grains.  
a) granitic                      b) graphic                      c) porphyritic                      d) trachytic
-



Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017**  
**ENGINEERING GEOLOGY**

Day and Date : Saturday, 23-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions:** 1) **Q. 6 and Q. 11 are compulsory.**  
2) **Figures to the right indicate full marks.**  
3) **Draw neat-labelled diagrams wherever necessary.**

SECTION – I

2. A) Define joints. Describe columnar joints. **6**  
B) Define Fold. Describe in detail recumbent and isoclinal folds. **6**

OR

3. A) Define Metamorphic rocks. Describe two types of metamorphism. **6**  
B) Describe physical properties and chemical properties of Felspar group minerals. **6**

4. Define landslide. Describe types of landslide. **7**

OR

5. Define seismic waves. Add a note on characteristics of seismic waves. **7**

6. Write notes on (**any three**) : **9**

- a) Vesicular structure  
b) Moh's scale of Hardness of minerals  
c) Acidic and basic lava  
d) Angular unconformity  
e) Sub-divisions of Geology.



## SECTION – II

7. A) What are dams ? Describe two types of concrete dams. **6**  
B) What are building stones ? Add a note on their compressive strength and durability. **6**
- OR
8. A) Define reservoir. Add a note on silting process. **6**  
B) Define tunnels. Explain desirable and undesirable geological conditions of tunneling through folds. **6**
9. Explain in detail various methods of preliminary geological investigation. **7**
- OR
10. Define Bridges. Describe various types of bridges. **7**
11. Write notes on (**any three**) : **9**
- a) Porosity and permeability of rocks
  - b) RQD
  - c) Tunnels in basalts
  - d) Reservoir induced Seismicity
  - e) Dams on Faults.
-



SLR-TJ – 22

Seat No.	
-------------	--

Set	<b>S</b>
-----	----------

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017  
ENGINEERING GEOLOGY**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Q. 6 and Q. 11 are **compulsory**.  
4) Figures to the **right** indicate **full** marks.  
5) **Draw** neat-labelled diagrams **wherever** necessary.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **14**
- 1) The leakage of the water from the reservoir takes place when the water table is \_\_\_\_\_ type.  
a) effluent                      b) influent                      c) confluent                      d) all of these
  - 2) Tsunamis are generated by activity of \_\_\_\_\_ below the ocean.  
a) volcano    b) earthquake  
c) tunneling    d) all of these
  - 3) Drill water loss indicates a \_\_\_\_\_  
a) leaky zone    b) hard zone  
c) tight zone    d) saturated zone
  - 4) The most efficient, cheaper and rapid method of determination of sub-surface geology is \_\_\_\_\_  
a) seismic method    b) gravity method  
c) magnetic method    d) electric resistivity method
  - 5) Which of the following is true ?  
a) Granite – high crushing strength, low porosity  
b) Vesicular basalt – high crushing strength, low porosity  
c) Limestone – composition  $\text{CaCO}_3$ , high durability  
d) Marble – composition  $\text{CaCO}_3$ , high permeability

P.T.O.



- 6) Basalt is a \_\_\_\_\_ rock.
- a) Plutonic, acidic
  - b) Volcanic, acidic
  - c) Plutonic, basic
  - d) Volcanic, basic
- 7) The inner core is \_\_\_\_\_ in nature.
- a) gaseous
  - b) solid
  - c) liquid
  - d) semi-solid
- 8) Himalaya is the best example of \_\_\_\_\_ mountain.
- a) fold
  - b) fault
  - c) relict
  - d) volcanic
- 9) In \_\_\_\_\_ texture, large and well-developed crystals are surrounded by fine grains.
- a) granitic
  - b) graphic
  - c) porphyritic
  - d) trachytic
- 10) Which of the following statement is true ?
- a) Horst fault – central block is down thrown
  - b) Graben fault – peripheral blocks are down thrown
  - c) Normal fault – hanging moves towards gravity
  - d) None of these
- 11) Marble is formed by thermal metamorphism of \_\_\_\_\_
- a) Basalt
  - b) Shale
  - c) Limestone
  - d) Sandstone
- 12) Mica group minerals are characterized by \_\_\_\_\_
- a) pearly luster, 1 set cleavage, foliated form
  - b) pearly luster, 2 set cleavages, foliated form
  - c) pearly luster, 1 set cleavage, fibrous form
  - d) pearly luster, 3 set cleavages, foliated form
- 13) SIAL consists of \_\_\_\_\_
- a) Granite
  - b) Gabbro
  - c) Marble
  - d) Basalt
- 14) Slope treatment, giving proper drainage and construction of retaining wall are prevention methods of \_\_\_\_\_
- a) landslides
  - b) earthquake
  - c) tsunamis
  - d) volcano
-



Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (New) (CBCS Pattern) Examination, 2017**  
**ENGINEERING GEOLOGY**

Day and Date : Saturday, 23-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions:** 1) **Q. 6 and Q. 11 are compulsory.**  
2) **Figures to the right indicate full marks.**  
3) **Draw neat-labelled diagrams wherever necessary.**

SECTION – I

2. A) Define joints. Describe columnar joints. **6**  
B) Define Fold. Describe in detail recumbent and isoclinal folds. **6**

OR

3. A) Define Metamorphic rocks. Describe two types of metamorphism. **6**  
B) Describe physical properties and chemical properties of Felspar group minerals. **6**

4. Define landslide. Describe types of landslide. **7**

OR

5. Define seismic waves. Add a note on characteristics of seismic waves. **7**

6. Write notes on (**any three**) : **9**

- a) Vesicular structure  
b) Moh's scale of Hardness of minerals  
c) Acidic and basic lava  
d) Angular unconformity  
e) Sub-divisions of Geology.



## SECTION – II

7. A) What are dams ? Describe two types of concrete dams. **6**  
B) What are building stones ? Add a note on their compressive strength and durability. **6**
- OR
8. A) Define reservoir. Add a note on silting process. **6**  
B) Define tunnels. Explain desirable and undesirable geological conditions of tunneling through folds. **6**
9. Explain in detail various methods of preliminary geological investigation. **7**
- OR
10. Define Bridges. Describe various types of bridges. **7**
11. Write notes on (**any three**) : **9**
- a) Porosity and permeability of rocks
  - b) RQD
  - c) Tunnels in basalts
  - d) Reservoir induced Seismicity
  - e) Dams on Faults.
-





SLR-TJ – 23

Seat No.	
----------	--

Set	P
-----	---

**S.E. (Civil Engineering) (Part – I) (Old-CGPA) Examination, 2017  
CONCRETE TECHNOLOGY**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Assume suitable data if **necessary** and mention it **clearly**.
  - 2) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

Choose the correct alternative :

1. During the manufacture process of Portland cement, gypsum or plaster of paris is added
  - a) To increase the strength of cement
  - b) To modify the colour of cement
  - c) To adjust the setting time of cement
  - d) To reduce the heat of hydration
2. The constituents of cement which act as binder as
  - a) Tricalcium silicate, dicalcium silicate, sulphur trioxide
  - b) Tricalcium silicate and tetracalcium alimino-ferrite
  - c) Tricalcium silicate and tricalcium aluminate
  - d) Dicalcium silicate, tetracalcium alumina-ferrite and tricalcium aluminate
3. Aggregates is used in concrete because
  - a) It is relatively inert material and cheaper than cement
  - b) It imparts volume stability and durability to the concrete
  - c) It provides bulk to concrete
  - d) None of the above
4. Which of the following statement is incorrect ?
  - a) Water is most important and least expensive ingredient of concrete
  - b) Mixing of water is utilized in the hydration of cement and provide lubrication between fine and coarse aggregate
  - c) Excess water forms a scum or laitance at the surface
  - d) Excess water may make concrete honeycombed
5. An admixture
  - a) Is the basic ingredient of concrete
  - b) Offers improvement not economically attained by adjusting mix proportions
  - c) Is a substitute for good concreting practice
  - d) Is beneficial to the properties of concrete when used in large quantities

P.T.O.



6. After curing normal concrete
  - a) Shrinks on drying
  - b) Expands on drying
  - c) Shrinks when still wet
  - d) May shrink or expand depending upon the proportions of various ingredients
7. The elastic behaviour of concrete is due to the
  - a) Shrinkage in concrete
  - b) Propagation of bond and mortar cracks
  - c) Presence of macro and micro cracks
  - d) None of the above
8. For determination of flexural tension test of concrete can be done by
  - a) Centre point loading method and third point loading method
  - b) Center point loading method and three point loading method
  - c) Midpoint loading method and third point loading method
  - d) None of the above
9. The manufacture of light weight concrete can be done using
  - a) By light weight aggregates
  - b) By introducing gas or air bubbles
  - c) By omitting the sand fraction from the aggregates
  - d) By using all the methods
10. Cathode protection is used for preventing
  - a) Sulphate attack
  - b) Corrosion of steel
  - c) Carbonation of concrete
  - d) All the above
11. Sources of alkalis in concrete are
  - a) Cement
  - b) Pozzolanic material
  - c) Aggregate
  - d) All the above
12. Increase in strain under sustained stress is called
  - a) Creep
  - b) Shrinkage
  - c) Carbonation
  - d) Yield stress
13. Fly ash may be used as
  - a) A part replacement of cement
  - b) A part replacement of fine aggregate
  - c) An admixture
  - d) All the above
14. For fineness test of cement IS sieve \_\_\_\_\_ is used,
  - a) 90  $\mu\text{m}$
  - b) 100  $\mu\text{m}$
  - c) 1.18  $\mu\text{m}$
  - d) 300  $\mu\text{m}$



Seat No.	
-------------	--

**S.E. (Civil Engineering) (Part – I) (Old-CGPA) Examination, 2017  
CONCRETE TECHNOLOGY**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) Q. No. 5 is **compulsory**. Solve **any three** questions from Section – I.
  - 2) Assume suitable data if **necessary** and mention it **clearly**.
  - 3) **Use** of Non-programmable calculator is **permitted**.
  - 4) Figure to **right** indicate **full** marks.

SECTION – I

1. a) What are the various properties of cement ? Explain any one. **4**  
b) Explain dry manufacturing of cement. **3**  
c) What are the physical properties of aggregates ? Explain any one. **3**
2. a) State and explain the physical properties of compounds of concrete. **3**  
b) What is workability of concrete ? What are the factors affecting the workability of concrete ? **3**  
c) What is segregation and bleeding ? What are the various precautions are to be taken to minimize the segregation and bleeding ? **3**
3. a) What are the various factors affect the quality of concrete ? **3**  
b) What are the various admixtures used in concrete ? State their effect on workability and strength. **3**  
c) State the role of accelerators and retarders and effect on the properties of concrete. **3**
4. a) State effect of water cement ratio and admixtures on strength properties of concrete. **3**  
b) Explain the tensile test on concrete. **3**  
c) Define characteristic strength of concrete. What are the various concrete mixes as per IS 456-2000 ? State their uses. **3**

SECTION – II

5. Answer **any two** questions (**6 Marks each**) : **12**
  - a) What is alkali aggregate reaction ? Discuss the reasons and prevention measures.
  - b) Define durability. Explain how concrete is made durable against
    - i) Sulphate attack
    - ii) Corrosion of steel
  - c) Write a note on creep and shrinkage of concrete.

OR

Set P



Design of M20 concrete mix as per IS : 10262-2009.

12

- 1) Grade designation : M20
- 2) Type of cement : OPC 43 grade confirming to IS 8112.
- 3) Maximum nominal size of aggregates : 20 mm
- 4) Minimum cement content : 320 kg/m<sup>3</sup>.
- 5) Maximum water cement ratio : 0.55
- 6) Workability : 75 mm (slump)
- 7) Exposure condition : Mild
- 8) Degree of supervision : Good
- 9) Type of aggregate : Crushed angular aggregate
- 10) Maximum cement content : 450 kg/m<sup>3</sup>
- 11) Chemical admixture : Not recommended
- 12) Method of concrete placing-Manual (Pumping not required)

#### TEST DATA FOR MATERIALS

Cement used : OPC 43 grade confirming to IS 8112

Specific gravity of cement : 3.15

#### Specific gravity of

Coarse aggregate : 2.68

Fine aggregate : 2.65

#### Water absorption

Coarse aggregate : Nil

Fine aggregate : Nil

#### Free (surface) moisture

Coarse aggregate : Nil (absorbed moisture full)

Fine aggregate : Nil

#### Sieve analysis

Coarse aggregate : Conforming to Table 2 of IS : 383

Fine aggregate : Conforming to Zone I of IS : 383

Set P



Refer Fig. 1, Table 1, 2, 3 and 4

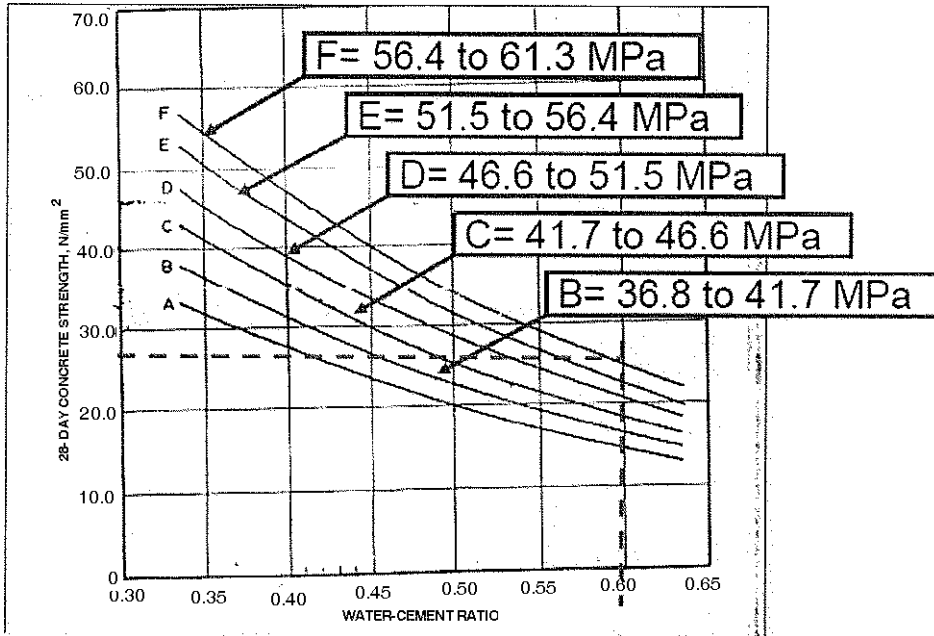


Figure 1

**Table 1 Assumed Standard Deviation**

(Clause 9.2.4.2 and Table 11)

Grade of Concrete	Assumed Standard Deviation N/mm <sup>2</sup>
M 10 } M 15 }	3.5
M 20 } M 25 }	4.0
M 30 } M 35 } M 40 } M 45 } M 50 }	5.0



**Table 2 Maximum Water Content per Cubic  
Metre of Concrete for Nominal  
Maximum Size of Aggregate**

*(Clauses 4.2, A-5 and B-5)*

Sl No.	Nominal Maximum Size of Aggregate mm	Maximum Water Content <sup>1)</sup> kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

**Note** – These quantities of mixing water are for use in computing cementitious material contents for trial batches.

<sup>1)</sup> Water content corresponding to saturated surface dry aggregate.

**Table 3 Volume of Coarse Aggregate per unit  
Volume of Total Aggregate for Different  
Zones of Fine Aggregate**

*(Clauses 4.4, A-7 and B-7)*

Sl. No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate <sup>1)</sup> per unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
(1)	(2)	Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

<sup>1)</sup> Volumes are based on aggregates in saturated surface dry condition.



**Table 4 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size**

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

SI No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	i) Mild	220	0.60	–	300	0.55	M 20
	ii) Moderate	240	0.60	M 15	300	0.50	M 25
	iii) Severe	250	0.50	M 20	320	0.45	M 30
	iv) Very severe	260	0.45	M 20	340	0.45	M 35
	v) Extreme	280	0.40	M 25	360	0.40	M 40

6. Answer **any two** questions (8 marks **each**) :

16

- a) Enlist the various types of concrete and explain any two in detail.
- b) Write a note on quality control of concrete.
- c) Enumerate various tests on hardened concrete to determine its strength. Explain any one in detail.







SLR-TJ – 23

Seat No.	
----------	--

Set	Q
-----	---

**S.E. (Civil Engineering) (Part – I) (Old-CGPA) Examination, 2017  
CONCRETE TECHNOLOGY**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Assume suitable data if **necessary** and mention it **clearly**.
  - 2) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

Choose the correct alternative :

1. For determination of flexural tension test of concrete can be done by
  - a) Centre point loading method and third point loading method
  - b) Center point loading method and three point loading method
  - c) Midpoint loading method and third point loading method
  - d) None of the above
2. The manufacture of light weight concrete can be done using
  - a) By light weight aggregates
  - b) By introducing gas or air bubbles
  - c) By omitting the sand fraction from the aggregates
  - d) By using all the methods
3. Cathode protection is used for preventing
  - a) Sulphate attack
  - b) Corrosion of steel
  - c) Carbonation of concrete
  - d) All the above
4. Sources of alkalis in concrete are
  - a) Cement
  - b) Pozzolanic material
  - c) Aggregate
  - d) All the above
5. Increase in strain under sustained stress is called
  - a) Creep
  - b) Shrinkage
  - c) Carbonation
  - d) Yield stress
6. Fly ash may be used as
  - a) A part replacement of cement
  - b) A part replacement of fine aggregate
  - c) An admixture
  - d) All the above

P.T.O.



7. For fineness test of cement IS sieve \_\_\_\_\_ is used,  
a) 90  $\mu\text{m}$                       b) 100  $\mu\text{m}$                       c) 1.18  $\mu\text{m}$                       d) 300  $\mu\text{m}$
8. During the manufacture process of Portland cement, gypsum or plaster of paris is added  
a) To increase the strength of cement    b) To modify the colour of cement  
c) To adjust the setting time of cement    d) To reduce the heat of hydration
9. The constituents of cement which act as binder as  
a) Tricalcium silicate, dicalcium silicate, sulphur trioxide  
b) Tricalcium silicate and tetracalcium alimino-ferrite  
c) Tricalcium silicate and tricalcium aluminate  
d) Dicalcium silicate, tetracalcium alumina-ferrite and tricalcium aluminate
10. Aggregates is used in concrete because  
a) It is relatively inert material and cheaper than cement  
b) It imparts volume stability and durability to the concrete  
c) It provides bulk to concrete  
d) None of the above
11. Which of the following statement is incorrect ?  
a) Water is most important and least expensive ingredient of concrete  
b) Mixing of water is utilized in the hydration of cement and provide lubrication between fine and coarse aggregate  
c) Excess water forms a scum or laitance at the surface  
d) Excess water may make concrete honeycombed
12. An admixture  
a) Is the basic ingredient of concrete  
b) Offers improvement not economically attained by adjusting mix proportions  
c) Is a substitute for good concreting practice  
d) Is beneficial to the properties of concrete when used in large quantities
13. After curing normal concrete  
a) Shrinks on drying  
b) Expands on drying  
c) Shrinks when still wet  
d) May shrink or expand depending upon the proportions of various ingredients
14. The elastic behaviour of concrete is due to the  
a) Shrinkage in concrete  
b) Propagation of bond and mortar cracks  
c) Presence of macro and micro cracks  
d) None of the above
-



Seat No.	
-------------	--

**S.E. (Civil Engineering) (Part – I) (Old-CGPA) Examination, 2017  
CONCRETE TECHNOLOGY**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) Q. No. 5 is **compulsory**. Solve **any three** questions from Section – I.
  - 2) Assume suitable data if **necessary** and mention it **clearly**.
  - 3) **Use** of Non-programmable calculator is **permitted**.
  - 4) Figure to **right** indicate **full** marks.

SECTION – I

1. a) What are the various properties of cement ? Explain any one. **4**  
b) Explain dry manufacturing of cement. **3**  
c) What are the physical properties of aggregates ? Explain any one. **3**
2. a) State and explain the physical properties of compounds of concrete. **3**  
b) What is workability of concrete ? What are the factors affecting the workability of concrete ? **3**  
c) What is segregation and bleeding ? What are the various precautions are to be taken to minimize the segregation and bleeding ? **3**
3. a) What are the various factors affect the quality of concrete ? **3**  
b) What are the various admixtures used in concrete ? State their effect on workability and strength. **3**  
c) State the role of accelerators and retarders and effect on the properties of concrete. **3**
4. a) State effect of water cement ratio and admixtures on strength properties of concrete. **3**  
b) Explain the tensile test on concrete. **3**  
c) Define characteristic strength of concrete. What are the various concrete mixes as per IS 456-2000 ? State their uses. **3**

SECTION – II

5. Answer **any two** questions (**6 Marks each**) : **12**
  - a) What is alkali aggregate reaction ? Discuss the reasons and prevention measures.
  - b) Define durability. Explain how concrete is made durable against
    - i) Sulphate attack
    - ii) Corrosion of steel
  - c) Write a note on creep and shrinkage of concrete.

OR

Set Q



Design of M20 concrete mix as per IS : 10262-2009.

12

- 1) Grade designation : M20
- 2) Type of cement : OPC 43 grade confirming to IS 8112.
- 3) Maximum nominal size of aggregates : 20 mm
- 4) Minimum cement content : 320 kg/m<sup>3</sup>.
- 5) Maximum water cement ratio : 0.55
- 6) Workability : 75 mm (slump)
- 7) Exposure condition : Mild
- 8) Degree of supervision : Good
- 9) Type of aggregate : Crushed angular aggregate
- 10) Maximum cement content : 450 kg/m<sup>3</sup>
- 11) Chemical admixture : Not recommended
- 12) Method of concrete placing-Manual (Pumping not required)

#### TEST DATA FOR MATERIALS

Cement used : OPC 43 grade confirming to IS 8112

Specific gravity of cement : 3.15

#### Specific gravity of

Coarse aggregate : 2.68

Fine aggregate : 2.65

#### Water absorption

Coarse aggregate : Nil

Fine aggregate : Nil

#### Free (surface) moisture

Coarse aggregate : Nil (absorbed moisture full)

Fine aggregate : Nil

#### Sieve analysis

Coarse aggregate : Conforming to Table 2 of IS : 383

Fine aggregate : Conforming to Zone I of IS : 383

Set Q



Refer Fig. 1, Table 1, 2, 3 and 4

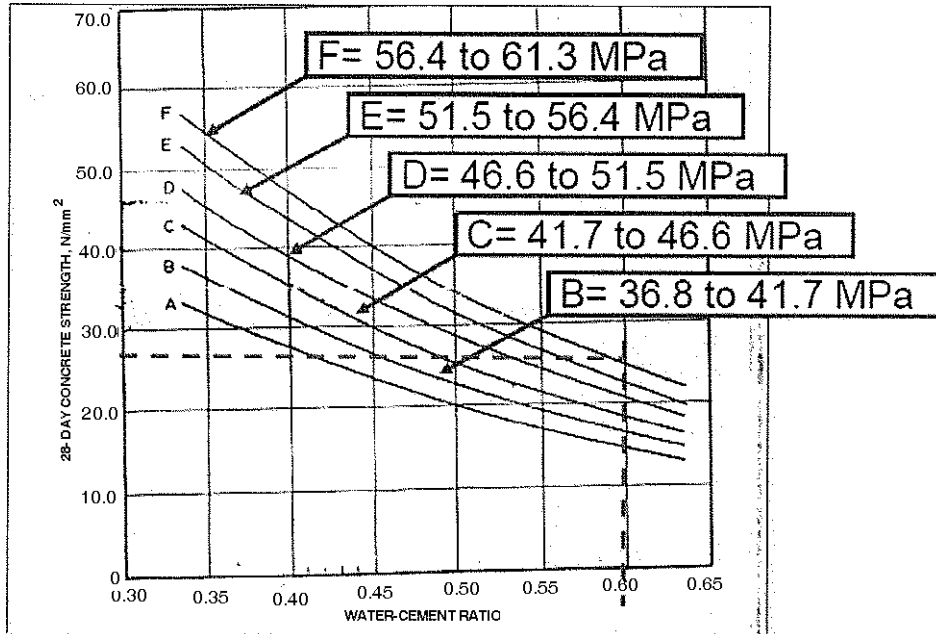


Figure 1

### Table 1 Assumed Standard Deviation

(Clause 9.2.4.2 and Table 11)

Grade of Concrete	Assumed Standard Deviation (N/mm <sup>2</sup> )
M 10 } M 15 }	3.5
M 20 } M 25 }	4.0
M 30 } M 35 } M 40 } M 45 } M 50 }	5.0



**Table 2 Maximum Water Content per Cubic  
Metre of Concrete for Nominal  
Maximum Size of Aggregate**

*(Clauses 4.2, A-5 and B-5)*

Sl No.	Nominal Maximum Size of Aggregate mm	Maximum Water Content <sup>1)</sup> kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

**Note** – These quantities of mixing water are for use in computing cementitious material contents for trial batches.

<sup>1)</sup> Water content corresponding to saturated surface dry aggregate.

**Table 3 Volume of Coarse Aggregate per unit  
Volume of Total Aggregate for Different  
Zones of Fine Aggregate**

*(Clauses 4.4, A-7 and B-7)*

Sl. No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate <sup>1)</sup> per unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
(1)	(2)	Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

<sup>1)</sup> Volumes are based on aggregates in saturated surface dry condition.



**Table 4 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size**

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

SI No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	i) Mild	220	0.60	–	300	0.55	M 20
	ii) Moderate	240	0.60	M 15	300	0.50	M 25
	iii) Severe	250	0.50	M 20	320	0.45	M 30
	iv) Very severe	260	0.45	M 20	340	0.45	M 35
	v) Extreme	280	0.40	M 25	360	0.40	M 40

6. Answer **any two** questions (8 marks each) :

16

- a) Enlist the various types of concrete and explain any two in detail.
- b) Write a note on quality control of concrete.
- c) Enumerate various tests on hardened concrete to determine its strength. Explain any one in detail.







SLR-TJ – 23

Seat No.	
----------	--

Set	R
-----	---

**S.E. (Civil Engineering) (Part – I) (Old-CGPA) Examination, 2017  
CONCRETE TECHNOLOGY**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Assume suitable data if **necessary** and mention it **clearly**.
  - 2) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

Choose the correct alternative :

1. An admixture
  - a) Is the basic ingredient of concrete
  - b) Offers improvement not economically attained by adjusting mix proportions
  - c) Is a substitute for good concreting practice
  - d) Is beneficial to the properties of concrete when used in large quantities
2. After curing normal concrete
  - a) Shrinks on drying
  - b) Expands on drying
  - c) Shrinks when still wet
  - d) May shrink or expand depending upon the proportions of various ingredients
3. The elastic behaviour of concrete is due to the
  - a) Shrinkage in concrete
  - b) Propagation of bond and mortar cracks
  - c) Presence of macro and micro cracks
  - d) None of the above
4. For determination of flexural tension test of concrete can be done by
  - a) Centre point loading method and third point loading method
  - b) Center point loading method and three point loading method
  - c) Midpoint loading method and third point loading method
  - d) None of the above
5. The manufacture of light weight concrete can be done using
  - a) By light weight aggregates
  - b) By introducing gas or air bubbles
  - c) By omitting the sand fraction from the aggregates
  - d) By using all the methods

P.T.O.



6. Cathode protection is used for preventing
- a) Sulphate attack
  - b) Corrosion of steel
  - c) Carbonation of concrete
  - d) All the above
7. Sources of alkalis in concrete are
- a) Cement
  - b) Pozzolanic material
  - c) Aggregate
  - d) All the above
8. Increase in strain under sustained stress is called
- a) Creep
  - b) Shrinkage
  - c) Carbonation
  - d) Yield stress
9. Fly ash may be used as
- a) A part replacement of cement
  - b) A part replacement of fine aggregate
  - c) An admixture
  - d) All the above
10. For fineness test of cement IS sieve \_\_\_\_\_ is used,
- a) 90  $\mu\text{m}$
  - b) 100  $\mu\text{m}$
  - c) 1.18  $\mu\text{m}$
  - d) 300  $\mu\text{m}$
11. During the manufacture process of Portland cement, gypsum or plaster of paris is added
- a) To increase the strength of cement
  - b) To modify the colour of cement
  - c) To adjust the setting time of cement
  - d) To reduce the heat of hydration
12. The constituents of cement which act as binder are
- a) Tricalcium silicate, dicalcium silicate, sulphur trioxide
  - b) Tricalcium silicate and tetracalcium alimino-ferrite
  - c) Tricalcium silicate and tricalcium aluminate
  - d) Dicalcium silicate, tetracalcium alumina-ferrite and tricalcium aluminate
13. Aggregates are used in concrete because
- a) It is relatively inert material and cheaper than cement
  - b) It imparts volume stability and durability to the concrete
  - c) It provides bulk to concrete
  - d) None of the above
14. Which of the following statements is incorrect ?
- a) Water is most important and least expensive ingredient of concrete
  - b) Mixing of water is utilized in the hydration of cement and provides lubrication between fine and coarse aggregate
  - c) Excess water forms a scum or laitance at the surface
  - d) Excess water may make concrete honeycombed
-



Seat No.	
-------------	--

**S.E. (Civil Engineering) (Part – I) (Old-CGPA) Examination, 2017  
CONCRETE TECHNOLOGY**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) Q. No. 5 is **compulsory**. Solve **any three** questions from Section – I.
  - 2) Assume suitable data if **necessary** and mention it **clearly**.
  - 3) **Use** of Non-programmable calculator is **permitted**.
  - 4) Figure to **right** indicate **full** marks.

SECTION – I

1. a) What are the various properties of cement ? Explain any one. **4**  
b) Explain dry manufacturing of cement. **3**  
c) What are the physical properties of aggregates ? Explain any one. **3**
2. a) State and explain the physical properties of compounds of concrete. **3**  
b) What is workability of concrete ? What are the factors affecting the workability of concrete ? **3**  
c) What is segregation and bleeding ? What are the various precautions are to be taken to minimize the segregation and bleeding ? **3**
3. a) What are the various factors affect the quality of concrete ? **3**  
b) What are the various admixtures used in concrete ? State their effect on workability and strength. **3**  
c) State the role of accelerators and retarders and effect on the properties of concrete. **3**
4. a) State effect of water cement ratio and admixtures on strength properties of concrete. **3**  
b) Explain the tensile test on concrete. **3**  
c) Define characteristic strength of concrete. What are the various concrete mixes as per IS 456-2000 ? State their uses. **3**

SECTION – II

5. Answer **any two** questions (**6 Marks each**) : **12**
  - a) What is alkali aggregate reaction ? Discuss the reasons and prevention measures.
  - b) Define durability. Explain how concrete is made durable against
    - i) Sulphate attack
    - ii) Corrosion of steel
  - c) Write a note on creep and shrinkage of concrete.

OR

Set R



Design of M20 concrete mix as per IS : 10262-2009.

12

- 1) Grade designation : M20
- 2) Type of cement : OPC 43 grade confirming to IS 8112.
- 3) Maximum nominal size of aggregates : 20 mm
- 4) Minimum cement content : 320 kg/m<sup>3</sup>.
- 5) Maximum water cement ratio : 0.55
- 6) Workability : 75 mm (slump)
- 7) Exposure condition : Mild
- 8) Degree of supervision : Good
- 9) Type of aggregate : Crushed angular aggregate
- 10) Maximum cement content : 450 kg/m<sup>3</sup>
- 11) Chemical admixture : Not recommended
- 12) Method of concrete placing-Manual (Pumping not required)

#### TEST DATA FOR MATERIALS

Cement used : OPC 43 grade confirming to IS 8112

Specific gravity of cement : 3.15

#### Specific gravity of

Coarse aggregate : 2.68

Fine aggregate : 2.65

#### Water absorption

Coarse aggregate : Nil

Fine aggregate : Nil

#### Free (surface) moisture

Coarse aggregate : Nil (absorbed moisture full)

Fine aggregate : Nil

#### Sieve analysis

Coarse aggregate : Conforming to Table 2 of IS : 383

Fine aggregate : Conforming to Zone I of IS : 383

Set R



Refer Fig. 1, Table 1, 2, 3 and 4

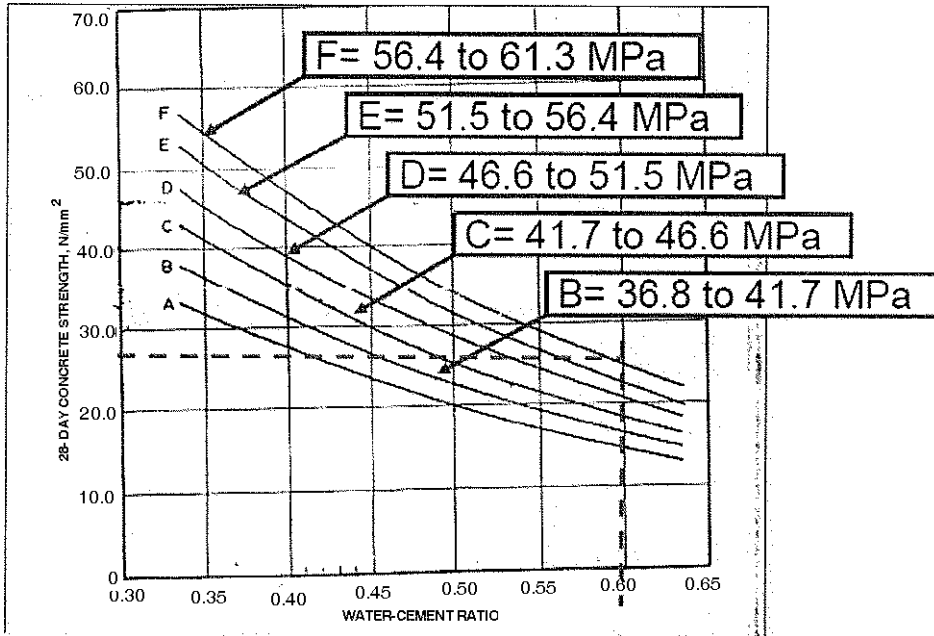


Figure 1

**Table 1 Assumed Standard Deviation**

(Clause 9.2.4.2 and Table 11)

Grade of Concrete	Assumed Standard Deviation N/mm <sup>2</sup>
M 10 } M 15 }	3.5
M 20 } M 25 }	4.0
M 30 } M 35 } M 40 } M 45 } M 50 }	5.0



**Table 2 Maximum Water Content per Cubic  
Metre of Concrete for Nominal  
Maximum Size of Aggregate**

*(Clauses 4.2, A-5 and B-5)*

Sl No.	Nominal Maximum Size of Aggregate	Maximum Water Content <sup>1)</sup>
	mm	kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

**Note** – These quantities of mixing water are for use in computing cementitious material contents for trial batches.

<sup>1)</sup> Water content corresponding to saturated surface dry aggregate.

**Table 3 Volume of Coarse Aggregate per unit  
Volume of Total Aggregate for Different  
Zones of Fine Aggregate**

*(Clauses 4.4, A-7 and B-7)*

Sl. No.	Nominal Maximum Size of Aggregate	Volume of Coarse Aggregate <sup>1)</sup> per unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
(1)	mm	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

<sup>1)</sup> Volumes are based on aggregates in saturated surface dry condition.



**Table 4 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size**

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

SI No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	i) Mild	220	0.60	–	300	0.55	M 20
	ii) Moderate	240	0.60	M 15	300	0.50	M 25
	iii) Severe	250	0.50	M 20	320	0.45	M 30
	iv) Very severe	260	0.45	M 20	340	0.45	M 35
	v) Extreme	280	0.40	M 25	360	0.40	M 40

6. Answer **any two** questions (8 marks **each**) :

16

- a) Enlist the various types of concrete and explain any two in detail.
- b) Write a note on quality control of concrete.
- c) Enumerate various tests on hardened concrete to determine its strength. Explain any one in detail.







SLR-TJ – 23

Seat No.	
----------	--

Set	S
-----	---

**S.E. (Civil Engineering) (Part – I) (Old-CGPA) Examination, 2017  
CONCRETE TECHNOLOGY**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Assume suitable data if **necessary** and mention it **clearly**.
  - 2) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

Choose the correct alternative :

1. Cathode protection is used for preventing
  - a) Sulphate attack
  - b) Corrosion of steel
  - c) Carbonation of concrete
  - d) All the above
2. Sources of alkalis in concrete are
  - a) Cement
  - b) Pozzolanic material
  - c) Aggregate
  - d) All the above
3. Increase in strain under sustained stress is called
  - a) Creep
  - b) Shrinkage
  - c) Carbonation
  - d) Yield stress
4. Fly ash may be used as
  - a) A part replacement of cement
  - b) A part replacement of fine aggregate
  - c) An admixture
  - d) All the above
5. For fineness test of cement IS sieve \_\_\_\_\_ is used,
  - a) 90  $\mu\text{m}$
  - b) 100  $\mu\text{m}$
  - c) 1.18  $\mu\text{m}$
  - d) 300  $\mu\text{m}$
6. During the manufacture process of Portland cement, gypsum or plaster of paris is added
  - a) To increase the strength of cement
  - b) To modify the colour of cement
  - c) To adjust the setting time of cement
  - d) To reduce the heat of hydration
7. The constituents of cement which act as binder as
  - a) Tricalcium silicate, dicalcium silicate, sulphur trioxide
  - b) Tricalcium silicate and tetracalcium alimino-ferrite
  - c) Tricalcium silicate and tricalcium aluminate
  - d) Dicalcium silicate, tetracalcium alumina-ferrite and tricalcium aluminate

P.T.O.



8. Aggregates is used in concrete because
    - a) It is relatively inert material and cheaper than cement
    - b) It imparts volume stability and durability to the concrete
    - c) It provides bulk to concrete
    - d) None of the above
  9. Which of the following statement is incorrect ?
    - a) Water is most important and least expensive ingredient of concrete
    - b) Mixing of water is utilized in the hydration of cement and provide lubrication between fine and coarse aggregate
    - c) Excess water forms a scum or laitance at the surface
    - d) Excess water may make concrete honeycombed
  10. An admixture
    - a) Is the basic ingredient of concrete
    - b) Offers improvement not economically attained by adjusting mix proportions
    - c) Is a substitute for good concreting practice
    - d) Is beneficial to the properties of concrete when used in large quantities
  11. After curing normal concrete
    - a) Shrinks on drying
    - b) Expands on drying
    - c) Shrinks when still wet
    - d) May shrink or expand depending upon the proportions of various ingredients
  12. The elastic behaviour of concrete is due to the
    - a) Shrinkage in concrete
    - b) Propagation of bond and mortar cracks
    - c) Presence of macro and micro cracks
    - d) None of the above
  13. For determination of flexural tension test of concrete can be done by
    - a) Centre point loading method and third point loading method
    - b) Center point loading method and three point loading method
    - c) Midpoint loading method and third point loading method
    - d) None of the above
  14. The manufacture of light weight concrete can be done using
    - a) By light weight aggregates
    - b) By introducing gas or air bubbles
    - c) By omitting the sand fraction from the aggregates
    - d) By using all the methods
-



Seat No.	
-------------	--

**S.E. (Civil Engineering) (Part – I) (Old-CGPA) Examination, 2017  
CONCRETE TECHNOLOGY**

Day and Date : Tuesday, 12-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) Q. No. 5 is **compulsory**. Solve **any three** questions from Section – I.
  - 2) Assume suitable data if **necessary** and mention it **clearly**.
  - 3) **Use** of Non-programmable calculator is **permitted**.
  - 4) Figure to **right** indicate **full** marks.

SECTION – I

1. a) What are the various properties of cement ? Explain any one. **4**  
b) Explain dry manufacturing of cement. **3**  
c) What are the physical properties of aggregates ? Explain any one. **3**
2. a) State and explain the physical properties of compounds of concrete. **3**  
b) What is workability of concrete ? What are the factors affecting the workability of concrete ? **3**  
c) What is segregation and bleeding ? What are the various precautions are to be taken to minimize the segregation and bleeding ? **3**
3. a) What are the various factors affect the quality of concrete ? **3**  
b) What are the various admixtures used in concrete ? State their effect on workability and strength. **3**  
c) State the role of accelerators and retarders and effect on the properties of concrete. **3**
4. a) State effect of water cement ratio and admixtures on strength properties of concrete. **3**  
b) Explain the tensile test on concrete. **3**  
c) Define characteristic strength of concrete. What are the various concrete mixes as per IS 456-2000 ? State their uses. **3**

SECTION – II

5. Answer **any two** questions (**6 Marks each**) : **12**
  - a) What is alkali aggregate reaction ? Discuss the reasons and prevention measures.
  - b) Define durability. Explain how concrete is made durable against
    - i) Sulphate attack
    - ii) Corrosion of steel
  - c) Write a note on creep and shrinkage of concrete.

OR

Set S



Design of M20 concrete mix as per IS : 10262-2009.

12

- 1) Grade designation : M20
- 2) Type of cement : OPC 43 grade confirming to IS 8112.
- 3) Maximum nominal size of aggregates : 20 mm
- 4) Minimum cement content : 320 kg/m<sup>3</sup>.
- 5) Maximum water cement ratio : 0.55
- 6) Workability : 75 mm (slump)
- 7) Exposure condition : Mild
- 8) Degree of supervision : Good
- 9) Type of aggregate : Crushed angular aggregate
- 10) Maximum cement content : 450 kg/m<sup>3</sup>
- 11) Chemical admixture : Not recommended
- 12) Method of concrete placing-Manual (Pumping not required)

#### TEST DATA FOR MATERIALS

Cement used : OPC 43 grade confirming to IS 8112

Specific gravity of cement : 3.15

#### Specific gravity of

Coarse aggregate : 2.68

Fine aggregate : 2.65

#### Water absorption

Coarse aggregate : Nil

Fine aggregate : Nil

#### Free (surface) moisture

Coarse aggregate : Nil (absorbed moisture full)

Fine aggregate : Nil

#### Sieve analysis

Coarse aggregate : Conforming to Table 2 of IS : 383

Fine aggregate : Conforming to Zone I of IS : 383

Set S



Refer Fig. 1, Table 1, 2, 3 and 4

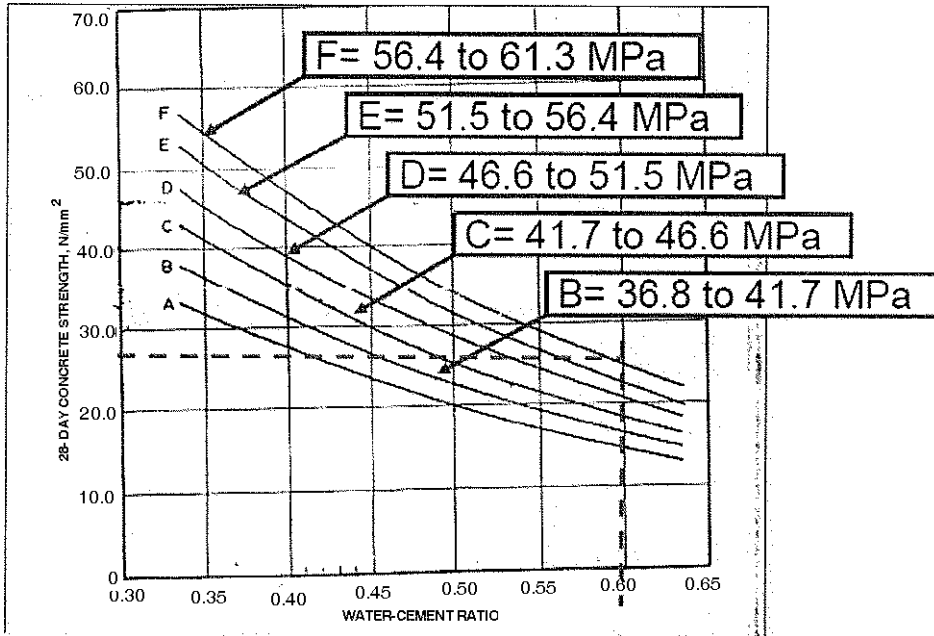


Figure 1

### Table 1 Assumed Standard Deviation

(Clause 9.2.4.2 and Table 11)

Grade of Concrete	Assumed Standard Deviation (N/mm <sup>2</sup> )
M 10	3.5
M 15	
M 20	4.0
M 25	
M 30	5.0
M 35	
M 40	
M 45	
M 50	



**Table 2 Maximum Water Content per Cubic  
Metre of Concrete for Nominal  
Maximum Size of Aggregate**

*(Clauses 4.2, A-5 and B-5)*

Sl No.	Nominal Maximum Size of Aggregate mm	Maximum Water Content <sup>1)</sup> kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

**Note** – These quantities of mixing water are for use in computing cementitious material contents for trial batches.

<sup>1)</sup> Water content corresponding to saturated surface dry aggregate.

**Table 3 Volume of Coarse Aggregate per unit  
Volume of Total Aggregate for Different  
Zones of Fine Aggregate**

*(Clauses 4.4, A-7 and B-7)*

Sl. No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate <sup>1)</sup> per unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
(1)	(2)	Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

<sup>1)</sup> Volumes are based on aggregates in saturated surface dry condition.



**Table 4 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size**

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

SI No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	i) Mild	220	0.60	–	300	0.55	M 20
	ii) Moderate	240	0.60	M 15	300	0.50	M 25
	iii) Severe	250	0.50	M 20	320	0.45	M 30
	iv) Very severe	260	0.45	M 20	340	0.45	M 35
	v) Extreme	280	0.40	M 25	360	0.40	M 40

6. Answer **any two** questions (8 marks each) :

16

- a) Enlist the various types of concrete and explain any two in detail.
- b) Write a note on quality control of concrete.
- c) Enumerate various tests on hardened concrete to determine its strength. Explain any one in detail.







SLR-TJ – 24

Seat No.	
----------	--

Set **P**

**S.E. (Civil) (Part – I) (Old – CGPA) Examination, 2017  
STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. Each question carries **one** mark.
  - 3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) A metallic bar firmly restrained at ends, on rise in temperature develops
  - a) Shear stress
  - b) Compressive stress
  - c) Tensile stress
  - d) Temperature stress
- 2) For the bars of composite section
  - a) The load carried by different materials is the same as the total external load
  - b) The total external load is equal to the total sum of the loads carried by different materials
  - c) Change in length of components of both materials is same
  - d) Both b) and c)
- 3) If a member is subjected to a uniform bending moment (M) the radius of curvature of the deflected form of the member is given by
  - a)  $\frac{M}{R} = \frac{E}{I}$
  - b)  $\frac{M}{I} = \frac{E}{R}$
  - c)  $\frac{M}{I} = \frac{R}{E}$
  - d)  $\frac{M}{E} = RI$
- 4) Water thrust in case of unit length of a dam retaining water of depth 'h' and density 'w' is
  - a)  $\frac{wh^2}{4}$
  - b)  $\frac{wh^2}{3}$
  - c)  $\frac{wh^2}{2}$
  - d) None of these
- 5) In a transversely loaded beam, the maximum compressive stress occurs at the
  - a) Top edge
  - b) Bottom edge
  - c) Neutral axis
  - d) None of the above

P.T.O.



- 6) The maximum stress intensity at the base of a square column of area 'A' and side 'b' subjected to load 'W' at an eccentricity 'e' is equal to
- a)  $\frac{W}{A} \left(1 + \frac{2e}{b}\right)$     b)  $\frac{W}{A} \left(1 - \frac{4e}{b}\right)$     c)  $\frac{W}{A} \left(1 + \frac{6e}{b}\right)$     d)  $\frac{W}{A} \left(1 + \frac{8e}{b}\right)$
- 7) A cantilever of length (L) carries uniformly distributed load over the whole length. The shear force diagram will be
- a) Two equal and opposite rectangles    b) A rectangle  
c) Two equal and opposite triangles    d) A triangle
- 8) Strain energy stored in a cantilever with point load (P) at the tip of length (L) and flexural rigidity (EI) is given by
- a)  $\frac{P^2 L^3}{6EI}$     b)  $\frac{P^3 L^3}{6EI}$     c)  $\frac{P^3 L^2}{6EI}$     d)  $\frac{P^2 L^2}{6EI}$
- 9) The ratio of maximum shear stress to average shear stress in case of circular cross section is
- a) 2    b) 3/4    c) 2/3    d) 4/3
- 10) Solid shaft of diameter (D) and permissible shear stress ( $\tau$ ) transmits the torque equal to
- a)  $\frac{\pi}{32} \tau D^3$     b)  $\frac{\pi}{64} \tau D^3$     c)  $\frac{\pi}{16} \tau D^3$     d)  $\frac{\pi}{8} \tau D^3$
- 11) Moment of resistance in flitched beam is
- a) Addition of MR to materials  
b) Multiplication of two MR  
c) Equal to maximum MR of one material  
d) All the above
- 12) The strain at the common surface of a flitched beam is
- a) Same    b) Different    c) Maximum    d) Minimum
- 13) Polar moment of inertia of hollow circular shaft with external diameter D and internal diameter d is given by
- a)  $\frac{\pi}{32} [D^3 - d^3]$     b)  $\frac{\pi}{32} [D^4 - d^4]$     c)  $\frac{\pi}{64} [D^3 - d^3]$     d)  $\frac{\pi}{64} [D^4 - d^4]$
- 14) Usually, shear stress is maximum along the cross section at
- a) Extreme fibres  
b) Neutral axis  
c) Halfway between N. A. and extreme fibre  
d) Anywhere



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (Old – CGPA) Examination, 2017  
STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) In Section – I question 2 is **compulsory**. Solve **any two** of remaining.
  - 2) In Section – II question 6 is **compulsory**. Solve **any two** of remaining.
  - 3) Figure to the **right** indicate **full** marks.
  - 4) Assume suitable data **if necessary**.

SECTION – I

2. a) Derive an expression of axial deformation for bar subjected to axial load 'P' having cross sectional area 'A', length 'L' and Modulus of elasticity 'E'. 3
- b) A compound bar consists of brass portion AB of diameter 80 mm and steel portion BC of diameter 45 mm as shown in Figure 1 below. Supports A and B are rigid. If temperature raised through 120°C find the force exerted on support and stresses developed in each section.

$$\alpha_s = 11.2 \times 10^{-6}/^{\circ}\text{C}, E_s = 210 \text{ GPa}$$

$$\alpha_b = 20 \times 10^{-6}/^{\circ}\text{C}, E_b = 85 \text{ GPa}$$

7

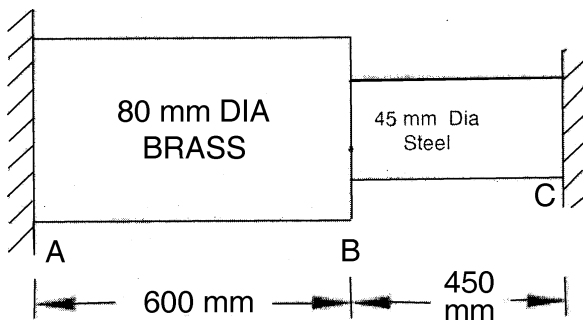


Figure 1

3. a) Give assumptions made in theory of simple bending. 2
- b) A tapering chimney of circular section 45 m high, 3.6 m external diameter at base, 2.4 m at top and constant internal diameter of 1.2 m is subjected to wind pressure of 1 kN/m<sup>2</sup> on projected area. Find the maximum and minimum stresses at the base. Assume the weight of chimney 4000 kN and coefficient of wind resistance 0.6. 7



4. A beam ABCD is loaded and supported as shown in Figure 2 below. Draw shear force and bending moment diagrams showing all important points. Show all calculations. 9

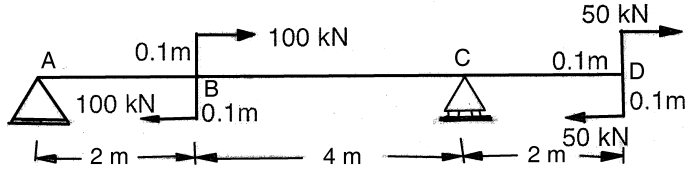
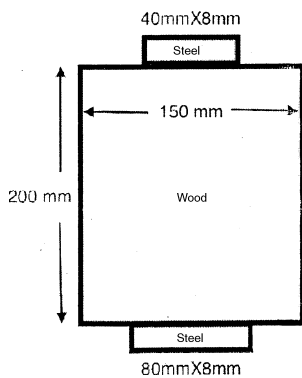


Figure 2

5. a) What do you mean by pure bending ? State assumptions made in theory of pure bending. 2  
 b) A simply supported beam has a span of 5 m. Its cross section profile is 'T' in section having flange 150 mm × 20 mm at top and web of 150 mm × 20 mm at bottom. The beam is subjected to UDL of 10 kN/m over a whole span. Calculate maximum bending stress. 7

SECTION – II

6. Solve **any two** : (5×2=10)  
 i) Find the change in volume of cylinder due to internal pressure of 3 N/mm<sup>2</sup> with dimensions of 100 cm dia, 1 cm thickness and 5 m length. Take  $E = 2 \times 10^5$  N/mm<sup>2</sup> and Poisson's ratio of 0.3.  
 ii) A simply supported beam with of 2 m span with 200 mm width and 300 mm deep carries UDL of  $w$  in N/m. Find value of  $w$  for the beam material with permissible shear stress of 1 N/mm<sup>2</sup>.  
 iii) Draw shear stress distribution diagram for circular and rectangular sections and show stresses at important locations.  
 7. Find the moment of resistance of the flitched beam shown in figure where permissible stress in steel is 127 N/mm<sup>2</sup> and in wood is 7 N/mm<sup>2</sup>.  
 Take  $E_s = 20E_w$ . 9



8. Find the diameter of a solid cylinder shaft, which transmits 350 kW at 100 rpm for permissible shear stress of 90 N/mm<sup>2</sup>. What percent of weight could be saved by using hollow shaft of internal dia of 0.6 of the external diameter with same length, material and maximum shear stress being same ? 9  
 9. Obtain an expression for strain energy stored in a body for  
 a) Gradually applied load  
 b) Suddenly applied load. 9



SLR-TJ – 24

Seat No.	
----------	--

Set **Q**

**S.E. (Civil) (Part – I) (Old – CGPA) Examination, 2017  
STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.
  - 3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) Strain energy stored in a cantilever with point load (P) at the tip of length (L) and flexural rigidity (EI) is given by
  - a)  $\frac{P^2L^3}{6EI}$
  - b)  $\frac{P^3L^3}{6EI}$
  - c)  $\frac{P^3L^2}{6EI}$
  - d)  $\frac{P^2L^2}{6EI}$
- 2) The ratio of maximum shear stress to average shear stress in case of circular cross section is
  - a) 2
  - b) 3/4
  - c) 2/3
  - d) 4/3
- 3) Solid shaft of diameter (D) and permissible shear stress ( $\tau$ ) transmits the torque equal to
  - a)  $\frac{\pi}{32} \tau D^3$
  - b)  $\frac{\pi}{64} \tau D^3$
  - c)  $\frac{\pi}{16} \tau D^3$
  - d)  $\frac{\pi}{8} \tau D^3$
- 4) Moment of resistance in flitched beam is
  - a) Addition of MR to materials
  - b) Multiplication of two MR
  - c) Equal to maximum MR of one material
  - d) All the above
- 5) The strain at the common surface of a flitched beam is
  - a) Same
  - b) Different
  - c) Maximum
  - d) Minimum

P.T.O.



6) Polar moment of inertia of hollow circular shaft with external diameter D and internal diameter d is given by

a)  $\frac{\pi}{32} [D^3 - d^3]$     b)  $\frac{\pi}{32} [D^4 - d^4]$     c)  $\frac{\pi}{64} [D^3 - d^3]$     d)  $\frac{\pi}{64} [D^4 - d^4]$

7) Usually, shear stress is maximum along the cross section at

- a) Extreme fibres
- b) Neutral axis
- c) Halfway between N. A. and extreme fibre
- d) Anywhere

8) A metallic bar firmly restrained at ends, on rise in temperature develops

- a) Shear stress
- b) Compressive stress
- c) Tensile stress
- d) Temperature stress

9) For the bars of composite section

- a) The load carried by different materials is the same as the total external load
- b) The total external load is equal to the total sum of the loads carried by different materials
- c) Change in length of components of both materials is same
- d) Both b) and c)

10) If a member is subjected to a uniform bending moment (M) the radius of curvature of the deflected form of the member is given by

a)  $\frac{M}{R} = \frac{E}{I}$     b)  $\frac{M}{I} = \frac{E}{R}$     c)  $\frac{M}{I} = \frac{R}{E}$     d)  $\frac{M}{E} = RI$

11) Water thrust in case of unit length of a dam retaining water of depth 'h' and density 'w' is

a)  $\frac{wh^2}{4}$     b)  $\frac{wh^2}{3}$     c)  $\frac{wh^2}{2}$     d) None of these

12) In a transversely loaded beam, the maximum compressive stress occurs at the

- a) Top edge
- b) Bottom edge
- c) Neutral axis
- d) None of the above

13) The maximum stress intensity at the base of a square column of area 'A' and side 'b' subjected to load 'W' at an eccentricity 'e' is equal to

a)  $\frac{W}{A} \left( 1 + \frac{2e}{b} \right)$     b)  $\frac{W}{A} \left( 1 - \frac{4e}{b} \right)$     c)  $\frac{W}{A} \left( 1 + \frac{6e}{b} \right)$     d)  $\frac{W}{A} \left( 1 + \frac{8e}{b} \right)$

14) A cantilever of length (L) carries uniformly distributed load over the whole length. The shear force diagram will be

- a) Two equal and opposite rectangles
- b) A rectangle
- c) Two equal and opposite triangles
- d) A triangle



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (Old – CGPA) Examination, 2017  
STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) In Section – I question 2 is **compulsory**. Solve **any two** of remaining.  
2) In Section – II question 6 is **compulsory**. Solve **any two** of remaining.  
3) Figure to the **right** indicate **full** marks.  
4) Assume suitable data **if necessary**.

SECTION – I

2. a) Derive an expression of axial deformation for bar subjected to axial load 'P' having cross sectional area 'A', length 'L' and Modulus of elasticity 'E'. 3
- b) A compound bar consists of brass portion AB of diameter 80 mm and steel portion BC of diameter 45 mm as shown in Figure 1 below. Supports A and B are rigid. If temperature raised through 120°C find the force exerted on support and stresses developed in each section.

$$\alpha_s = 11.2 \times 10^{-6}/^{\circ}\text{C}, E_s = 210 \text{ GPa}$$

$$\alpha_b = 20 \times 10^{-6}/^{\circ}\text{C}, E_b = 85 \text{ GPa}$$

7

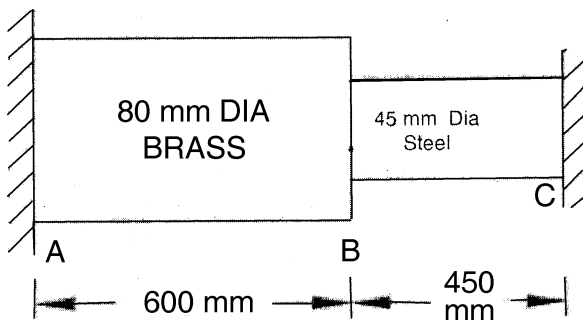


Figure 1

3. a) Give assumptions made in theory of simple bending. 2
- b) A tapering chimney of circular section 45 m high, 3.6 m external diameter at base, 2.4 m at top and constant internal diameter of 1.2 m is subjected to wind pressure of 1 kN/m<sup>2</sup> on projected area. Find the maximum and minimum stresses at the base. Assume the weight of chimney 4000 kN and coefficient of wind resistance 0.6. 7



4. A beam ABCD is loaded and supported as shown in Figure 2 below. Draw shear force and bending moment diagrams showing all important points. Show all calculations. 9

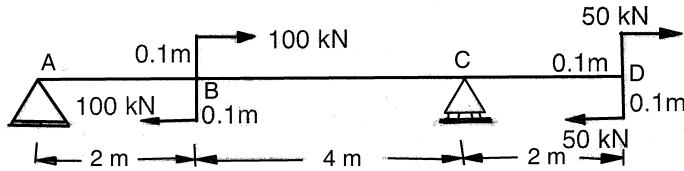


Figure 2

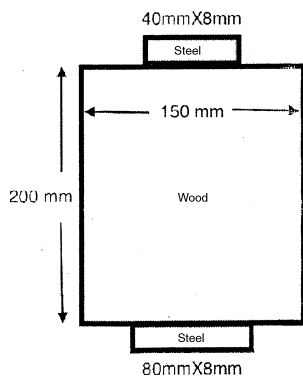
5. a) What do you mean by pure bending ? State assumptions made in theory of pure bending. 2  
 b) A simply supported beam has a span of 5 m. Its cross section profile is 'T' in section having flange 150 mm × 20 mm at top and web of 150 mm × 20 mm at bottom. The beam is subjected to UDL of 10 kN/m over a whole span. Calculate maximum bending stress. 7

SECTION – II

6. Solve **any two** : (5×2=10)  
 i) Find the change in volume of cylinder due to internal pressure of 3 N/mm<sup>2</sup> with dimensions of 100 cm dia, 1 cm thickness and 5 m length. Take  $E = 2 \times 10^5$  N/mm<sup>2</sup> and Poisson's ratio of 0.3.  
 ii) A simply supported beam with a span of 2 m, 200 mm width and 300 mm deep carries UDL of  $w$  in N/m. Find the value of  $w$  for the beam material with permissible shear stress of 1 N/mm<sup>2</sup>.  
 iii) Draw shear stress distribution diagrams for circular and rectangular sections and show stresses at important locations.  
 7. Find the moment of resistance of the flitched beam shown in figure where permissible stress in steel is 127 N/mm<sup>2</sup> and in wood is 7 N/mm<sup>2</sup>.

Take  $E_s = 20E_w$ .

9



8. Find the diameter of a solid cylinder shaft, which transmits 350 kW at 100 rpm for permissible shear stress of 90 N/mm<sup>2</sup>. What percent of weight could be saved by using a hollow shaft of internal dia of 0.6 of the external diameter with the same length, material, and maximum shear stress being the same? 9  
 9. Obtain an expression for strain energy stored in a body for  
 a) Gradually applied load  
 b) Suddenly applied load. 9





SLR-TJ – 24

Seat No.	
----------	--

Set **R**

**S.E. (Civil) (Part – I) (Old – CGPA) Examination, 2017  
STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.
  - 3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) In a transversely loaded beam, the maximum compressive stress occurs at the  
a) Top edge      b) Bottom edge      c) Neutral axis      d) None of the above
- 2) The maximum stress intensity at the base of a square column of area 'A' and side 'b' subjected to load 'W' at an eccentricity 'e' is equal to  
a)  $\frac{W}{A} \left(1 + \frac{2e}{b}\right)$       b)  $\frac{W}{A} \left(1 - \frac{4e}{b}\right)$       c)  $\frac{W}{A} \left(1 + \frac{6e}{b}\right)$       d)  $\frac{W}{A} \left(1 + \frac{8e}{b}\right)$
- 3) A cantilever of length (L) carries uniformly distributed load over the whole length. The shear force diagram will be  
a) Two equal and opposite rectangles      b) A rectangle  
c) Two equal and opposite triangles      d) A triangle
- 4) Strain energy stored in a cantilever with point load (P) at the tip of length (L) and flexural rigidity (EI) is given by  
a)  $\frac{P^2L^3}{6EI}$       b)  $\frac{P^3L^3}{6EI}$       c)  $\frac{P^3L^2}{6EI}$       d)  $\frac{P^2L^2}{6EI}$
- 5) The ratio of maximum shear stress to average shear stress in case of circular cross section is  
a) 2      b) 3/4      c) 2/3      d) 4/3

P.T.O.



- 6) Solid shaft of diameter (D) and permissible shear stress ( $\tau$ ) transmits the torque equal to
- a)  $\frac{\pi}{32} \tau D^3$       b)  $\frac{\pi}{64} \tau D^3$       c)  $\frac{\pi}{16} \tau D^3$       d)  $\frac{\pi}{8} \tau D^3$
- 7) Moment of resistance in flitched beam is
- a) Addition of MR to materials  
b) Multiplication of two MR  
c) Equal to maximum MR of one material  
d) All the above
- 8) The strain at the common surface of a flitched beam is
- a) Same      b) Different      c) Maximum      d) Minimum
- 9) Polar moment of inertia of hollow circular shaft with external diameter D and internal diameter d is given by
- a)  $\frac{\pi}{32} [D^3 - d^3]$       b)  $\frac{\pi}{32} [D^4 - d^4]$       c)  $\frac{\pi}{64} [D^3 - d^3]$       d)  $\frac{\pi}{64} [D^4 - d^4]$
- 10) Usually, shear stress is maximum along the cross section at
- a) Extreme fibres  
b) Neutral axis  
c) Halfway between N. A. and extreme fibre  
d) Anywhere
- 11) A metallic bar firmly restrained at ends, on rise in temperature develops
- a) Shear stress      b) Compressive stress  
c) Tensile stress      d) Temperature stress
- 12) For the bars of composite section
- a) The load carried by different materials is the same as the total external load  
b) The total external load is equal to the total sum of the loads carried by different materials  
c) Change in length of components of both materials is same  
d) Both b) and c)
- 13) If a member is subjected to a uniform bending moment (M) the radius of curvature of the deflected form of the member is given by
- a)  $\frac{M}{R} = \frac{E}{I}$       b)  $\frac{M}{I} = \frac{E}{R}$       c)  $\frac{M}{I} = \frac{R}{E}$       d)  $\frac{M}{E} = RI$
- 14) Water thrust in case of unit length of a dam retaining water of depth 'h' and density 'w' is
- a)  $\frac{wh^2}{4}$       b)  $\frac{wh^2}{3}$       c)  $\frac{wh^2}{2}$       d) None of these
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (Old – CGPA) Examination, 2017  
STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) In Section – I question 2 is **compulsory**. Solve **any two** of remaining.
  - 2) In Section – II question 6 is **compulsory**. Solve **any two** of remaining.
  - 3) Figure to the **right** indicate **full** marks.
  - 4) Assume suitable data **if necessary**.

SECTION – I

- 2. a) Derive an expression of axial deformation for bar subjected to axial load 'P' having cross sectional area 'A', length 'L' and Modulus of elasticity 'E'. 3
- b) A compound bar consists of brass portion AB of diameter 80 mm and steel portion BC of diameter 45 mm as shown in Figure 1 below. Supports A and B are rigid. If temperature raised through 120°C find the force exerted on support and stresses developed in each section.

$\alpha_s = 11.2 \times 10^{-6}/^{\circ}\text{C}$ ,  $E_s = 210 \text{ GPa}$

$\alpha_b = 20 \times 10^{-6}/^{\circ}\text{C}$ ,  $E_b = 85 \text{ GPa}$

7

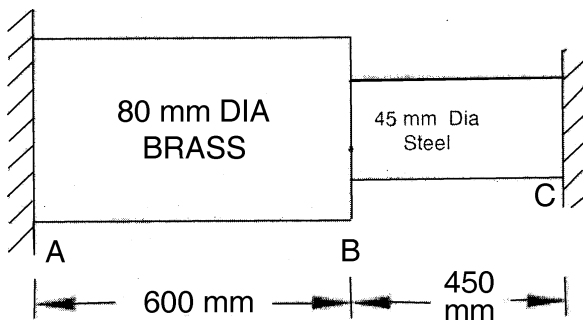


Figure 1

- 3. a) Give assumptions made in theory of simple bending. 2
- b) A tapering chimney of circular section 45 m high, 3.6 m external diameter at base, 2.4 m at top and constant internal diameter of 1.2 m is subjected to wind pressure of 1 kN/m<sup>2</sup> on projected area. Find the maximum and minimum stresses at the base. Assume the weight of chimney 4000 kN and coefficient of wind resistance 0.6. 7



4. A beam ABCD is loaded and supported as shown in Figure 2 below. Draw shear force and bending moment diagrams showing all important points. Show all calculations. 9

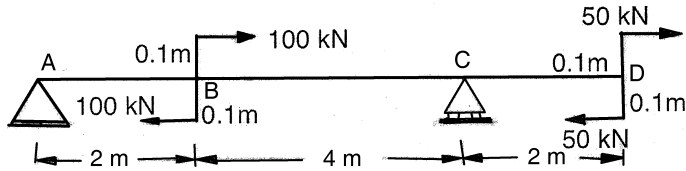


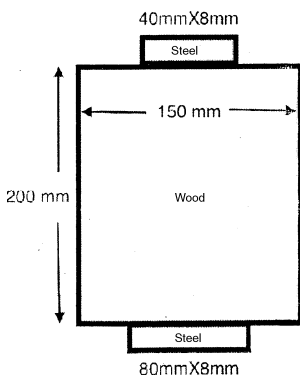
Figure 2

5. a) What do you mean by pure bending ? State assumptions made in theory of pure bending. 2  
 b) A simply supported beam has a span of 5 m. Its cross section profile is 'T' in section having flange 150 mm × 20 mm at top and web of 150 mm × 20 mm at bottom. The beam is subjected to UDL of 10 kN/m over a whole span. Calculate maximum bending stress. 7

SECTION – II

6. Solve **any two** : (5×2=10)  
 i) Find the change in volume of cylinder due to internal pressure of 3 N/mm<sup>2</sup> with dimensions of 100 cm dia, 1 cm thickness and 5 m length. Take  $E = 2 \times 10^5$  N/mm<sup>2</sup> and Poisson's ratio of 0.3.  
 ii) A simply supported beam with of 2 m span with 200 mm width and 300 mm deep carries UDL of  $w$  in N/m. Find value of  $w$  for the beam material with permissible shear stress of 1 N/mm<sup>2</sup>.  
 iii) Draw shear stress distribution diagram for circular and rectangular sections and show stresses at important locations.  
 7. Find the moment of resistance of the flitched beam shown in figure where permissible stress in steel is 127 N/mm<sup>2</sup> and in wood is 7 N/mm<sup>2</sup>.

Take  $E_s = 20E_w$ .



8. Find the diameter of a solid cylinder shaft, which transmits 350 kW at 100 rpm for permissible shear stress of 90 N/mm<sup>2</sup>. What percent of weight could be saved by using hollow shaft of internal dia of 0.6 of the external diameter with same length, material and maximum shear stress being same ? 9  
 9. Obtain an expression for strain energy stored in a body for  
 a) Gradually applied load  
 b) Suddenly applied load. 9



SLR-TJ – 24

Seat No.	
----------	--

Set **S**

**S.E. (Civil) (Part – I) (Old – CGPA) Examination, 2017  
STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.
  - 3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

**14**

- 1) Solid shaft of diameter (D) and permissible shear stress ( $\tau$ ) transmits the torque equal to
  - a)  $\frac{\pi}{32} \tau D^3$
  - b)  $\frac{\pi}{64} \tau D^3$
  - c)  $\frac{\pi}{16} \tau D^3$
  - d)  $\frac{\pi}{8} \tau D^3$
- 2) Moment of resistance in flitched beam is
  - a) Addition of MR to materials
  - b) Multiplication of two MR
  - c) Equal to maximum MR of one material
  - d) All the above
- 3) The strain at the common surface of a flitched beam is
  - a) Same
  - b) Different
  - c) Maximum
  - d) Minimum
- 4) Polar moment of inertia of hollow circular shaft with external diameter D and internal diameter d is given by
  - a)  $\frac{\pi}{32} [D^3 - d^3]$
  - b)  $\frac{\pi}{32} [D^4 - d^4]$
  - c)  $\frac{\pi}{64} [D^3 - d^3]$
  - d)  $\frac{\pi}{64} [D^4 - d^4]$

P.T.O.



- 5) Usually, shear stress is maximum along the cross section at
- Extreme fibres
  - Neutral axis
  - Halfway between N. A. and extreme fibre
  - Anywere
- 6) A metallic bar firmly restrained at ends, on rise in temperature develops
- Shear stress
  - Compressive stress
  - Tensile stress
  - Temperature stress
- 7) For the bars of composite section
- The load carried by different materials is the same as the total external load
  - The total external load is equal to the total sum of the loads carried by different materials
  - Change in length of components of both materials is same
  - Both b) and c)
- 8) If a member is subjected to a uniform bending moment (M) the radius of curvature of the deflected form of the member is given by
- $\frac{M}{R} = \frac{E}{I}$
  - $\frac{M}{I} = \frac{E}{R}$
  - $\frac{M}{I} = \frac{R}{E}$
  - $\frac{M}{E} = RI$
- 9) Water thrust in case of unit length of a dam retaining water of depth 'h' and density 'w' is
- $\frac{wh^2}{4}$
  - $\frac{wh^2}{3}$
  - $\frac{wh^2}{2}$
  - None of these
- 10) In a transversely loaded beam, the maximum compressive stress occurs at the
- Top edge
  - Bottom edge
  - Neutral axis
  - None of the above
- 11) The maximum stress intensity at the base of a square column of area 'A' and side 'b' subjected to load 'W' at an eccentricity 'e' is equal to
- $\frac{W}{A} \left( 1 + \frac{2e}{b} \right)$
  - $\frac{W}{A} \left( 1 - \frac{4e}{b} \right)$
  - $\frac{W}{A} \left( 1 + \frac{6e}{b} \right)$
  - $\frac{W}{A} \left( 1 + \frac{8e}{b} \right)$
- 12) A cantilever of length (L) carries uniformly distributed load over the whole length. The shear force diagram will be
- Two equal and opposite rectangles
  - A rectangle
  - Two equal and opposite triangles
  - A triangle
- 13) Strain energy stored in a cantilever with point load (P) at the tip of length (L) and flexural rigidity (EI) is given by
- $\frac{P^2L^3}{6EI}$
  - $\frac{P^3L^3}{6EI}$
  - $\frac{P^3L^2}{6EI}$
  - $\frac{P^2L^2}{6EI}$
- 14) The ratio of maximum shear stress to average shear stress in case of circular cross section is
- 2
  - 3/4
  - 2/3
  - 4/3



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (Old – CGPA) Examination, 2017  
STRUCTURAL MECHANICS – I**

Day and Date : Thursday, 14-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) In Section – I question 2 is **compulsory**. Solve **any two** of remaining.  
2) In Section – II question 6 is **compulsory**. Solve **any two** of remaining.  
3) Figure to the **right** indicate **full** marks.  
4) Assume suitable data **if necessary**.

SECTION – I

2. a) Derive an expression of axial deformation for bar subjected to axial load 'P' having cross sectional area 'A', length 'L' and Modulus of elasticity 'E'. 3
- b) A compound bar consists of brass portion AB of diameter 80 mm and steel portion BC of diameter 45 mm as shown in Figure 1 below. Supports A and B are rigid. If temperature raised through 120°C find the force exerted on support and stresses developed in each section.

$$\alpha_s = 11.2 \times 10^{-6}/^{\circ}\text{C}, E_s = 210 \text{ GPa}$$

$$\alpha_b = 20 \times 10^{-6}/^{\circ}\text{C}, E_b = 85 \text{ GPa}$$

7

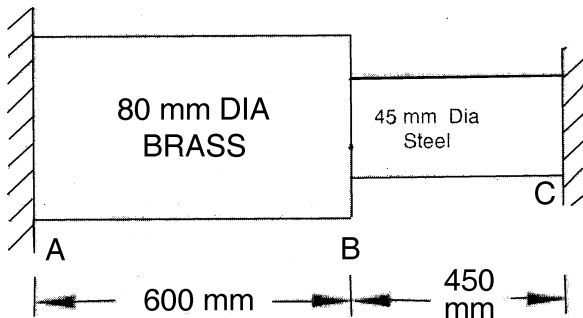


Figure 1

3. a) Give assumptions made in theory of simple bending. 2
- b) A tapering chimney of circular section 45 m high, 3.6 m external diameter at base, 2.4 m at top and constant internal diameter of 1.2 m is subjected to wind pressure of 1 kN/m<sup>2</sup> on projected area. Find the maximum and minimum stresses at the base. Assume the weight of chimney 4000 kN and coefficient of wind resistance 0.6. 7



4. A beam ABCD is loaded and supported as shown in Figure 2 below. Draw shear force and bending moment diagrams showing all important points. Show all calculations. 9

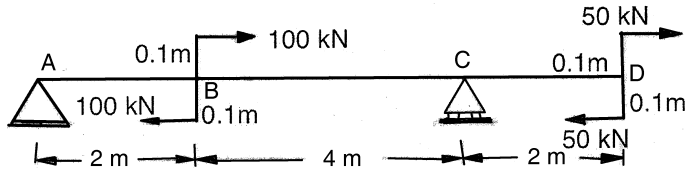
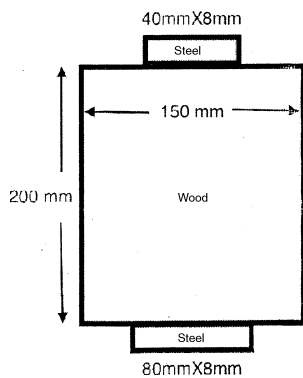


Figure 2

5. a) What do you mean by pure bending ? State assumptions made in theory of pure bending. 2  
 b) A simply supported beam has a span of 5 m. Its cross section profile is 'T' in section having flange 150 mm × 20 mm at top and web of 150 mm × 20 mm at bottom. The beam is subjected to UDL of 10 kN/m over a whole span. Calculate maximum bending stress. 7

SECTION – II

6. Solve **any two** : (5×2=10)
- i) Find the change in volume of cylinder due to internal pressure of 3 N/mm<sup>2</sup> with dimensions of 100 cm dia, 1 cm thickness and 5 m length. Take  $E = 2 \times 10^5$  N/mm<sup>2</sup> and Poisson's ratio of 0.3.
  - ii) A simply supported beam with a 2 m span, 200 mm width and 300 mm deep carries a UDL of  $w$  in N/m. Find the value of  $w$  for the beam material with a permissible shear stress of 1 N/mm<sup>2</sup>.
  - iii) Draw shear stress distribution diagrams for circular and rectangular sections and show stresses at important locations.
7. Find the moment of resistance of the flitched beam shown in figure where permissible stress in steel is 127 N/mm<sup>2</sup> and in wood is 7 N/mm<sup>2</sup>.  
 Take  $E_s = 20E_w$ . 9



8. Find the diameter of a solid cylinder shaft, which transmits 350 kW at 100 rpm for a permissible shear stress of 90 N/mm<sup>2</sup>. What percent of weight could be saved by using a hollow shaft of internal dia of 0.6 of the external diameter with the same length, material, and maximum shear stress being the same? 9
9. Obtain an expression for strain energy stored in a body for
- a) Gradually applied load
  - b) Suddenly applied load. 9





SLR-TJ – 25

Seat No.	
----------	--

Set	<b>P</b>
-----	----------

**S.E. (Civil) (Old) (Part – I) Examination, 2017  
SURVEYING – I  
(CGPA Pattern)**

Day and Date : Saturday, 16-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) Q. No. 2 from Section I is **compulsory**. Solve **any two full** question from Q. No. 3 to Q. No. 5.  
3) Q. No. 6 from Section II is **compulsory**. Solve **any two full** questions from Q. No. 7 to Q. No. 9.  
4) Make suitable assumptions **if required** and mention it **clearly**.  
5) Figures to **right** indicate **full** marks.  
6) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(1 mark each)**
- 1) Correction due to refraction is given by \_\_\_\_\_  
a)  $0.0112 D^2$       b)  $0.0785 D^2$       c)  $0.0673 D^2$       d)  $0.0012 D^2$
- 2) Pick out the correct statement  
a) The sensitivity of a bubble tube increases with the increase of radius of curvature of the bubble tube  
b) The sensitivity of a bubble tube increases with the increase of the length of the vapor bubble  
c) The sensitivity of a bubble tube will be more if the diameter of the bubble tube is more  
d) All of the above
- 3) The departure of a line of a traverse is its length multiplied by \_\_\_\_\_  
a) Cosine of reduced bearing      b) Sine of reduced bearing  
c) Secant of reduced bearing      d) Tangent of reduced bearing
- 4) For an open traverse, which of the following is correct ?  
a)  $\Sigma \text{Latitude} = 0$       b)  $\Sigma \text{departure} = 0$   
c) Both a) and b)      d) None of the above

P.T.O.



- 5) Pick out the correct statement.
- i) An example of a negative co-ordinate is the south co-ordinate.
  - ii) The method of plotting by independent co-ordinate is better than by consecutive co-ordinates.
- a) Only (i) is correct                      b) Only (ii) is correct  
c) Both (i) and (ii) are correct        d) None of correct
- 6) The difference between face left and face right observations of a theodolite is 3'. The error is \_\_\_\_\_
- a) 45"                      b) 1' 30"                      c) 3'                      d) 0'
- 7) The surface tangential to a level surface is said to be a \_\_\_\_\_
- a) Vertical surface                      b) Horizontal surface  
c) Ground surface                      d) None of these
- 8) It is necessary to go to one of the plotted stations in the method of resection
- a) By through compass                      b) By back ray  
c) Both a) and b)                      d) By three point
- 9) Inaccessible point can be located by
- a) Radiation                      b) Traversing                      c) Intersection                      d) Resection
- 10) During orientation of a plane table
- a) Farthest point is sighted                      b) Nearest point is sighted  
c) Either a) or b)                      d) The previous station is sighted
- 11) In Simpsons formula the line joining the top of the ordinates is considered
- a) Parabolic                      b) Circular                      c) Elliptical                      d) None of these
- 12) A contour line intersects a ridge line
- a) Obliquely                      b) Perpendicularly  
c) Vertical                      d) Either a) or c)
- 13) Number of sets of Tellurometer for distance measurement is
- a) One                      b) Two                      c) Three                      d) Four
- 14) Geodimeter uses
- a) Visible light                      b) Microwaved signal  
c) Infrared radiation                      d) None of these
-



Seat No.	
-------------	--

**S.E. (Civil) (Old) (Part – I) Examination, 2017  
SURVEYING – I  
(CGPA Pattern)**

Day and Date : Saturday, 16-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions:** 1) Q. No. 2 from Section I is **compulsory**. Solve **any two full** question from Q. No. 3 to Q. No. 5.  
 2) Q. No. 6 from Section II is **compulsory**. Solve **any two full** questions from Q. No. 7 to Q. No. 9.  
 3) Make suitable assumptions **if required** and mention it **clearly**.  
 4) Figures to **right** indicate **full** marks.

SECTION – I

2. a) What are the effects of the earth’s curvature and atmospheric refraction on levelling ? 3
- b) The following notes refer to the reciprocal level’s taken with one level. Find
- i) True R.L. of B’
  - ii) Combined correction for curvature and refraction
  - iii) The error in collimation adjustment of the instrument. 7

Inst. Station	Staff Reading on		Remark
	A	B	
A	1.03	1.630	Distance AB = 800 m R.L. of A = 450 m
B	0.95	1.540	

3. a) What is Reciprocal Leveling ? Explain with neat sketches. 3
- b) Find the radius of curvature of the bubble tube if the length of one division is 2 mm and if the angular value of one division is
- a) 20 sec
  - b) 1 minute. 6



4. a) How can a line be extended by a theodolite ? 2  
 b) An incomplete traverse table is obtained as follows :

LINE	Length (m)	Bearing
AB	100.0	?
BC	80.5	140°30'
CD	60.0	220°30'
DA	?	310°15'

Calculate the length of DA, and bearing of line AB. 7

5. Write short note on (**Each 3** mark) :
- Describe working of Box sextant with sketch.
  - Construction and use of proportional compass.
  - Construction and use of a hand level.

#### SECTION – II

6. a) Explain the use of total station in surveying. 7  
 b) Write the difference between the geodimeter and tellerometer. 3
7. a) If the points are inaccessible for locating, which method of plane table surveying would you apply ? Explain in detail. 6  
 b) State the accessory required for plane table surveying with its purpose. 3
8. a) State different applications of contour map. Explain one in detail. 6  
 b) Discuss any one method of calculation of earthwork volume. 3
9. Write a short note on : (3×3=9)
- Mechanical planimeter
  - Tangent Clinometer
  - Advantages of plane table surveying.



SLR-TJ – 25

Seat No.	
----------	--

Set	Q
-----	---

**S.E. (Civil) (Old) (Part – I) Examination, 2017  
SURVEYING – I  
(CGPA Pattern)**

Day and Date : Saturday, 16-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) Q. No. 2 from Section I is **compulsory**. Solve **any two full** question from Q. No. 3 to Q. No. 5.  
3) Q. No. 6 from Section II is **compulsory**. Solve **any two full** questions from Q. No. 7 to Q. No. 9.  
4) Make suitable assumptions **if required** and mention it **clearly**.  
5) Figures to **right** indicate **full** marks.  
6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(1 mark each)**
- 1) It is necessary to go to one of the plotted stations in the method of resection  
a) By through compass                      b) By back ray  
c) Both a) and b)                              d) By three point
  - 2) Inaccessible point can be located by  
a) Radiation                      b) Traversing                      c) Intersection                      d) Resection
  - 3) During orientation of a plane table  
a) Farthest point is sighted                      b) Nearest point is sighted  
c) Either a) or b)                                      d) The previous station is sighted
  - 4) In Simpsons formula the line joining the top of the ordinates is considered  
a) Parabolic                      b) Circular                      c) Elliptical                      d) None of these
  - 5) A contour line intersects a ridge line  
a) Obliquely                                      b) Perpendicularly  
c) Vertical    d) Either a) or c)
  - 6) Number of sets of Tellurometer for distance measurement is  
a) One                                      b) Two                                      c) Three                                      d) Four

P.T.O.



- 7) Geodimeter uses
- a) Visible light
  - b) Microwaved signal
  - c) Infrared radiation
  - d) None of these
- 8) Correction due to refraction is given by \_\_\_\_\_
- a)  $0.0112 D^2$
  - b)  $0.0785 D^2$
  - c)  $0.0673 D^2$
  - d)  $0.0012 D^2$
- 9) Pick out the correct statement
- a) The sensitivity of a bubble tube increases with the increase of radius of curvature of the bubble tube
  - b) The sensitivity of a bubble tube increases with the increase of the length of the vapor bubble
  - c) The sensitivity of a bubble tube will be more if the diameter of the bubble tube is more
  - d) All of the above
- 10) The departure of a line of a traverse is its length multiplied by \_\_\_\_\_
- a) Cosine of reduced bearing
  - b) Sine of reduced bearing
  - c) Secant of reduced bearing
  - d) Tangent of reduced bearing
- 11) For an open traverse, which of the following is correct ?
- a)  $\Sigma \text{Latitude} = 0$
  - b)  $\Sigma \text{departure} = 0$
  - c) Both a) and b)
  - d) None of the above
- 12) Pick out the correct statement.
- i) An example of a negative co-ordinate is the south co-ordinate.
  - ii) The method of plotting by independent co-ordinate is better than by consecutive co-ordinates.
- a) Only (i) is correct
  - b) Only (ii) is correct
  - c) Both (i) and (ii) are correct
  - d) None of correct
- 13) The difference between face left and face right observations of a theodolite is  $3'$ . The error is \_\_\_\_\_
- a)  $45''$
  - b)  $1'30''$
  - c)  $3'$
  - d)  $0'$
- 14) The surface tangential to a level surface is said to be a \_\_\_\_\_
- a) Vertical surface
  - b) Horizontal surface
  - c) Ground surface
  - d) None of these
-



Seat No.	
-------------	--

**S.E. (Civil) (Old) (Part – I) Examination, 2017  
SURVEYING – I  
(CGPA Pattern)**

Day and Date : Saturday, 16-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions:** 1) Q. No. 2 from Section I is **compulsory**. Solve **any two full** question from Q. No. 3 to Q. No. 5.  
 2) Q. No. 6 from Section II is **compulsory**. Solve **any two full** questions from Q. No. 7 to Q. No. 9.  
 3) Make suitable assumptions **if required** and mention it **clearly**.  
 4) Figures to **right** indicate **full** marks.

SECTION – I

2. a) What are the effects of the earth’s curvature and atmospheric refraction on levelling ? 3
- b) The following notes refer to the reciprocal level’s taken with one level. Find
- i) True R.L. of B’
  - ii) Combined correction for curvature and refraction
  - iii) The error in collimation adjustment of the instrument. 7

Inst. Station	Staff Reading on		Remark
	A	B	
A	1.03	1.630	Distance AB = 800 m R.L. of A = 450 m
B	0.95	1.540	

3. a) What is Reciprocal Leveling ? Explain with neat sketches. 3
- b) Find the radius of curvature of the bubble tube if the length of one division is 2 mm and if the angular value of one division is
- a) 20 sec
  - b) 1 minute. 6

Set Q



4. a) How can a line be extended by a theodolite ? 2  
 b) An incomplete traverse table is obtained as follows :

LINE	Length (m)	Bearing
AB	100.0	?
BC	80.5	140°30'
CD	60.0	220°30'
DA	?	310°15'

Calculate the length of DA, and bearing of line AB. 7

5. Write short note on (**Each 3** mark) :
- Describe working of Box sextant with sketch.
  - Construction and use of proportional compass.
  - Construction and use of a hand level.

#### SECTION – II

6. a) Explain the use of total station in surveying. 7  
 b) Write the difference between the geodimeter and tellerometer. 3
7. a) If the points are inaccessible for locating, which method of plane table surveying would you apply ? Explain in detail. 6  
 b) State the accessory required for plane table surveying with its purpose. 3
8. a) State different applications of contour map. Explain one in detail. 6  
 b) Discuss any one method of calculation of earthwork volume. 3
9. Write a short note on : (3×3=9)
- Mechanical planimeter
  - Tangent Clinometer
  - Advantages of plane table surveying.





SLR-TJ – 25

Seat No.	
----------	--

Set	R
-----	---

**S.E. (Civil) (Old) (Part – I) Examination, 2017  
SURVEYING – I  
(CGPA Pattern)**

Day and Date : Saturday, 16-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) Q. No. 2 from Section I is **compulsory**. Solve **any two full** question from Q. No. 3 to Q. No. 5.
  - 3) Q. No. 6 from Section II is **compulsory**. Solve **any two full** questions from Q. No. 7 to Q. No. 9.
  - 4) Make suitable assumptions **if required** and mention it **clearly**.
  - 5) Figures to **right** indicate **full** marks.
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(1 mark each)**
- 1) Pick out the correct statement.
    - i) An example of a negative co-ordinate is the south co-ordinate.
    - ii) The method of plotting by independent co-ordinate is better than by consecutive co-ordinates.

a) Only (i) is correct	b) Only (ii) is correct
c) Both (i) and (ii) are correct	d) None of correct
  - 2) The difference between face left and face right observations of a theodolite is 3' . The error is \_\_\_\_\_

a) 45"	b) 1' 30"	c) 3'	d) 0'
--------	-----------	-------	-------
  - 3) The surface tangential to a level surface is said to be a \_\_\_\_\_

a) Vertical surface	b) Horizontal surface
c) Ground surface	d) None of these
  - 4) It is necessary to go to one of the plotted stations in the method of resection

a) By through compass	b) By back ray
c) Both a) and b)	d) By three point

P.T.O.



- 5) Inaccessible point can be located by  
a) Radiation            b) Traversing            c) Intersection            d) Resection
- 6) During orientation of a plane table  
a) Farthest point is sighted            b) Nearest point is sighted  
c) Either a) or b)            d) The previous station is sighted
- 7) In Simpsons formula the line joining the top of the ordinates is considered  
a) Parabolic            b) Circular            c) Elliptical            d) None of these
- 8) A contour line intersects a ridge line  
a) Obliquely            b) Perpendicularly  
c) Vertical            d) Either a) or c)
- 9) Number of sets of Tellurometer for distance measurement is  
a) One            b) Two            c) Three            d) Four
- 10) Geodimeter uses  
a) Visible light            b) Microwaved signal  
c) Infrared radiation            d) None of these
- 11) Correction due to refraction is given by \_\_\_\_\_  
a)  $0.0112 D^2$             b)  $0.0785 D^2$             c)  $0.0673 D^2$             d)  $0.0012 D^2$
- 12) Pick out the correct statement  
a) The sensitivity of a bubble tube increases with the increase of radius of curvature of the bubble tube  
b) The sensitivity of a bubble tube increases with the increase of the length of the vapor bubble  
c) The sensitivity of a bubble tube will be more if the diameter of the bubble tube is more  
d) All of the above
- 13) The departure of a line of a traverse is its length multiplied by \_\_\_\_\_  
a) Cosine of reduced bearing            b) Sine of reduced bearing  
c) Secant of reduced bearing            d) Tangent of reduced bearing
- 14) For an open traverse, which of the following is correct ?  
a)  $\sum \text{Latitude} = 0$             b)  $\sum \text{departure} = 0$   
c) Both a) and b)            d) None of the above
-



Seat No.	
-------------	--

**S.E. (Civil) (Old) (Part – I) Examination, 2017  
SURVEYING – I  
(CGPA Pattern)**

Day and Date : Saturday, 16-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions:** 1) Q. No. 2 from Section I is **compulsory**. Solve **any two full** question from Q. No. 3 to Q. No. 5.  
2) Q. No. 6 from Section II is **compulsory**. Solve **any two full** questions from Q. No. 7 to Q. No. 9.  
3) Make suitable assumptions **if required** and mention it **clearly**.  
4) Figures to **right** indicate **full** marks.

SECTION – I

2. a) What are the effects of the earth’s curvature and atmospheric refraction on levelling ? 3
- b) The following notes refer to the reciprocal level’s taken with one level. Find
- i) True R.L. of B’
  - ii) Combined correction for curvature and refraction
  - iii) The error in collimation adjustment of the instrument. 7

Inst. Station	Staff Reading on		Remark
	A	B	
A	1.03	1.630	Distance AB = 800 m R.L. of A = 450 m
B	0.95	1.540	

3. a) What is Reciprocal Leveling ? Explain with neat sketches. 3
- b) Find the radius of curvature of the bubble tube if the length of one division is 2 mm and if the angular value of one division is
- a) 20 sec
  - b) 1 minute. 6



4. a) How can a line be extended by a theodolite ? 2  
 b) An incomplete traverse table is obtained as follows :

LINE	Length (m)	Bearing
AB	100.0	?
BC	80.5	140°30'
CD	60.0	220°30'
DA	?	310°15'

Calculate the length of DA, and bearing of line AB. 7

5. Write short note on (**Each 3** mark) :
- Describe working of Box sextant with sketch.
  - Construction and use of proportional compass.
  - Construction and use of a hand level.

#### SECTION – II

6. a) Explain the use of total station in surveying. 7  
 b) Write the difference between the geodimeter and tellerometer. 3
7. a) If the points are inaccessible for locating, which method of plane table surveying would you apply ? Explain in detail. 6  
 b) State the accessory required for plane table surveying with its purpose. 3
8. a) State different applications of contour map. Explain one in detail. 6  
 b) Discuss any one method of calculation of earthwork volume. 3
9. Write a short note on : (3×3=9)
- Mechanical planimeter
  - Tangent Clinometer
  - Advantages of plane table surveying.



SLR-TJ – 25

Seat No.	
----------	--

Set	<b>S</b>
-----	----------

**S.E. (Civil) (Old) (Part – I) Examination, 2017  
SURVEYING – I  
(CGPA Pattern)**

Day and Date : Saturday, 16-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) Q. No. 2 from Section I is **compulsory**. Solve **any two full** question from Q. No. 3 to Q. No. 5.  
3) Q. No. 6 from Section II is **compulsory**. Solve **any two full** questions from Q. No. 7 to Q. No. 9.  
4) Make suitable assumptions **if required** and mention it **clearly**.  
5) Figures to **right** indicate **full** marks.  
6) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(1 mark each)**
- During orientation of a plane table
    - Farthest point is sighted
    - Nearest point is sighted
    - Either a) or b)
    - The previous station is sighted
  - In Simpsons formula the line joining the top of the ordinates is considered
    - Parabolic
    - Circular
    - Elliptical
    - None of these
  - A contour line intersects a ridge line
    - Obliquely
    - Perpendicularly
    - Vertical
    - Either a) or c)
  - Number of sets of Tellurometer for distance measurement is
    - One
    - Two
    - Three
    - Four
  - Geodimeter uses
    - Visible light
    - Microwaved signal
    - Infrared radiation
    - None of these
  - Correction due to refraction is given by \_\_\_\_\_
    - $0.0112 D^2$
    - $0.0785 D^2$
    - $0.0673 D^2$
    - $0.0012 D^2$

P.T.O.



- 7) Pick out the correct statement
- The sensitivity of a bubble tube increases with the increase of radius of curvature of the bubble tube
  - The sensitivity of a bubble tube increases with the increase of the length of the vapor bubble
  - The sensitivity of a bubble tube will be more if the diameter of the bubble tube is more
  - All of the above
- 8) The departure of a line of a traverse is its length multiplied by \_\_\_\_\_
- Cosine of reduced bearing
  - Sine of reduced bearing
  - Secant of reduced bearing
  - Tangent of reduced bearing
- 9) For an open traverse, which of the following is correct ?
- $\sum \text{Latitude} = 0$
  - $\sum \text{departure} = 0$
  - Both a) and b)
  - None of the above
- 10) Pick out the correct statement.
- An example of a negative co-ordinate is the south co-ordinate.
  - The method of plotting by independent co-ordinate is better than by consecutive co-ordinates.
- Only (i) is correct
  - Only (ii) is correct
  - Both (i) and (ii) are correct
  - None of correct
- 11) The difference between face left and face right observations of a theodolite is  $3'$ . The error is \_\_\_\_\_
- $45''$
  - $1' 30''$
  - $3'$
  - $0'$
- 12) The surface tangential to a level surface is said to be a \_\_\_\_\_
- Vertical surface
  - Horizontal surface
  - Ground surface
  - None of these
- 13) It is necessary to go to one of the plotted stations in the method of resection
- By through compass
  - By back ray
  - Both a) and b)
  - By three point
- 14) Inaccessible point can be located by
- Radiation
  - Traversing
  - Intersection
  - Resection
-



Seat No.	
-------------	--

**S.E. (Civil) (Old) (Part – I) Examination, 2017  
SURVEYING – I  
(CGPA Pattern)**

Day and Date : Saturday, 16-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions:** 1) Q. No. 2 from Section I is **compulsory**. Solve **any two full** question from Q. No. 3 to Q. No. 5.  
 2) Q. No. 6 from Section II is **compulsory**. Solve **any two full** questions from Q. No. 7 to Q. No. 9.  
 3) Make suitable assumptions **if required** and mention it **clearly**.  
 4) Figures to **right** indicate **full** marks.

SECTION – I

2. a) What are the effects of the earth’s curvature and atmospheric refraction on levelling ? 3
- b) The following notes refer to the reciprocal level’s taken with one level. Find
- i) True R.L. of B’
  - ii) Combined correction for curvature and refraction
  - iii) The error in collimation adjustment of the instrument. 7

Inst. Station	Staff Reading on		Remark
	A	B	
A	1.03	1.630	Distance AB = 800 m R.L. of A = 450 m
B	0.95	1.540	

3. a) What is Reciprocal Leveling ? Explain with neat sketches. 3
- b) Find the radius of curvature of the bubble tube if the length of one division is 2 mm and if the angular value of one division is
- a) 20 sec
  - b) 1 minute. 6



4. a) How can a line be extended by a theodolite ? 2  
 b) An incomplete traverse table is obtained as follows :

LINE	Length (m)	Bearing
AB	100.0	?
BC	80.5	140°30'
CD	60.0	220°30'
DA	?	310°15'

Calculate the length of DA, and bearing of line AB. 7

5. Write short note on (**Each 3** mark) :
- Describe working of Box sextant with sketch.
  - Construction and use of proportional compass.
  - Construction and use of a hand level.

#### SECTION – II

6. a) Explain the use of total station in surveying. 7  
 b) Write the difference between the geodimeter and tellerometer. 3
7. a) If the points are inaccessible for locating, which method of plane table surveying would you apply ? Explain in detail. 6  
 b) State the accessory required for plane table surveying with its purpose. 3
8. a) State different applications of contour map. Explain one in detail. 6  
 b) Discuss any one method of calculation of earthwork volume. 3
9. Write a short note on : (3×3=9)
- Mechanical planimeter
  - Tangent Clinometer
  - Advantages of plane table surveying.





SLR-TJ – 26

Seat No.	
----------	--

Set	P
-----	---

**S.E. Civil (Part – I) (Old) (CGPA Pattern) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 7.00 p.m.

- Instructions:**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) **All questions are compulsory.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. A) Multiple choice questions :

7

- 1) \_\_\_\_\_ is not related to brick masonry.  
a) James Bond    b) Flemish Bond    c) English Bond    d) Dutch Bond
- 2) Going and Nosing makes one  
a) Arcade    b) Tread    c) Arch    d) Shutter
- 3) The weight of Queen closure is 400 gms then the weight of the full brick shall be \_\_\_\_\_ gms.  
a) 600    b) 800    c) 1000    d) 200
- 4) The lowest part of a structure which transmits the load to the soil is known as  
a) super-structure    b) plinth    c) foundation    d) basement
- 5) A grillage foundation can be treated as a deep foundation.  
a) Right    b) Wrong    c) Both a) and b)    d) None of these
- 6) Concrete is liable for \_\_\_\_\_ when in contact with sea water.  
a) Termite    b) Vermine  
c) Sulphate    d) None of the above
- 7) Tudor arch having \_\_\_\_\_ centers.  
a) 2    b) 3    c) 4    d) None of the above

P.T.O.



B) State whether following statement is correct or incorrect.

7

- 1) Construction of load bearing structure takes lesser time as compared to framed structure for construction of high rise building. T/F
  - 2) Stepped footing may be used for load bearing structures. T/F
  - 3) In strap footing, columns are not connected by a beam. T/F
  - 4) The exterior angle or corner of a wall is known as quoins. T/F
  - 5) Pitch of truss = Rise/Span. T/F
  - 6) Knotting is an art of giving shape to stones for use in masonry. T/F
  - 7) King closer is the highest part of an arch. T/F
-



Seat No.	
-------------	--

**S.E. Civil (Part – I) (Old) (CGPA Pattern) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017

Marks : 56

Time : 3.00 p.m. to 7.00 p.m.

- Instructions:**
- 1) **All questions are compulsory.**
  - 2) *Section – I to be written in answer book.*
  - 3) *Section – II to be drawn on half imperial drawing sheet. (Use both sides).*
  - 4) *Figures to the **right** indicate **full** marks.*
  - 5) *Assume suitable data **wherever** necessary and mention it **clearly**.*
  - 6) *Retain **all** projection/construction lines on drawing sheet.*

SECTION – I

2. Answer **any four** of the following : **28**
- a) Write a note on functional requirements of a building.
  - b) Draw a neat sketch for a floor constructed with RSJ and flagstone as main components.
  - c) What are the ideal properties of good bricks ?
  - d) How will you compare load bearing structure with framed structure ?
  - e) Explain the importance of 'breaking of joint' and provision of horizontal RCC stiffener in the construction of 100 mm thick portion wall.
  - f) Draw neat sketch for 'Mangalore Tile Roof', and label all components.

SECTION – II

3. Solve **any two** of following (**compulsory** question) : **28**
- A) Draw to scale 1 : 5 'Horizontal Section' and 'Front Elevation' for two leaf, fully glazed wooden window of overall size of 900 mm × 1200 mm use following (All dimensions are in mm) :
- 1) Frame-Wooden section 50 × 110
  - 2) Shutter-Wooden shutter frame-section 30 × 100
  - 3) Glass thickness = 6
- (Select and assume other suitable data if required and mention it clearly)

**Set P**



B) Design and draw to scale 1 : 20 plan vertical section for a bifurcated RCC stair for a school building. Use following data.

- i) height to be climbed = 4050 mm
- ii) Stair flight width (Minimum) = 1200 mm
- iii) Select and assume other suitable data if required.

Show all dimensions and label all the elements. (Steel reinforcement details not expected.)

C) Draw to scale 1 : 10 plan and elevation for 'L' shaped brick masonry wall portion of 1200 mm height. Take brick size 100 mm × 100 mm × 200 mm, wall thickness 1½ Brick – 'English Bond'.

- Draw plan for courses 1, 3, 5 \_\_\_\_\_
- Draw plan for courses 2, 4, 6 \_\_\_\_\_
- Elevation for all courses up to a height of 900 mm

Show all dimensions and label all elements.

---



SLR-TJ – 26

Seat No.	
----------	--

Set	Q
-----	---

**S.E. Civil (Part – I) (Old) (CGPA Pattern) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017  
Time : 3.00 p.m. to 7.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) **All questions are compulsory.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. A) Multiple choice questions :

7

- 1) Tudor arch having \_\_\_\_\_ centers.  
a) 2                      b) 3                      c) 4                      d) None of the above
- 2) \_\_\_\_\_ is not related to brick masonry.  
a) James Bond      b) Flemish Bond      c) English Bond      d) Dutch Bond
- 3) Going and Nosing makes one  
a) Arcade              b) Tread              c) Arch              d) Shutter
- 4) The weight of Queen closure is 400 gms then the weight of the full brick shall be \_\_\_\_\_ gms.  
a) 600                      b) 800                      c) 1000                      d) 200
- 5) The lowest part of a structure which transmits the load to the soil is known as  
a) super-structure                      b) plinth  
c) foundation                      d) basement
- 6) A grillage foundation can be treated as a deep foundation.  
a) Right                      b) Wrong                      c) Both a) and b)      d) None of these
- 7) Concrete is liable for \_\_\_\_\_ when in contact with sea water.  
a) Termite                      b) Vermine  
c) Sulphate                      d) None of the above

P.T.O.



- B) State whether following statement is correct or incorrect. 7
- 1) Pitch of truss = Rise/Span. T/F
  - 2) Knotting is an art of giving shape to stones for use in masonry. T/F
  - 3) King closer is the highest part of an arch. T/F
  - 4) Construction of load bearing structure takes lesser time as compared to framed structure for construction of high rise building. T/F
  - 5) Stepped footing may be used for load bearing structures. T/F
  - 6) In strap footing, columns are not connected by a beam. T/F
  - 7) The exterior angle or corner of a wall is known as quoins. T/F
-



Seat No.	
-------------	--

**S.E. Civil (Part – I) (Old) (CGPA Pattern) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017

Marks : 56

Time : 3.00 p.m. to 7.00 p.m.

- Instructions:**
- 1) **All questions are compulsory.**
  - 2) *Section – I to be written in answer book.*
  - 3) *Section – II to be drawn on half imperial drawing sheet. (Use both sides).*
  - 4) *Figures to the **right** indicate **full** marks.*
  - 5) *Assume suitable data **wherever** necessary and mention it **clearly**.*
  - 6) *Retain **all** projection/construction lines on drawing sheet.*

SECTION – I

2. Answer **any four** of the following : **28**
- a) Write a note on functional requirements of a building.
  - b) Draw a neat sketch for a floor constructed with RSJ and flagstone as main components.
  - c) What are the ideal properties of good bricks ?
  - d) How will you compare load bearing structure with framed structure ?
  - e) Explain the importance of 'breaking of joint' and provision of horizontal RCC stiffener in the construction of 100 mm thick portion wall.
  - f) Draw neat sketch for 'Mangalore Tile Roof', and label all components.

SECTION – II

3. Solve **any two** of following (**compulsory** question) : **28**
- A) Draw to scale 1 : 5 'Horizontal Section' and 'Front Elevation' for two leaf, fully glazed wooden window of overall size of 900 mm × 1200 mm use following (All dimensions are in mm) :
- 1) Frame-Wooden section 50 × 110
  - 2) Shutter-Wooden shutter frame-section 30 × 100
  - 3) Glass thickness = 6
- (Select and assume other suitable data if required and mention it clearly)

**Set Q**



B) Design and draw to scale 1 : 20 plan vertical section for a bifurcated RCC stair for a school building. Use following data.

- i) height to be climbed = 4050 mm
- ii) Stair flight width (Minimum) = 1200 mm
- iii) Select and assume other suitable data if required.

Show all dimensions and label all the elements. (Steel reinforcement details not expected.)

C) Draw to scale 1 : 10 plan and elevation for 'L' shaped brick masonry wall portion of 1200 mm height. Take brick size 100 mm × 100 mm × 200 mm, wall thickness 1½ Brick – 'English Bond'.

- Draw plan for courses 1, 3, 5 \_\_\_\_\_
- Draw plan for courses 2, 4, 6 \_\_\_\_\_
- Elevation for all courses up to a height of 900 mm

Show all dimensions and label all elements.

---





SLR-TJ – 26

Seat No.	
----------	--

Set	R
-----	---

**S.E. Civil (Part – I) (Old) (CGPA Pattern) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 7.00 p.m.

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) **All questions are compulsory.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. A) State whether following statement is correct or incorrect. **7**
  - 1) The exterior angle or corner of a wall is known as quoins. T/F
  - 2) Pitch of truss = Rise/Span. T/F
  - 3) Knotting is an art of giving shape to stones for use in masonry. T/F
  - 4) King closer is the highest part of an arch. T/F
  - 5) Construction of load bearing structure takes lesser time as compared to framed structure for construction of high rise building. T/F
  - 6) Stepped footing may be used for load bearing structures. T/F
  - 7) In strap footing, columns are not connected by a beam. T/F
- B) Multiple choice questions : **7**
  - 1) A grillage foundation can be treated as a deep foundation.
    - a) Right
    - b) Wrong
    - c) Both a) and b)
    - d) None of these
  - 2) Concrete is liable for \_\_\_\_\_ when in contact with sea water.
    - a) Termite
    - b) Vermine
    - c) Sulphate
    - d) None of the above

P.T.O.



- 3) Tudor arch having \_\_\_\_\_ centers.
- a) 2                                      b) 3  
c) 4                                      d) None of the above
- 4) \_\_\_\_\_ is not related to brick masonry.
- a) James Bond                              b) Flemish Bond  
c) English Bond                              d) Dutch Bond
- 5) Going and Nosing makes one \_\_\_\_\_
- a) Arcade                      b) Tread                      c) Arch                      d) Shutter
- 6) The weight of Queen closure is 400 gms then the weight of the full brick shall be \_\_\_\_\_ gms.
- a) 600                      b) 800                      c) 1000                      d) 200
- 7) The lowest part of a structure which transmits the load to the soil is known as
- a) super-structure                              b) plinth  
c) foundation                              d) basement
-



Seat No.	
-------------	--

**S.E. Civil (Part – I) (Old) (CGPA Pattern) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017

Marks : 56

Time : 3.00 p.m. to 7.00 p.m.

- Instructions:**
- 1) **All questions are compulsory.**
  - 2) *Section – I to be written in answer book.*
  - 3) *Section – II to be drawn on half imperial drawing sheet. (Use both sides).*
  - 4) *Figures to the **right** indicate **full** marks.*
  - 5) *Assume suitable data **wherever** necessary and mention it **clearly**.*
  - 6) *Retain **all** projection/construction lines on drawing sheet.*

SECTION – I

2. Answer **any four** of the following : **28**
- a) Write a note on functional requirements of a building.
  - b) Draw a neat sketch for a floor constructed with RSJ and flagstone as main components.
  - c) What are the ideal properties of good bricks ?
  - d) How will you compare load bearing structure with framed structure ?
  - e) Explain the importance of 'breaking of joint' and provision of horizontal RCC stiffener in the construction of 100 mm thick portion wall.
  - f) Draw neat sketch for 'Mangalore Tile Roof', and label all components.

SECTION – II

3. Solve **any two** of following (**compulsory** question) : **28**
- A) Draw to scale 1 : 5 'Horizontal Section' and 'Front Elevation' for two leaf, fully glazed wooden window of overall size of 900 mm × 1200 mm use following (All dimensions are in mm) :
- 1) Frame-Wooden section 50 × 110
  - 2) Shutter-Wooden shutter frame-section 30 × 100
  - 3) Glass thickness = 6
- (Select and assume other suitable data if required and mention it clearly)

**Set R**



B) Design and draw to scale 1 : 20 plan vertical section for a bifurcated RCC stair for a school building. Use following data.

- i) height to be climbed = 4050 mm
- ii) Stair flight width (Minimum) = 1200 mm
- iii) Select and assume other suitable data if required.

Show all dimensions and label all the elements. (Steel reinforcement details not expected.)

C) Draw to scale 1 : 10 plan and elevation for 'L' shaped brick masonry wall portion of 1200 mm height. Take brick size 100 mm × 100 mm × 200 mm, wall thickness 1½ Brick – 'English Bond'.

- Draw plan for courses 1, 3, 5 \_\_\_\_\_
- Draw plan for courses 2, 4, 6 \_\_\_\_\_
- Elevation for all courses up to a height of 900 mm

Show all dimensions and label all elements.

---



SLR-TJ – 26

Seat No.	
----------	--

Set	S
-----	---

**S.E. Civil (Part – I) (Old) (CGPA Pattern) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017  
Time : 3.00 p.m. to 7.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) **All questions are compulsory.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. A) State whether following statement is correct or incorrect. 7
- 1) In strap footing, columns are not connected by a beam. T/F
  - 2) The exterior angle or corner of a wall is known as quoins. T/F
  - 3) Pitch of truss = Rise/Span. T/F
  - 4) Knotting is an art of giving shape to stones for use in masonry. T/F
  - 5) King closer is the highest part of an arch. T/F
  - 6) Construction of load bearing structure takes lesser time as compared to framed structure for construction of high rise building. T/F
  - 7) Stepped footing may be used for load bearing structures. T/F
- B) Multiple choice questions : 7
- 1) The weight of Queen closure is 400 gms then the weight of the full brick shall be \_\_\_\_\_ gms.  
a) 600                      b) 800                      c) 1000                      d) 200
  - 2) The lowest part of a structure which transmits the load to the soil is known as  
a) super-structure                      b) plinth  
c) foundation                      d) basement
  - 3) A grillage foundation can be treated as a deep foundation.  
a) Right                      b) Wrong  
c) Both a) and b)                      d) None of these

P.T.O.



- 4) Concrete is liable for \_\_\_\_\_ when in contact with sea water.
- a) Termite
  - b) Vermine
  - c) Sulphate
  - d) None of the above
- 5) Tudor arch having \_\_\_\_\_ centers.
- a) 2
  - b) 3
  - c) 4
  - d) None of the above
- 6) \_\_\_\_\_ is not related to brick masonry.
- a) James Bond
  - b) Flemish Bond
  - c) English Bond
  - d) Dutch Bond
- 7) Going and Nosing makes one \_\_\_\_\_
- a) Arcade
  - b) Tread
  - c) Arch
  - d) Shutter
-



Seat No.	
-------------	--

**S.E. Civil (Part – I) (Old) (CGPA Pattern) Examination, 2017  
BUILDING CONSTRUCTION AND DRAWING**

Day and Date : Tuesday, 19-12-2017

Marks : 56

Time : 3.00 p.m. to 7.00 p.m.

- Instructions:**
- 1) **All questions are compulsory.**
  - 2) *Section – I to be written in answer book.*
  - 3) *Section – II to be drawn on half imperial drawing sheet. (Use both sides).*
  - 4) *Figures to the **right** indicate **full** marks.*
  - 5) *Assume suitable data **wherever** necessary and mention it **clearly**.*
  - 6) *Retain **all** projection/construction lines on drawing sheet.*

SECTION – I

2. Answer **any four** of the following : **28**
- a) Write a note on functional requirements of a building.
  - b) Draw a neat sketch for a floor constructed with RSJ and flagstone as main components.
  - c) What are the ideal properties of good bricks ?
  - d) How will you compare load bearing structure with framed structure ?
  - e) Explain the importance of 'breaking of joint' and provision of horizontal RCC stiffener in the construction of 100 mm thick portion wall.
  - f) Draw neat sketch for 'Mangalore Tile Roof', and label all components.

SECTION – II

3. Solve **any two** of following (**compulsory** question) : **28**
- A) Draw to scale 1 : 5 'Horizontal Section' and 'Front Elevation' for two leaf, fully glazed wooden window of overall size of 900 mm × 1200 mm use following (All dimensions are in mm) :
- 1) Frame-Wooden section 50 × 110
  - 2) Shutter-Wooden shutter frame-section 30 × 100
  - 3) Glass thickness = 6
- (Select and assume other suitable data if required and mention it clearly)

**Set S**



B) Design and draw to scale 1 : 20 plan vertical section for a bifurcated RCC stair for a school building. Use following data.

- i) height to be climbed = 4050 mm
- ii) Stair flight width (Minimum) = 1200 mm
- iii) Select and assume other suitable data if required.

Show all dimensions and label all the elements. (Steel reinforcement details not expected.)

C) Draw to scale 1 : 10 plan and elevation for 'L' shaped brick masonry wall portion of 1200 mm height. Take brick size 100 mm × 100 mm × 200 mm, wall thickness 1½ Brick – 'English Bond'.

- Draw plan for courses 1, 3, 5 \_\_\_\_\_
- Draw plan for courses 2, 4, 6 \_\_\_\_\_
- Elevation for all courses up to a height of 900 mm

Show all dimensions and label all elements.

---





SLR-TJ – 27

Seat No.	
----------	--

Set	<b>P</b>
-----	----------

**S.E. (Civil) (Part – I) (Old-CGPA) Examination, 2017  
FLUID MECHANICS – I**

Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

**Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*

2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose correct answer :

14

- 1) Fluid which do not follow the linear relationship between shear stress and rate of deformation are termed as
  - a) Newtonian
  - b) Diabent
  - c) Non-Newtonian
  - d) None
- 2) If the Reynolds number is more than 4000 the type of flow is
  - a) Turbulent
  - b) Transitional
  - c) Laminar
  - d) None
- 3) The property of fluid which determines its resistance to shear stress is called as
  - a) Compressibility
  - b) Viscosity
  - c) Surface tension
  - d) Capillarity
- 4) Centre of pressure ( ) for inclined immersed surface.
  - a)  $IG \sin/\Delta x + x$
  - b)  $I^2G \sin^2/\Delta x$
  - c)  $IG \sin/\Delta^2x + x$
  - d)  $IG \sin^2/\Delta x + x$
- 5) A floating body is in stable equilibrium when
  - a) Metacentre is above G
  - b) Metacentre below G
  - c) Metacentric height zero
  - d) CG is below centre of buoyancy
- 6) Surface tension is expressed in
  - a)  $N/m^2$
  - b)  $N/m$
  - c)  $N^2/m$
  - d)  $N/m^3$

P.T.O.



- 7) Path followed by fluid particle in motion is called as
- a) Streamline
  - b) Streamline
  - c) Path line
  - d) None
- 8) The boundary layer exists in which of the following ?
- a) Flow of real fluids
  - b) Flow of ideal fluids
  - c) Flow over flat surface
  - d) Pipe flow only
- 9) An \_\_\_\_\_ is an opening in the wall or base of a vessel through which fluid flows.
- a) venturimeter
  - b) mouth piece
  - c) orifice
  - d) pitot tube
- 10) The coefficient of contraction ( $C_c$ ) is equal to
- a)  $\frac{a_c}{a}$
  - b)  $\frac{a}{a_c}$
  - c)  $a \times a_c$
  - d)  $\sqrt{\frac{a_c}{a}}$
- 11) The flow in town water supply pipes is generally
- a) Laminar
  - b) Turbulent
  - c) Transition
  - d) Any of the above
- 12) The hydraulic gradient line indicates the variation of which of the following ?
- a) Velocity head in flow direction
  - b) Piezometric head in flow direction
  - c) Total energy of flow in flow direction
  - d) None of the above
- 13) Loss of head due to sudden enlargement is given as
- a)  $\frac{(v_1 - v_2)^3}{2g}$
  - b)  $\frac{(v_1 - v_2)^2}{2g}$
  - c)  $\frac{v_1^2 - v_2^2}{2g}$
  - d) none of these
- 14) In case of turbulent flow the loss of head is approximately proportional to
- a) Velocity
  - b) (Velocity) $^{1/2}$
  - c) (Velocity) $^{3/4}$
  - d) (Velocity) $^2$
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (Old-CGPA) Examination, 2017  
FLUID MECHANICS – I**

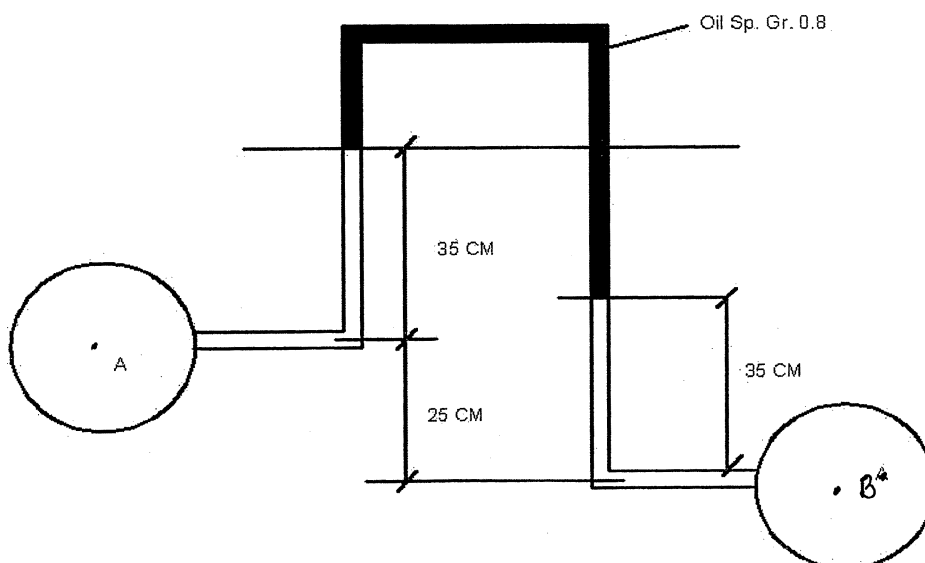
Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) Attempt **all** questions from Section – I.  
2) Draw **neat** figures **wherever** necessary.  
3) Q. 5 is **compulsory** and solve **any one** question from remaining questions.  
4) Figures to the **right** indicate **full** marks.  
5) Assume correct data **wherever** necessary.  
6) **Use** of non-programmable calculator is **permitted**.

SECTION – I

2. a) Explain the following terms : 8  
1) Viscosity      2) Buoyancy      3) Metacentre      4) Velocity potential.  
b) Calculate specific height, mass density and specific gravity of one litre of liquid which weighs 8N.
3. Solve **any two** : 10  
a) An inverted differential manometer is connected to the pipes A and B which carries water, and the manometric fluid is of Sp Gr 0.8. Find the pressure difference between A and B with the manometer readings given below.



Set P



- b) Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid.
- c) A block of wood of Sp.Gr. 0.7 floats in water. Determine the metacentric height of the block if the size is 3.5 m × 1.5 m × 1.0 m.

4. Solve **any two** :

**10**

- a) Define stream function and equipotential line.

The velocity potential function ( $\Phi$ ) is given as  $\Phi = -xy^3 / 3 - x^2 + x^3y / 3 + y^2$ .

- i) Calculate the velocity components in X and Y direction
- ii) Show that it represents a possible case of flow.
- b) Define Pascal's law and derive expression for it. (Draw neat sketch)
- c) Find the total pressure on a circular plate of dia. 1.5 M which is placed vertically in water in such a way that the centre of plate is 3.5 M below free water surface, also find the position of centre of pressure. (Draw neat sketch)

#### SECTION – II

5. a) Derive the theoretical discharge through venturimeter with neat sketch.

**5**

- b) Water is flowing through a tapered pipe of length 50 m having diameters 40 cm at the upper and 20 cm at lower end, at the rate of 60 lit/s. The pipe has a slope of 1 in 40. Find the pressure at the lower end if the pressure at higher level is 24.525 N/cm<sup>2</sup>.

**6**

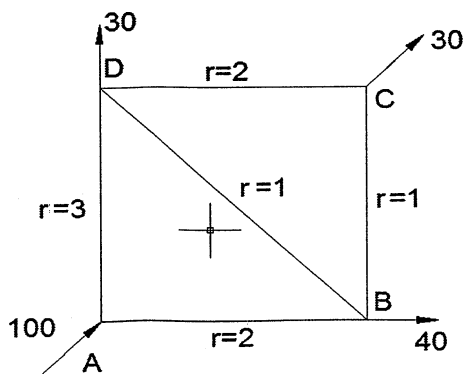
- c) Define HGL and TEL with neat sketches.

**3**

**Set P**



- 6. a) Derive the expression for velocity distribution for Couette flow. 4
- b) The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameter 300 mm, 200 mm and 400 mm respectively is 12 m. Determine the rate of flow of water if co-efficient of friction are 0.005, 0.0052 and 0.0048 respectively, considering :
  - i) minor losses 7
  - ii) neglecting minor losses. 3
- c) Explain Equivalent Length and Equivalent diameter of pipe. 3
- 7. a) Explain :
  - i) Displacement thickness
  - ii) Momentum thickness
  - iii) Energy thickness. 6
- b) Calculate the discharge in each pipe of network by hardy cross method if  $h_f = rQ^2$ . Take two trials. 8







SLR-TJ – 27

Seat No.	
----------	--

Set	Q
-----	---

**S.E. (Civil) (Part – I) (Old-CGPA) Examination, 2017  
FLUID MECHANICS – I**

Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

**Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*

2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose correct answer :

14

- 1) The boundary layer exists in which of the following ?
  - a) Flow of real fluids
  - b) Flow of ideal fluids
  - c) Flow over flat surface
  - d) Pipe flow only
- 2) An \_\_\_\_\_ is an opening in the wall or base of a vessel through which fluid flows.
  - a) venturimeter
  - b) mouth piece
  - c) orifice
  - d) pitot tube
- 3) The co-efficient of contraction ( $C_c$ ) is equal to
  - a)  $a_c/a$
  - b)  $a/a_c$
  - c)  $a \times a_c$
  - d)  $\sqrt{a_c/a}$
- 4) The flow in town water supply pipes is generally
  - a) Laminar
  - b) Turbulent
  - c) Transition
  - d) Any of the above
- 5) The hydraulic gradient line indicates the variation of which of the following ?
  - a) Velocity head in flow direction
  - b) Piezometric head in flow direction
  - c) Total energy of flow in flow direction
  - d) None of the above

P.T.O.



- 6) Loss of head due to sudden enlargement is given as
- a)  $\frac{(v_1 - v_2)^3}{2g}$                       b)  $\frac{(v_1 - v_2)^2}{2g}$
- c)  $\frac{v_1^2 - v_2^2}{2g}$                       d) none of these
- 7) In case of turbulent flow the loss of head is approximately proportional to
- a) Velocity                      b) (Velocity)<sup>1/2</sup>
- c) (Velocity)<sup>3/4</sup>                      d) (Velocity)<sup>2</sup>
- 8) Fluid which do not follow the linear relationship between shear stress and rate of deformation are termed as
- a) Newtonian              b) Diabent              c) Non-Newtonian              d) None
- 9) If the Reynolds number is more than 4000 the type of flow is
- a) Turbulent              b) Transitional              c) Laminar              d) None
- 10) The property of fluid which determines its resistance to shear stress is called as
- a) Compressibility              b) Viscosity
- c) Surface tension              d) Capillarity
- 11) Centre of pressure ( ) for inclined immersed surface.
- a)  $IG \sin/Ax + x$                       b)  $I^2G \sin^2/Ax$
- c)  $IG \sin/A^2x + x$                       d)  $IG \sin^2/Ax + x$
- 12) A floating body is in stable equilibrium when
- a) Metacentre is above G                      b) Metacentre below G
- c) Metacentric height zero                      d) CG is below centre of buoyancy
- 13) Surface tension is expressed in
- a) N/m<sup>2</sup>                      b) N/m
- c) N<sup>2</sup>/m                      d) N/m<sup>3</sup>
- 14) Path followed by fluid particle in motion is called as
- a) Strateline                      b) Streamline
- c) Path line                      d) None
-





Seat No.	
----------	--

**S.E. (Civil) (Part – I) (Old-CGPA) Examination, 2017  
FLUID MECHANICS – I**

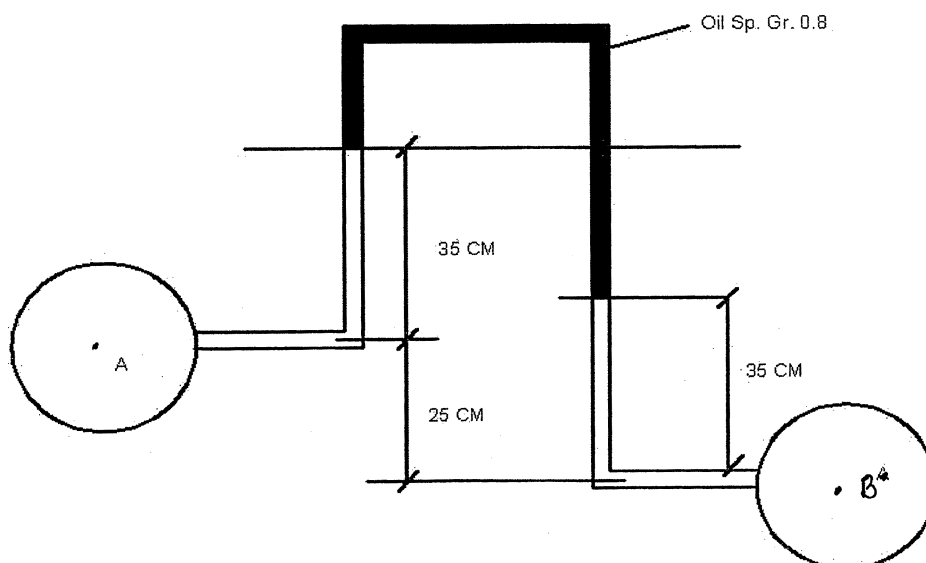
Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) Attempt **all** questions from Section – I.  
2) Draw **neat** figures **wherever** necessary.  
3) Q. 5 is **compulsory** and solve **any one** question from remaining questions.  
4) Figures to the **right** indicate **full** marks.  
5) Assume correct data **wherever** necessary.  
6) **Use** of non-programmable calculator is **permitted**.

SECTION – I

2. a) Explain the following terms : 8  
1) Viscosity      2) Buoyancy      3) Metacentre      4) Velocity potential.  
b) Calculate specific height, mass density and specific gravity of one litre of liquid which weighs 8N.
3. Solve **any two** : 10  
a) An inverted differential manometer is connected to the pipes A and B which carries water, and the manometric fluid is of Sp Gr 0.8. Find the pressure difference between A and B with the manometer readings given below.



Set Q



- b) Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid.
- c) A block of wood of Sp.Gr. 0.7 floats in water. Determine the metacentric height of the block if the size is 3.5 m × 1.5 m × 1.0 m.

4. Solve **any two** :

**10**

- a) Define stream function and equipotential line.

The velocity potential function ( $\Phi$ ) is given as  $\Phi = -xy^3 / 3 - x^2 + x^3y / 3 + y^2$ .

- i) Calculate the velocity components in X and Y direction
- ii) Show that it represents a possible case of flow.
- b) Define Pascal's law and derive expression for it. (Draw neat sketch)
- c) Find the total pressure on a circular plate of dia. 1.5 M which is placed vertically in water in such a way that the centre of plate in 3.5 M below free water surface, also find the position of centre of pressure. (Draw neat sketch)

#### SECTION – II

5. a) Derive the theoretical discharge through venturimeter with neat sketch.

**5**

- b) Water is flowing through a tapered pipe of length 50 m having diameters 40 cm at the upper and 20 cm at lower end, at the rate of 60 lit/s. The pipe has a slope of 1 in 40. Find the pressure at the lower end if the pressure at higher level is 24.525 N/cm<sup>2</sup>.

**6**

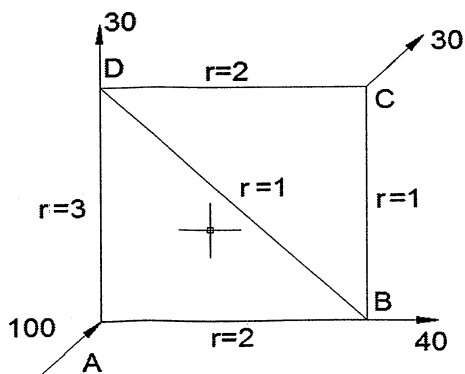
- c) Define HGL and TEL with neat sketches.

**3**

**Set Q**



- 6. a) Derive the expression for velocity distribution for Couette flow. 4
- b) The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameter 300 mm, 200 mm and 400 mm respectively is 12 m. Determine the rate of flow of water if co-efficient of friction are 0.005, 0.0052 and 0.0048 respectively, considering :
  - i) minor losses 7
  - ii) neglecting minor losses. 3
- c) Explain Equivalent Length and Equivalent diameter of pipe. 3
- 7. a) Explain :
  - i) Displacement thickness
  - ii) Momentum thickness
  - iii) Energy thickness. 6
- b) Calculate the discharge in each pipe of network by hardy cross method if  $h_f = rQ^2$ . Take two trials. 8







SLR-TJ – 27

Seat No.	
----------	--

Set	R
-----	---

**S.E. (Civil) (Part – I) (Old-CGPA) Examination, 2017  
FLUID MECHANICS – I**

Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

**Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*

2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose correct answer :

14

1) A floating body is in stable equilibrium when

- |                            |                                   |
|----------------------------|-----------------------------------|
| a) Metacentre is above G   | b) Metacentre below G             |
| c) Metacentric height zero | d) CG is below centre of buoyancy |

2) Surface tension is expressed in

- |                      |                     |
|----------------------|---------------------|
| a) N/m <sup>2</sup>  | b) N/m              |
| c) N <sup>2</sup> /m | d) N/m <sup>3</sup> |

3) Path followed by fluid particle in motion is called as

- |               |               |
|---------------|---------------|
| a) Strateline | b) Streamline |
| c) Path line  | d) None       |

4) The boundary layer exists in which of the following ?

- |                           |                         |
|---------------------------|-------------------------|
| a) Flow of real fluids    | b) Flow of ideal fluids |
| c) Flow over flat surface | d) Pipe flow only       |

5) An \_\_\_\_\_ is an opening in the wall or base of a vessel through which fluid flows.

- |                 |                |            |               |
|-----------------|----------------|------------|---------------|
| a) venturimeter | b) mouth piece | c) orifice | d) pitot tube |
|-----------------|----------------|------------|---------------|

6) The co-efficient of contraction ( $C_c$ ) is equal to

- |                    |                    |                   |                           |
|--------------------|--------------------|-------------------|---------------------------|
| a) $\frac{a_c}{a}$ | b) $\frac{a}{a_c}$ | c) $a \times a_c$ | d) $\sqrt{\frac{a_c}{a}}$ |
|--------------------|--------------------|-------------------|---------------------------|

P.T.O.



- 7) The flow in town water supply pipes is generally
- a) Laminar
  - b) Turbulent
  - c) Transition
  - d) Any of the above
- 8) The hydraulic gradient line indicates the variation of which of the following ?
- a) Velocity head in flow direction
  - b) Piezometric head in flow direction
  - c) Total energy of flow in flow direction
  - d) None of the above
- 9) Loss of head due to sudden enlargement is given as
- a)  $\frac{(v_1 - v_2)^3}{2g}$
  - b)  $\frac{(v_1 - v_2)^2}{2g}$
  - c)  $\frac{v_1^2 - v_2^2}{2g}$
  - d) none of these
- 10) In case of turbulent flow the loss of head is approximately proportional to
- a) Velocity
  - b) (Velocity)<sup>1/2</sup>
  - c) (Velocity)<sup>3/4</sup>
  - d) (Velocity)<sup>2</sup>
- 11) Fluid which do not follow the linear relationship between shear stress and rate of deformation are termed as
- a) Newtonian
  - b) Diabent
  - c) Non-Newtonian
  - d) None
- 12) If the Reynolds number is more than 4000 the type of flow is
- a) Turbulent
  - b) Transitional
  - c) Laminar
  - d) None
- 13) The property of fluid which determiner its resistance to shear stress is called as
- a) Compressibility
  - b) Viscosity
  - c) Surface tension
  - d) Capillarity
- 14) Centre of pressure ( ) for inclined immersed surface.
- a)  $IG \sin/Ax + x$
  - b)  $l^2G \sin^2/Ax$
  - c)  $IG \sin/A^2x + x$
  - d)  $IG \sin^2/Ax + x$
-



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (Old-CGPA) Examination, 2017  
FLUID MECHANICS – I**

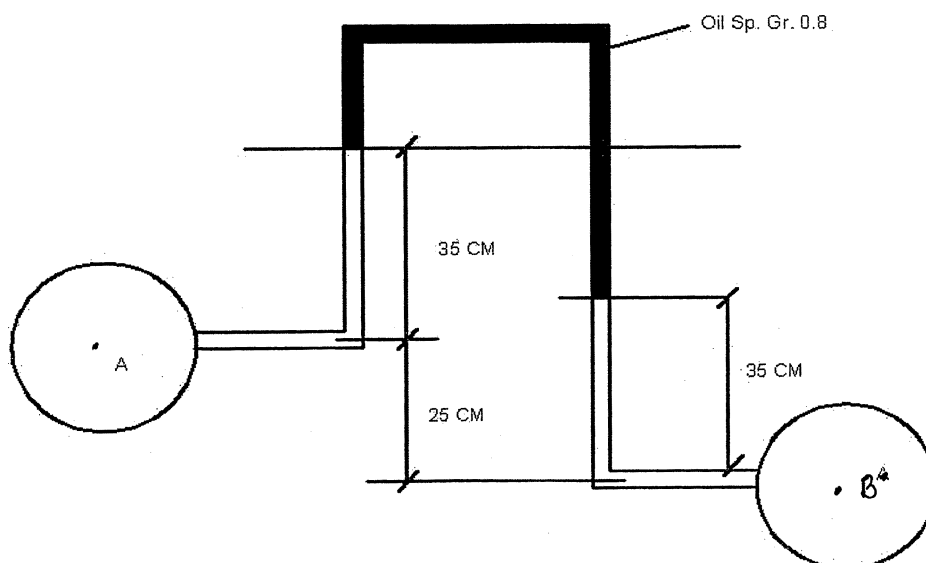
Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) Attempt **all** questions from Section – I.
  - 2) Draw **neat** figures **wherever** necessary.
  - 3) Q. 5 is **compulsory** and solve **any one** question from remaining questions.
  - 4) Figures to the **right** indicate **full** marks.
  - 5) Assume correct data **wherever** necessary.
  - 6) **Use** of non-programmable calculator is **permitted**.

SECTION – I

2. a) Explain the following terms : 8  
1) Viscosity      2) Buoyancy      3) Metacentre      4) Velocity potential.
- b) Calculate specific height, mass density and specific gravity of one litre of liquid which weighs 8N.
3. Solve **any two** : 10
- a) An inverted differential manometer is connected to the pipes A and B which carries water, and the manometric fluid is of Sp Gr 0.8. Find the pressure difference between A and B with the manometer readings given below.



Set R



- b) Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid.
- c) A block of wood of Sp.Gr. 0.7 floats in water. Determine the metacentric height of the block if the size is 3.5 m × 1.5 m × 1.0 m.

4. Solve **any two** :

**10**

- a) Define stream function and equipotential line.

The velocity potential function ( $\Phi$ ) is given as  $\Phi = -xy^3/3 - x^2 + x^3y/3 + y^2$ .

- i) Calculate the velocity components in X and Y direction
- ii) Show that it represents a possible case of flow.
- b) Define Pascal's law and derive expression for it. (Draw neat sketch)
- c) Find the total pressure on a circular plate of dia. 1.5 M which is placed vertically in water in such a way that the centre of plate in 3.5 M below free water surface, also find the position of centre of pressure. (Draw neat sketch)

#### SECTION – II

5. a) Derive the theoretical discharge through venturimeter with neat sketch.

**5**

- b) Water is flowing through a tapered pipe of length 50 m having diameters 40 cm at the upper and 20 cm at lower end, at the rate of 60 lit/s. The pipe has a slope of 1 in 40. Find the pressure at the lower end if the pressure at higher level is 24.525 N/cm<sup>2</sup>.

**6**

- c) Define HGL and TEL with neat sketches.

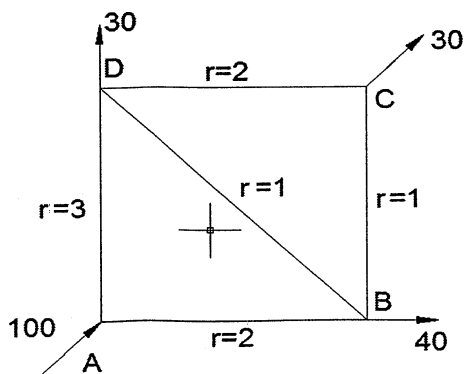
**3**

**Set R**





6. a) Derive the expression for velocity distribution for Couette flow. **4**
- b) The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameter 300 mm, 200 mm and 400 mm respectively is 12 m. Determine the rate of flow of water if co-efficient of friction are 0.005, 0.0052 and 0.0048 respectively, considering :
- i) minor losses
  - ii) neglecting minor losses. **7**
- c) Explain Equivalent Length and Equivalent diameter of pipe. **3**
7. a) Explain :
- i) Displacement thickness
  - ii) Momentum thickness
  - iii) Energy thickness. **6**
- b) Calculate the discharge in each pipe of network by Hardy Cross method if  $h_f = rQ^2$ . Take two trials. **8**







SLR-TJ – 27

Seat No.	
----------	--

Set	<b>S</b>
-----	----------

**S.E. (Civil) (Part – I) (Old-CGPA) Examination, 2017  
FLUID MECHANICS – I**

Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

**Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*

2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose correct answer :

14

1) The co-efficient of contraction ( $C_c$ ) is equal to

a)  $\frac{a_c}{a}$

b)  $\frac{a}{a_c}$

c)  $a \times a_c$

d)  $\sqrt{\frac{a_c}{a}}$

2) The flow in town water supply pipes is generally

a) Laminar

b) Turbulent

c) Transition

d) Any of the above

3) The hydraulic gradient line indicates the variation of which of the following ?

a) Velocity head in flow direction

b) Piezometric head in flow direction

c) Total energy of flow in flow direction

d) None of the above

4) Loss of head due to sudden enlargement is given as

a)  $\frac{(v_1 - v_2)^3}{2g}$

b)  $\frac{(v_1 - v_2)^2}{2g}$

c)  $\frac{v_1^2 - v_2^2}{2g}$

d) none of these

P.T.O.



- 5) In case of turbulent flow the loss of head is approximately proportional to
- a) Velocity
  - b) (Velocity)<sup>1/2</sup>
  - c) (Velocity)<sup>3/4</sup>
  - d) (Velocity)<sup>2</sup>
- 6) Fluid which do not follow the linear relationship between shear stress and rate of deformation are termed as
- a) Newtonian
  - b) Diabent
  - c) Non-Newtonian
  - d) None
- 7) If the Reynolds number is more than 4000 the type of flow is
- a) Turbulent
  - b) Transitional
  - c) Laminar
  - d) None
- 8) The property of fluid which determiner its resistance to shear stress is called as
- a) Compressibility
  - b) Viscosity
  - c) Surface tension
  - d) Capillarity
- 9) Centre of pressure ( ) for inclined immersed surface.
- a)  $IG \sin/\Delta x + x$
  - b)  $l^2 G \sin^2/\Delta x$
  - c)  $IG \sin/\Delta x^2 + x$
  - d)  $IG \sin^2/\Delta x + x$
- 10) A floating body is in stable equilibrium when
- a) Metacentre is above G
  - b) Metacentre below G
  - c) Metacentric height zero
  - d) CG is below centre of buoyancy
- 11) Surface tension is expressed in
- a)  $N/m^2$
  - b)  $N/m$
  - c)  $N^2/m$
  - d)  $N/m^3$
- 12) Path followed by fluid particle in motion is called as
- a) Strateline
  - b) Streamline
  - c) Path line
  - d) None
- 13) The boundary layer exists in which of the following ?
- a) Flow of real fluids
  - b) Flow of ideal fluids
  - c) Flow over flat surface
  - d) Pipe flow only
- 14) An \_\_\_\_\_ is an opening in the wall or base of a vessel through which fluid flows.
- a) venturimeter
  - b) mouth piece
  - c) orifice
  - d) pitot tube



Seat No.	
----------	--

**S.E. (Civil) (Part – I) (Old-CGPA) Examination, 2017  
FLUID MECHANICS – I**

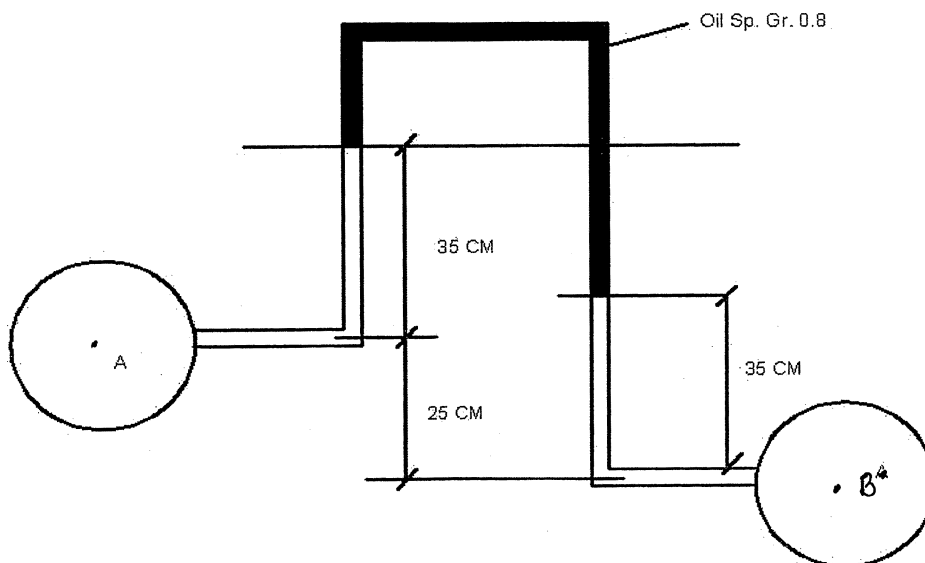
Day and Date : Thursday, 21-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) Attempt **all** questions from Section – I.
  - 2) Draw **neat** figures **wherever** necessary.
  - 3) Q. 5 is **compulsory** and solve **any one** question from remaining questions.
  - 4) Figures to the **right** indicate **full** marks.
  - 5) Assume correct data **wherever** necessary.
  - 6) **Use** of non-programmable calculator is **permitted**.

SECTION – I

2. a) Explain the following terms : 8  
1) Viscosity      2) Buoyancy      3) Metacentre      4) Velocity potential.  
b) Calculate specific height, mass density and specific gravity of one litre of liquid which weighs 8N.
3. Solve **any two** : 10  
a) An inverted differential manometer is connected to the pipes A and B which carries water, and the manometric fluid is of Sp Gr 0.8. Find the pressure difference between A and B with the manometer readings given below.



Set S



- b) Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid.
- c) A block of wood of Sp.Gr. 0.7 floats in water. Determine the metacentric height of the block if the size is 3.5 m × 1.5 m × 1.0 m.

4. Solve **any two** :

**10**

- a) Define stream function and equipotential line.

The velocity potential function ( $\Phi$ ) is given as  $\Phi = -xy^3 / 3 - x^2 + x^3y / 3 + y^2$ .

- i) Calculate the velocity components in X and Y direction
- ii) Show that it represents a possible case of flow.
- b) Define Pascal's law and derive expression for it. (Draw neat sketch)
- c) Find the total pressure on a circular plate of dia. 1.5 M which is placed vertically in water in such a way that the centre of plate in 3.5 M below free water surface, also find the position of centre of pressure. (Draw neat sketch)

#### SECTION – II

5. a) Derive the theoretical discharge through venturimeter with neat sketch.

**5**

- b) Water is flowing through a tapered pipe of length 50 m having diameters 40 cm at the upper and 20 cm at lower end, at the rate of 60 lit/s. The pipe has a slope of 1 in 40. Find the pressure at the lower end if the pressure at higher level is 24.525 N/cm<sup>2</sup>.

**6**

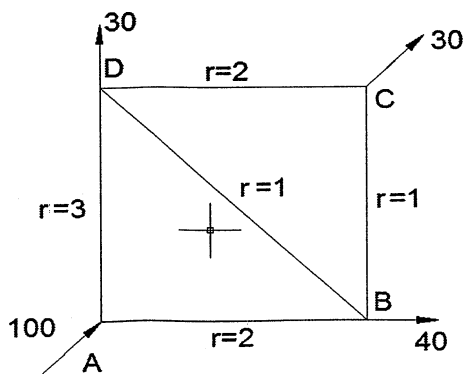
- c) Define HGL and TEL with neat sketches.

**3**

**Set S**



- 6. a) Derive the expression for velocity distribution for Couette flow. 4
- b) The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameter 300 mm, 200 mm and 400 mm respectively is 12 m. Determine the rate of flow of water if co-efficient of friction are 0.005, 0.0052 and 0.0048 respectively, considering :
  - i) minor losses 7
  - ii) neglecting minor losses. 3
- c) Explain Equivalent Length and Equivalent diameter of pipe. 3
- 7. a) Explain :
  - i) Displacement thickness
  - ii) Momentum thickness
  - iii) Energy thickness. 6
- b) Calculate the discharge in each pipe of network by hardy cross method if  $h_f = rQ^2$ . Take two trials. 8









SLR-TJ – 28

Seat No.	
-------------	--

Set	P
-----	---

**S.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENGINEERING GEOLOGY (Old)**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
- 3) **Question No. 5 from Section – I and 9 from Section – II are compulsory.**
- 4) Draw **neat** and labelled diagram **wherever** necessary.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- Maximum angle of inclination of layer of a rock with the horizontal is called as
  - True dip
  - Apparent dip
  - Low dip
  - Dip
- The maximum content of volcanic gas is
  - CO<sub>2</sub>
  - SO<sub>2</sub>
  - CO
  - Steam
- The spring which discharge hot water is called \_\_\_\_\_ spring.
  - Thermal
  - Mineral
  - Karst
  - Medium
- \_\_\_\_\_ is the depositional feature of old stage of river.
  - Pot hole
  - Delta
  - Waterfall
  - Meander
- The hardness of mineral Quartz on Moho's scale is
  - 6
  - 7
  - 8
  - 9

P.T.O.



- 6) Exfoliation is due to
- a) Chemical change
  - b) Leaching and bacterial action
  - c) Excessive heating
  - d) None of the above
- 7) The average density of earth is
- a) 3.3 g/cc
  - b) 5.517 g/cc
  - c) 4.3 g/cc
  - d) 5.37 g/cc
- 8) Himalaya is \_\_\_\_\_ type of mountain.
- a) Relief
  - b) Fold
  - c) Volcanic
  - d) None of the above
- 9) Which of the following is hydrated silica ?
- a) Tridymite
  - b) Quartz
  - c) Opal
  - d) Jasper
- 10) Artificially created water storage basin are called as
- a) Dam
  - b) Tank
  - c) Earthen dam
  - d) Reservoir
- 11) The slow downward creep of soil, sand, gravel caused by gravity is known as
- a) Rock slip
  - b) Collapsing
  - c) Soil slip
  - d) Physical weathering
- 12) The rock formation which is porous, permeable and yield sufficient quantity of water is called
- a) Aquifer
  - b) Aquitard
  - c) Aquifuge
  - d) Aquiclude
- 13) The excessive quantity of rock broken down beyond the perimeter of tunnel is known as
- a) Caving
  - b) Excavation
  - c) Over break
  - d) All the above
- 14) Which of the following is oldest type of drilling ?
- a) Rotatory
  - b) Auger
  - c) Calyx
  - d) Percussion
-



Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENGINEERING GEOLOGY (Old)**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 56

- Instructions :** 1) Question No. 5 from Section – I and 9 from Section – II are **compulsory**.  
2) Draw **neat** and labelled diagram **wherever** necessary.

SECTION – I

2. a) What are faults ? Explain with neat diagrams any three types of faults. **6**  
b) Enumerate different physical properties of minerals with examples. **6**
- OR
3. a) Describe in detail the internal structure of Earth. **6**  
b) Describe in detail the types of volcanic eruptions. **6**
4. What is igneous rock ? Give the classification of igneous rocks on the basis of **7**  
i) Mode of occurrence  
ii) Silica percentage
5. Write a note on **any 3** of the following : **9**  
a) Waterfall  
b) Strike and dip  
c) Residual mountain  
d) Engineering significance of fold.  
e) Batholith.



## SECTION – II

6. a) Explain in detail causes of earthquake and RIS ? 6  
b) Define aquifer. Describe different types of aquifers. 6
- OR
7. a) Define tunnel and explain difficulties during tunnelling. 6  
b) Explain engineering properties of building stones. 6
8. Define dam and describe the dams on different geological structures. 7
9. Write a note on **any 3** of the following : 9
- a) Seismic waves.
  - b) Silting of reservoir.
  - c) RQD.
  - d) Prevention of landslide.
  - e) Arch dam.
-



SLR-TJ – 28

Seat No.	
----------	--

Set	Q
-----	---

**S.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENGINEERING GEOLOGY (Old)**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
- 3) **Question No. 5 from Section – I and 9 from Section – II are compulsory.**
- 4) Draw **neat** and labelled diagram **wherever** necessary.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) Himalaya is \_\_\_\_\_ type of mountain.
- a) Relief  
b) Fold  
c) Volcanic  
d) None of the above
- 2) Which of the following is hydrated silica ?
- a) Tridymite  
b) Quartz  
c) Opal  
d) Jasper
- 3) Artificially created water storage basin are called as
- a) Dam  
b) Tank  
c) Earthen dam  
d) Reservoir
- 4) The slow downward creep of soil, sand, gravel caused by gravity is known as
- a) Rock slip  
b) Collapsing  
c) Soil slip  
d) Physical weathering
- 5) The rock formation which is porous, permeable and yield sufficient quantity of water is called
- a) Aquifer  
b) Aquitard  
c) Aquifuge  
d) Aquiclude

P.T.O.



- 6) The excessive quantity of rock broken down beyond the perimeter of tunnel is known as
- a) Caving
  - b) Excavation
  - c) Over break
  - d) All the above
- 7) Which of the following is oldest type of drilling ?
- a) Rotatory
  - b) Auger
  - c) Calyx
  - d) Percussion
- 8) Maximum angle of inclination of layer of a rock with the horizontal is called as
- a) True dip
  - b) Apparent dip
  - c) Low dip
  - d) Dip
- 9) The maximum content of volcanic gas is
- a) CO<sub>2</sub>
  - b) SO<sub>2</sub>
  - c) CO
  - d) Steam
- 10) The spring which discharge hot water is called \_\_\_\_\_ spring.
- a) Thermal
  - b) Mineral
  - c) Karst
  - d) Medium
- 11) \_\_\_\_\_ is the depositional feature of old stage of river.
- a) Pot hole
  - b) Delta
  - c) Waterfall
  - d) Meander
- 12) The hardness of mineral Quartz on Moho’s scale is
- a) 6
  - b) 7
  - c) 8
  - d) 9
- 13) Exfoliation is due to
- a) Chemical change
  - b) Leaching and bacterial action
  - c) Excessive heating
  - d) None of the above
- 14) The average density of earth is
- a) 3.3 g/cc
  - b) 5.517 g/cc
  - c) 4.3 g/cc
  - d) 5.37 g/cc
-



Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENGINEERING GEOLOGY (Old)**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 56

- Instructions :** 1) Question No. 5 from Section – I and 9 from Section – II are **compulsory**.  
2) Draw **neat** and labelled diagram **wherever** necessary.

SECTION – I

2. a) What are faults ? Explain with neat diagrams any three types of faults. **6**  
b) Enumerate different physical properties of minerals with examples. **6**
- OR
3. a) Describe in detail the internal structure of Earth. **6**  
b) Describe in detail the types of volcanic eruptions. **6**
4. What is igneous rock ? Give the classification of igneous rocks on the basis of **7**  
i) Mode of occurrence  
ii) Silica percentage
5. Write a note on **any 3** of the following : **9**  
a) Waterfall  
b) Strike and dip  
c) Residual mountain  
d) Engineering significance of fold.  
e) Batholith.



## SECTION – II

6. a) Explain in detail causes of earthquake and RIS ? 6  
b) Define aquifer. Describe different types of aquifers. 6
- OR
7. a) Define tunnel and explain difficulties during tunnelling. 6  
b) Explain engineering properties of building stones. 6
8. Define dam and describe the dams on different geological structures. 7
9. Write a note on **any 3** of the following : 9
- a) Seismic waves.
  - b) Silting of reservoir.
  - c) RQD.
  - d) Prevention of landslide.
  - e) Arch dam.
-





SLR-TJ – 28

Seat No.	
-------------	--

Set	R
-----	---

**S.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENGINEERING GEOLOGY (Old)**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
- 3) **Question No. 5 from Section – I and 9 from Section – II are compulsory.**
- 4) Draw **neat** and labelled diagram **wherever** necessary.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) The hardness of mineral Quartz on Moho's scale is  
a) 6  
b) 7  
c) 8  
d) 9
- 2) Exfoliation is due to  
a) Chemical change  
b) Leaching and bacterial action  
c) Excessive heating  
d) None of the above
- 3) The average density of earth is  
a) 3.3 g/cc  
b) 5.517 g/cc  
c) 4.3 g/cc  
d) 5.37 g/cc
- 4) Himalaya is \_\_\_\_\_ type of mountain.  
a) Relief  
b) Fold  
c) Volcanic  
d) None of the above
- 5) Which of the following is hydrated silica ?  
a) Tridymite  
b) Quartz  
c) Opal  
d) Jasper

P.T.O.



- 6) Artificially created water storage basin are called as  
 a) Dam  
 b) Tank  
 c) Earthen dam  
 d) Reservoir
- 7) The slow downward creep of soil, sand, gravel caused by gravity is known as  
 a) Rock slip  
 b) Collapsing  
 c) Soil slip  
 d) Physical weathering
- 8) The rock formation which is porous, permeable and yield sufficient quantity of water is called  
 a) Aquifer  
 b) Aquitard  
 c) Aquifuge  
 d) Aquiclude
- 9) The excessive quantity of rock broken down beyond the perimeter of tunnel is known as  
 a) Caving  
 b) Excavation  
 c) Over break  
 d) All the above
- 10) Which of the following is oldest type of drilling ?  
 a) Rotatory  
 b) Auger  
 c) Calyx  
 d) Percussion
- 11) Maximum angle of inclination of layer of a rock with the horizontal is called as  
 a) True dip  
 b) Apparent dip  
 c) Low dip  
 d) Dip
- 12) The maximum content of volcanic gas is  
 a) CO<sub>2</sub>  
 b) SO<sub>2</sub>  
 c) CO  
 d) Steam
- 13) The spring which discharge hot water is called \_\_\_\_\_ spring.  
 a) Thermal  
 b) Mineral  
 c) Karst  
 d) Medium
- 14) \_\_\_\_\_ is the depositional feature of old stage of river.  
 a) Pot hole  
 b) Delta  
 c) Waterfall  
 d) Meander
-



Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENGINEERING GEOLOGY (Old)**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 56

- Instructions :** 1) Question No. 5 from Section – I and 9 from Section – II are **compulsory**.  
2) Draw **neat** and labelled diagram **wherever** necessary.

SECTION – I

2. a) What are faults ? Explain with neat diagrams any three types of faults. **6**  
b) Enumerate different physical properties of minerals with examples. **6**
- OR
3. a) Describe in detail the internal structure of Earth. **6**  
b) Describe in detail the types of volcanic eruptions. **6**
4. What is igneous rock ? Give the classification of igneous rocks on the basis of **7**  
i) Mode of occurrence  
ii) Silica percentage
5. Write a note on **any 3** of the following : **9**  
a) Waterfall  
b) Strike and dip  
c) Residual mountain  
d) Engineering significance of fold.  
e) Batholith.



## SECTION – II

6. a) Explain in detail causes of earthquake and RIS ? **6**  
b) Define aquifer. Describe different types of aquifers. **6**
- OR
7. a) Define tunnel and explain difficulties during tunnelling. **6**  
b) Explain engineering properties of building stones. **6**
8. Define dam and describe the dams on different geological structures. **7**
9. Write a note on **any 3** of the following : **9**
- a) Seismic waves.
  - b) Silting of reservoir.
  - c) RQD.
  - d) Prevention of landslide.
  - e) Arch dam.
-



**SLR-TJ – 28**

Seat No.	
-------------	--

Set

**S**

**S.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENGINEERING GEOLOGY (Old)**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*
- 2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*
- 3) *Question No. 5 from Section – I and 9 from Section – II are compulsory.*
- 4) *Draw neat and labelled diagram wherever necessary.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) Artificially created water storage basin are called as
- a) Dam  
b) Tank  
c) Earthen dam  
d) Reservoir
- 2) The slow downward creep of soil, sand, gravel caused by gravity is known as
- a) Rock slip  
b) Collapsing  
c) Soil slip  
d) Physical weathering
- 3) The rock formation which is porous, permeable and yield sufficient quantity of water is called
- a) Aquifer  
b) Aquitard  
c) Aquifuge  
d) Aquiclude
- 4) The excessive quantity of rock broken down beyond the perimeter of tunnel is known as
- a) Caving  
b) Excavation  
c) Over break  
d) All the above

P.T.O.





Seat No.	
-------------	--

**S.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENGINEERING GEOLOGY (Old)**

Day and Date : Saturday, 23-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 56

- Instructions :** 1) Question No. 5 from Section – I and 9 from Section – II are **compulsory**.  
2) Draw **neat** and labelled diagram **wherever** necessary.

SECTION – I

2. a) What are faults ? Explain with neat diagrams any three types of faults. **6**  
b) Enumerate different physical properties of minerals with examples. **6**
- OR
3. a) Describe in detail the internal structure of Earth. **6**  
b) Describe in detail the types of volcanic eruptions. **6**
4. What is igneous rock ? Give the classification of igneous rocks on the basis of **7**  
i) Mode of occurrence  
ii) Silica percentage
5. Write a note on **any 3** of the following : **9**  
a) Waterfall  
b) Strike and dip  
c) Residual mountain  
d) Engineering significance of fold.  
e) Batholith.



## SECTION – II

6. a) Explain in detail causes of earthquake and RIS ? 6  
b) Define aquifer. Describe different types of aquifers. 6
- OR
7. a) Define tunnel and explain difficulties during tunnelling. 6  
b) Explain engineering properties of building stones. 6
8. Define dam and describe the dams on different geological structures. 7
9. Write a note on **any 3** of the following : 9
- a) Seismic waves.
  - b) Silting of reservoir.
  - c) RQD.
  - d) Prevention of landslide.
  - e) Arch dam.
-





SLR-TJ – 29

Seat No.	
----------	--

Set **P**

**S.E. (Civil) (Part – II) (CGPA Pattern) Examination, 2017  
STRUCTURAL MECHANICS – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Assume **suitable** data if required.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

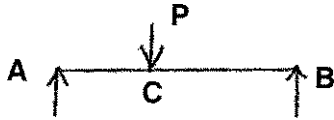
Marks : 14

1. Choose the correct answer : 14
- 1) The maximum strain energy stored in a body is known as 1  
a) Impact b) Proof resilience  
c) Both a) and b) d) Modules of resilience
- 2) If a member subjected to an axial tensile load, the plane normal to the axis of loading carries 1  
a) min. normal stress b) maximum normal stress  
c) maximum shear stress d) none of the above
- 3) A simply supported girder has a span of 12 m. A 200 kN wheel load moves from one end to other end on the span of the girder. The maximum B.M. occur at a section 4 m from left end is 2  
a) 53333 kNm b) 533.33 kNm c) 53.33 kNm d) 5.333 kNm
- 4) The equivalent bending moment under combined action of bending moment M and torque T is 1  
a)  $T_e = (M^2 + T^2)$  b)  $T_e = (M^2 + T^2)^{1/2}$   
c)  $T_e = (M^2 + T^2)^{3/2}$  d)  $T_e = (M^2 + T^2)^2$
- 5) A cantilever beam 3 m long carries a point load of 2 kN at a distance of 2 m from the fixed end. Then slope at free end of cantilever is 2  
Take  $EI = 8 \times 10^{12}$  N-mm<sup>2</sup>  
a) 0.05 rad b) 0.0005 rad c) 0.5 rad d) 5.005 rad

P.T.O.



- 6) Influence line concept is applicable for 1  
 a) Static load      b) Moving load      c) Rolling load      d) Both b) and c)
- 7) ILD for S.F. at a section for simply supported beam shown in fig. 2



- 8) Which of the following theory is suitable for ductile material ? 1  
 a) Maximum principal stress theory      b) Maximum principal strain theory  
 c) Maximum shear stress theory      d) Distortion energy theory
- 9) A simply supported beam of span ( $l$ ) carries a point load of ( $W$ ) at centre. The deflection at centre will be 1  
 a)  $W l^3/48EI$       b)  $W l^3/348EI$       c)  $W l^3/8EI$       d)  $W l^3/4EI$
- 10) Euler's critical load for a column of length  $l$ , moment of inertia  $I$ , modulus of elasticity  $E$ , one end is fixed and other free is given by 1  
 a)  $\Pi^2 EI/4l^2$       b)  $\Pi^2 EI/2l^2$       c)  $\Pi^2 EI/l^2$       d)  $4\Pi^2 EI/l^2$
- 11) A compressive member always tends to buckle in the direction of 1  
 a) Axis of load      b) Minimum cross-section  
 c) Least radius of gyration      d) None of the above



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA Pattern) Examination, 2017  
STRUCTURAL MECHANICS – II**

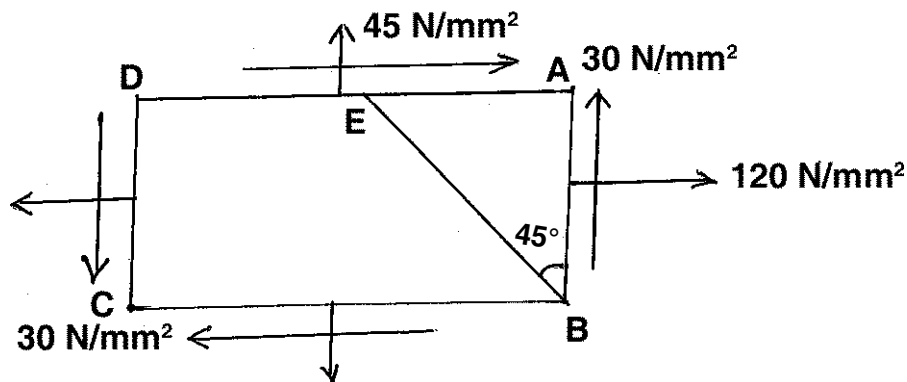
Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

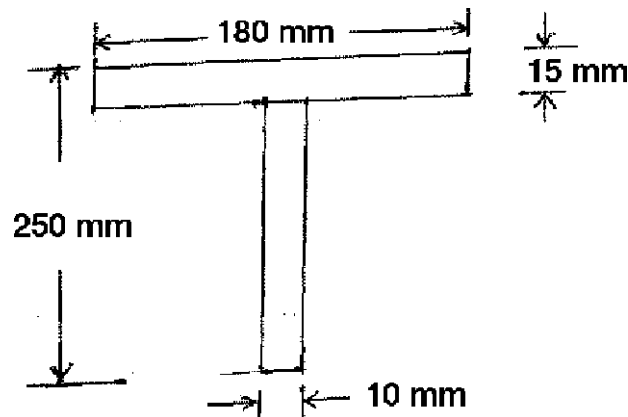
**Instructions :** 1) Solve **any three** questions from Section – I and Section – II.  
2) Assume suitable data **if** required.

SECTION – I

2. a) Show stresses acting on stress element ABCD. Determine normal and tangential stresses on the plane BE inclined at 45° to the plane AB. 7

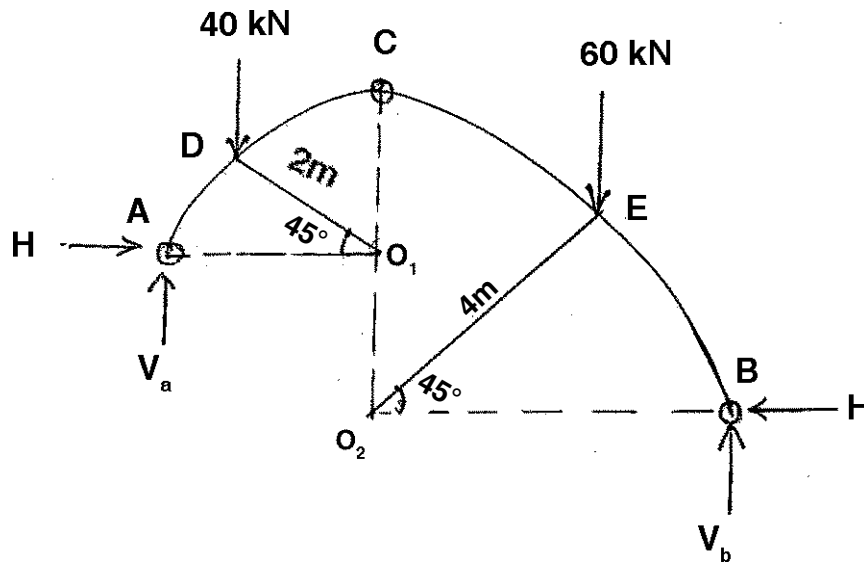


- b) Principle stresses and strains. 2
3. a) Derive crippling load for column whose both ends are hinged. 3
- b) Shows a T section column of mild steel 3.5 m long with both ends fixed. Find safe -axial load on the column. Take  $\sigma_c = 335 \text{ N/mm}^2$  and Rankine's constant  $\alpha = 1/7500$  and factor of safety of 3. 7



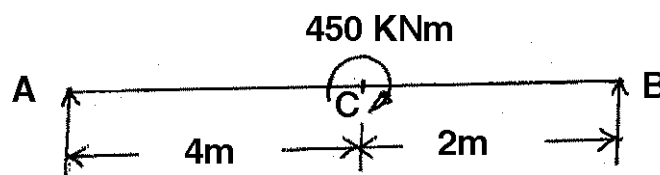


4. a) Explain equivalent torque and equivalent moment. 3
- b) A solid shaft is subjected to a bending moment of 2.3 KNm and twisting moment of 3.45 KNm. Find the diameter of the shaft if the permissible tensile and shear stress not to exceed 703 and 421.8 MN/m<sup>2</sup> respectively. 6
5. Shows three hinged arch consists of two quadrantal parts AC and CB of radii 2 m and 4 m respectively. Calculate reaction at supports and bending moments under the loads. 9



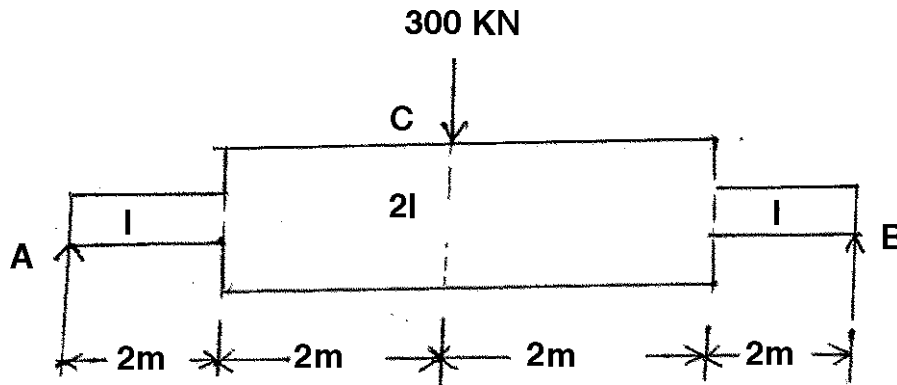
SECTION – II

6. A beam 6 m long is subjected to a 450 KNm clockwise couple. If uniform flexural rigidity EI of the beam  $8 \times 10^4$  KN m<sup>2</sup>, using Macaulay's method
- a) Determine deflection at the point of application of couple 9
- b) The max. deflection.

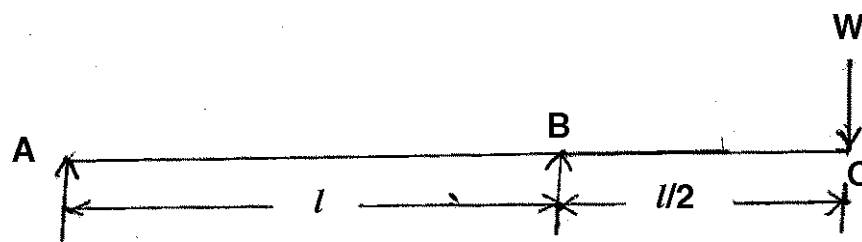




7. Using conjugate beam method determine the mid span deflection of the beam. Take  $E = 200 \times 10^6 \text{ KN/m}^2$  and  $I = 200 \times 10^{-4} \text{ m}^4$ . 10

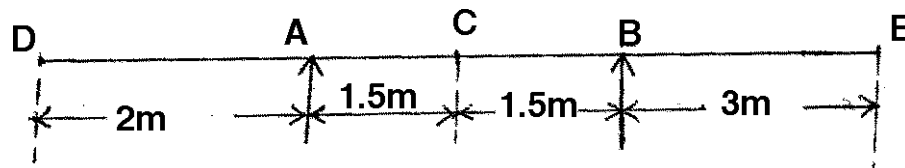


8. a) Find the vertical deflection of the load W for the beam shown in fig. using Strain Energy Method. (Using Castiglione's theorem). 7



- b) Explain Castiglione's 1<sup>st</sup> theorem. 2

9. Two wheel loads 200 kN and 80 kN spaced at 0.8 m apart move on the span of the girder of span 8 m. Find maximum positive and maximum negative S.F. at the section 3.5 m from the left. Use ILD method. 9







SLR-TJ – 29

Seat No.	
----------	--

Set **Q**

**S.E. (Civil) (Part – II) (CGPA Pattern) Examination, 2017  
STRUCTURAL MECHANICS – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Assume **suitable** data if required.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

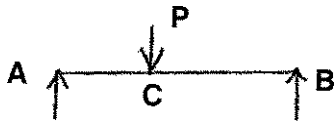
Marks : 14

1. Choose the correct answer : 14
- 1) If a member subjected to an axial tensile load, the plane normal to the axis of loading carries 1  
a) min. normal stress                      b) maximum normal stress  
c) maximum shear stress                  d) none of the above
- 2) The equivalent bending moment under combined action of bending moment M and torque T is 1  
a)  $T_e = (M^2 + T^2)$                       b)  $T_e = (M^2 + T^2)^{1/2}$   
c)  $T_e = (M^2 + T^2)^{3/2}$                   d)  $T_e = (M^2 + T^2)^2$
- 3) Influence line concept is applicable for 1  
a) Static load      b) Moving load      c) Rolling load      d) Both b) and c)
- 4) Which of the following theory is suitable for ductile material ? 1  
a) Maximum principal stress theory      b) Maximum principal strain theory  
c) Maximum shear stress theory      d) Distortion energy theory
- 5) Euler's critical load for a column of length  $l$ , moment of inertia  $I$ , modulus of elasticity  $E$ , one end is fixed and other free is given by 1  
a)  $\Pi^2 EI/4l^2$                       b)  $\Pi^2 EI/2l^2$   
c)  $\Pi^2 EI/l^2$                       d)  $4\Pi^2 EI/l^2$
- 6) The maximum strain energy stored in a body is known as 1  
a) Impact                      b) Proof resilience  
c) Both a) and b)              d) Modules of resilience

P.T.O.



- 7) A compressive member always tends to buckle in the direction of 1  
 a) Axis of load b) Minimum cross-section  
 c) Least radius of gyration d) None of the above
- 8) A simply supported girder has a span of 12 m. A 200 kN wheel load moves from one end to other end on the span of the girder. The maximum B.M. occur at a section 4 m from left end is 2  
 a) 53333 kNm b) 533.33 kNm c) 53.33 kNm d) 5.333 kNm
- 9) A cantilever beam 3 m long carries a point load of 2 kN at a distance of 2 m from the fixed end. Then slope at free end of cantilever is 2  
 Take  $EI = 8 \times 10^{12} \text{ N-mm}^2$   
 a) 0.05 rad b) 0.0005 rad c) 0.5 rad d) 5.005 rad
- 10) ILD for S.F. at a section for simply supported beam shown in fig. 2



- a)  b)  c)  d) 

- 11) A simply supported beam of span ( $l$ ) carries a point load of ( $W$ ) at centre. The deflection at centre will be 1  
 a)  $W l^3/48EI$  b)  $W l^3/348EI$  c)  $W l^3/8EI$  d)  $W l^3/4EI$





Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA Pattern) Examination, 2017  
STRUCTURAL MECHANICS – II**

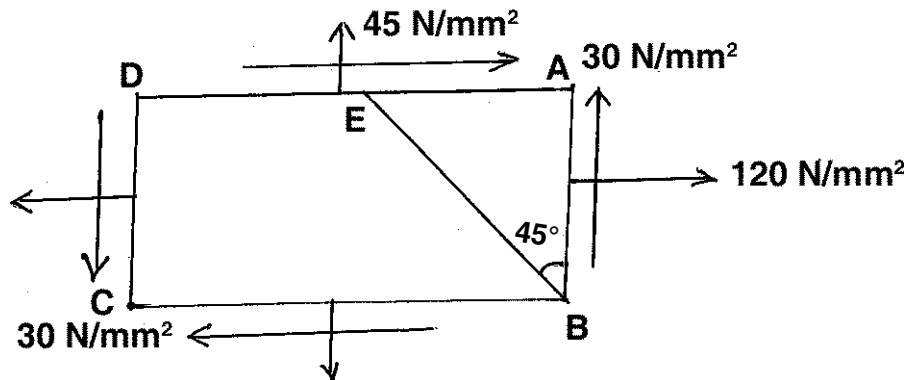
Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

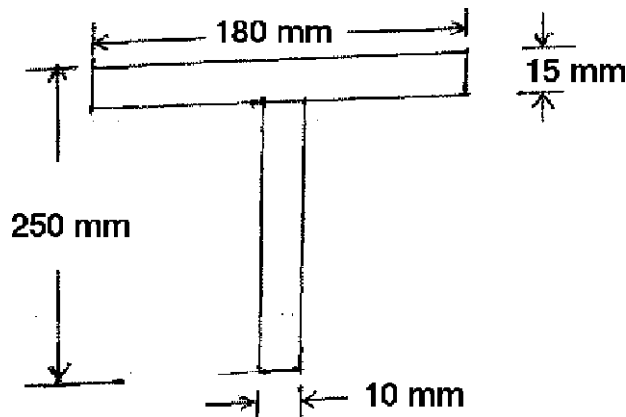
**Instructions :** 1) Solve **any three** questions from Section – I and Section – II.  
2) Assume suitable data **if** required.

SECTION – I

2. a) Show stresses acting on stress element ABCD. Determine normal and tangential stresses on the plane BE inclined at 45° to the plane AB. 7

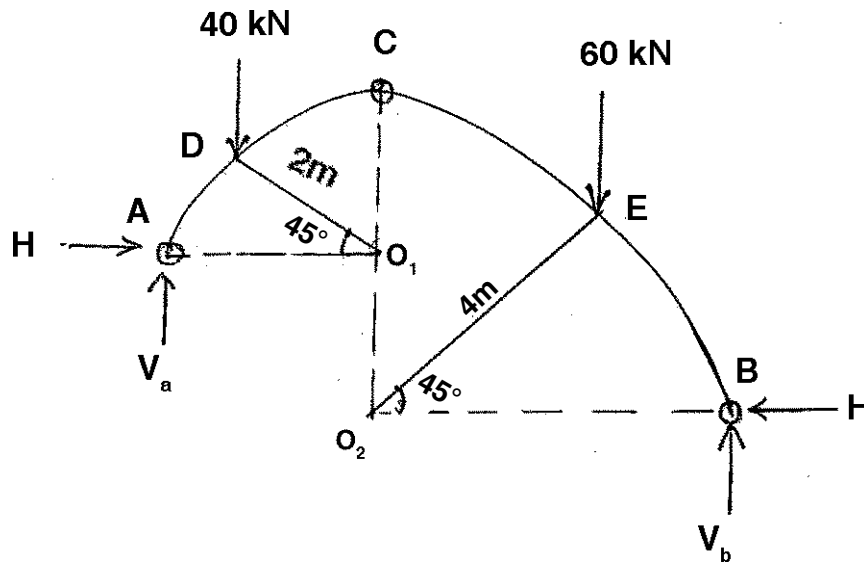


- b) Principle stresses and strains. 2
3. a) Derive crippling load for column whose both ends are hinged. 3
- b) Shows a T section column of mild steel 3.5 m long with both ends fixed. Find safe -axial load on the column. Take  $\sigma_c = 335 \text{ N/mm}^2$  and Rankine's constant  $\alpha = 1/7500$  and factor of safety of 3. 7



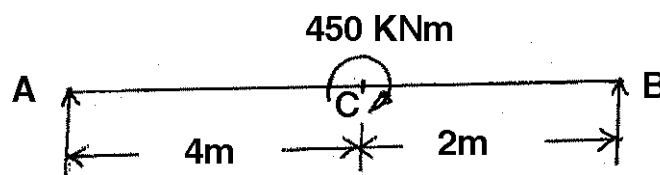


4. a) Explain equivalent torque and equivalent moment. 3
- b) A solid shaft is subjected to a bending moment of 2.3 KNm and twisting moment of 3.45 KNm. Find the diameter of the shaft if the permissible tensile and shear stress not to exceed 703 and 421.8 MN/m<sup>2</sup> respectively. 6
5. Shows three hinged arch consists of two quadrantal parts AC and CB of radii 2 m and 4 m respectively. Calculate reaction at supports and bending moments under the loads. 9



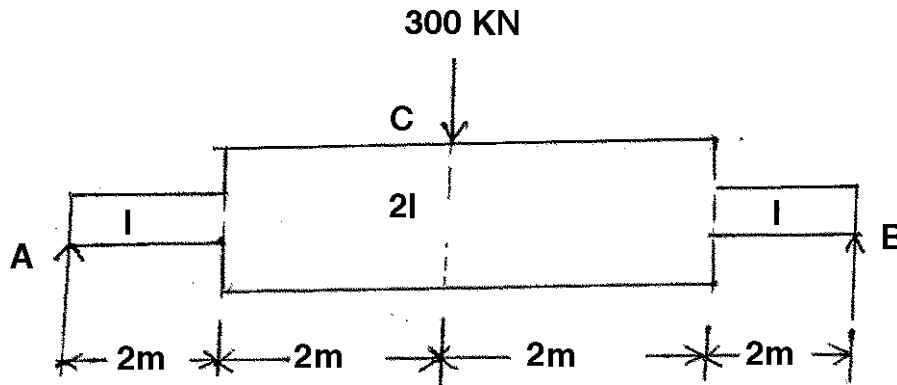
SECTION – II

6. A beam 6 m long is subjected to a 450 KNm clockwise couple. If uniform flexural rigidity EI of the beam  $8 \times 10^4$  KN m<sup>2</sup>, using Macaulay's method
- a) Determine deflection at the point of application of couple 9
- b) The max. deflection.

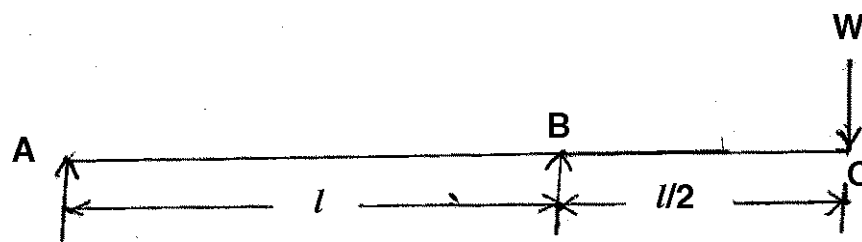




7. Using conjugate beam method determine the mid span deflection of the beam. Take  $E = 200 \times 10^6 \text{ KN/m}^2$  and  $I = 200 \times 10^{-4} \text{ m}^4$ . 10

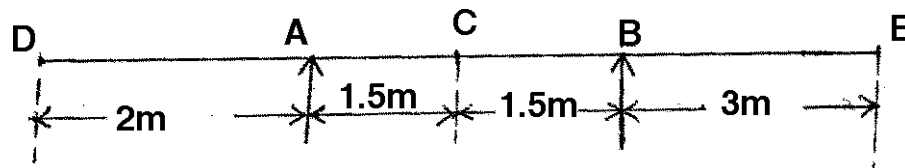


8. a) Find the vertical deflection of the load W for the beam shown in fig. using Strain Energy Method. (Using Castiglione's theorem). 7



- b) Explain Castiglione's 1<sup>st</sup> theorem. 2

9. Two wheel loads 200 kN and 80 kN spaced at 0.8 m apart move on the span of the girder of span 8 m. Find maximum positive and maximum negative S.F. at the section 3.5 m from the left. Use ILD method. 9







Seat No.	
----------	--

Set **R**

**S.E. (Civil) (Part – II) (CGPA Pattern) Examination, 2017**  
**STRUCTURAL MECHANICS – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

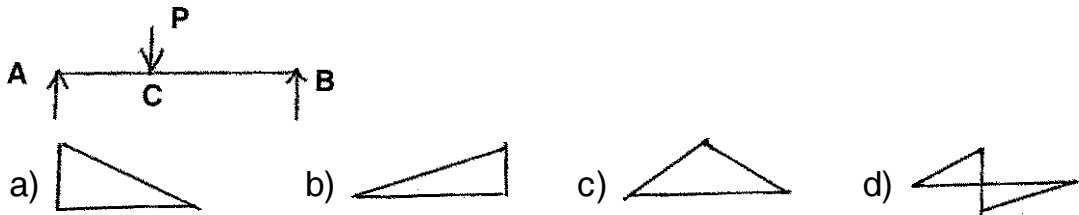
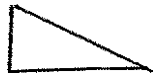
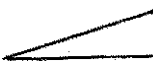

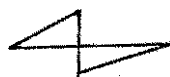
Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Assume **suitable** data if required.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14
- 1) A simply supported girder has a span of 12 m. A 200 kN wheel load moves from one end to other end on the span of the girder. The maximum B.M. occur at a section 4 m from left end is 2
- a) 53333 kNm      b) 533.33 kNm      c) 53.33 kNm      d) 5.333 kNm
- 2) A cantilever beam 3 m long carries a point load of 2 kN at a distance of 2 m from the fixed end. Then slope at free end of cantilever is 2
- Take  $EI = 8 \times 10^{12}$  N-mm<sup>2</sup>
- a) 0.05 rad      b) 0.0005 rad      c) 0.5 rad      d) 5.005 rad
- 3) ILD for S.F. at a section for simply supported beam shown in fig. 2
- 
- a)       b)       c)       d) 
- 4) A simply supported beam of span ( $l$ ) carries a point load of ( $W$ ) at centre. The deflection at centre will be 1
- a)  $W l^3/48EI$       b)  $W l^3/348EI$       c)  $W l^3/8EI$       d)  $W l^3/4EI$
- 5) A compressive member always tends to buckle in the direction of 1
- a) Axis of load      b) Minimum cross-section  
c) Least radius of gyration      d) None of the above

P.T.O.



- 6) If a member subjected to an axial tensile load, the plane normal to the axis of loading carries **1**  
a) min. normal stress                      b) maximum normal stress  
c) maximum shear stress                  d) none of the above
- 7) The equivalent bending moment under combined action of bending moment  $M$  and torque  $T$  is **1**  
a)  $T_e = (M^2 + T^2)$                       b)  $T_e = (M^2 + T^2)^{1/2}$   
c)  $T_e = (M^2 + T^2)^{3/2}$                   d)  $T_e = (M^2 + T^2)^2$
- 8) The maximum strain energy stored in a body is known as **1**  
a) Impact                                      b) Proof resilience  
c) Both a) and b)                          d) Modules of resilience
- 9) Influence line concept is applicable for **1**  
a) Static load              b) Moving load      c) Rolling load      d) Both b) and c)
- 10) Which of the following theory is suitable for ductile material ? **1**  
a) Maximum principal stress theory      b) Maximum principal strain theory  
c) Maximum shear stress theory          d) Distortion energy theory
- 11) Euler's critical load for a column of length  $l$ , moment of inertia  $I$ , modulus of elasticity  $E$ , one end is fixed and other free is given by **1**  
a)  $\Pi^2 EI/4l^2$               b)  $\Pi^2 EI/2l^2$               c)  $\Pi^2 EI/l^2$               d)  $4\Pi^2 EI/l^2$
-



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA Pattern) Examination, 2017  
STRUCTURAL MECHANICS – II**

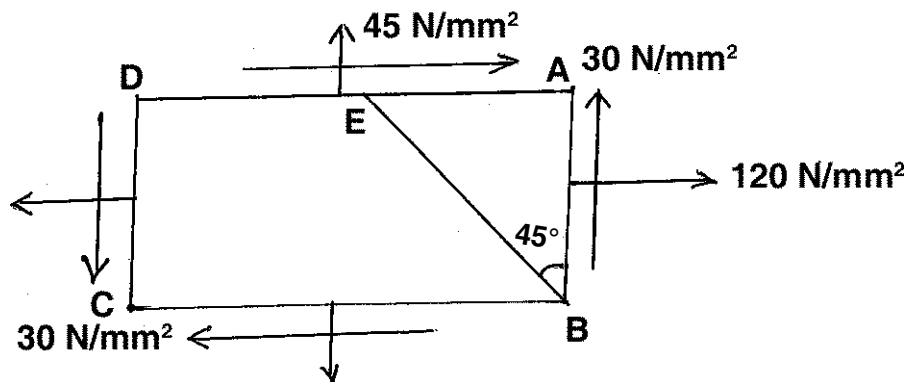
Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

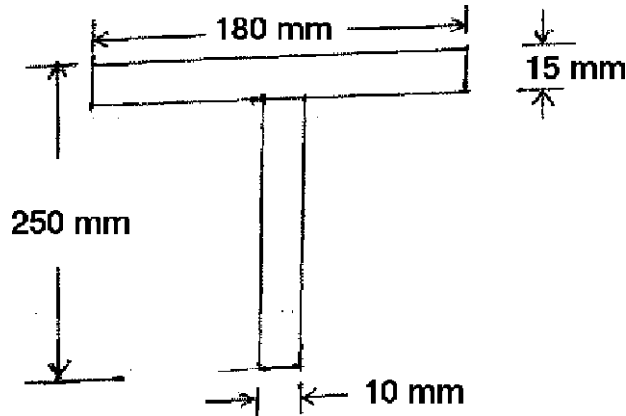
**Instructions :** 1) Solve **any three** questions from Section – I and Section – II.  
2) Assume suitable data **if** required.

SECTION – I

2. a) Show stresses acting on stress element ABCD. Determine normal and tangential stresses on the plane BE inclined at 45° to the plane AB. 7

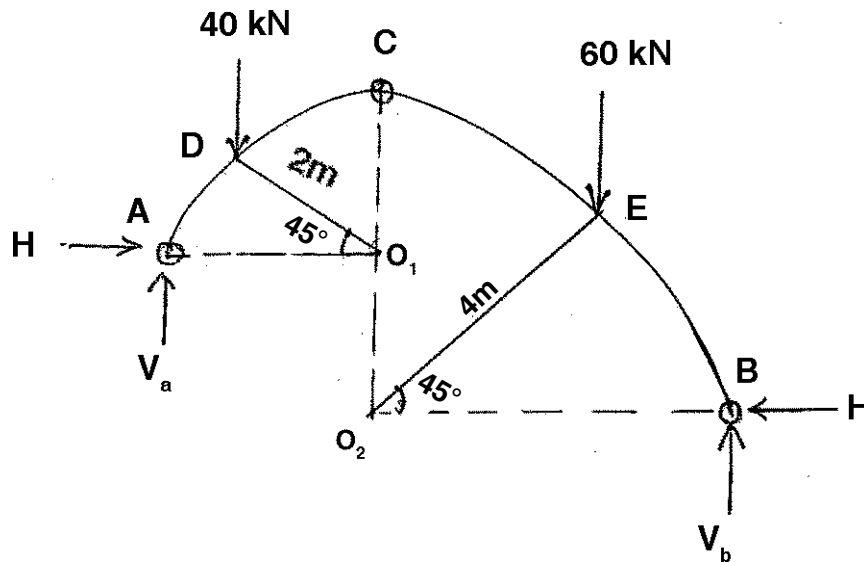


- b) Principle stresses and strains. 2
3. a) Derive crippling load for column whose both ends are hinged. 3
- b) Shows a T section column of mild steel 3.5 m long with both ends fixed. Find safe -axial load on the column. Take  $\sigma_c = 335 \text{ N/mm}^2$  and Rankine's constant  $\alpha = 1/7500$  and factor of safety of 3. 7



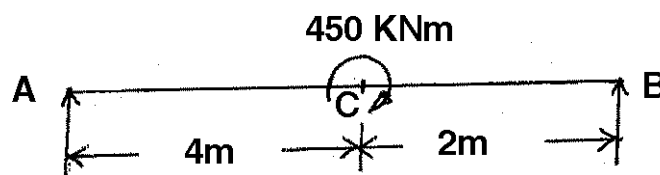


4. a) Explain equivalent torque and equivalent moment. 3
- b) A solid shaft is subjected to a bending moment of 2.3 KNm and twisting moment of 3.45 KNm. Find the diameter of the shaft if the permissible tensile and shear stress not to exceed 703 and 421.8 MN/m<sup>2</sup> respectively. 6
5. Shows three hinged arch consists of two quadrantal parts AC and CB of radii 2 m and 4 m respectively. Calculate reaction at supports and bending moments under the loads. 9



SECTION – II

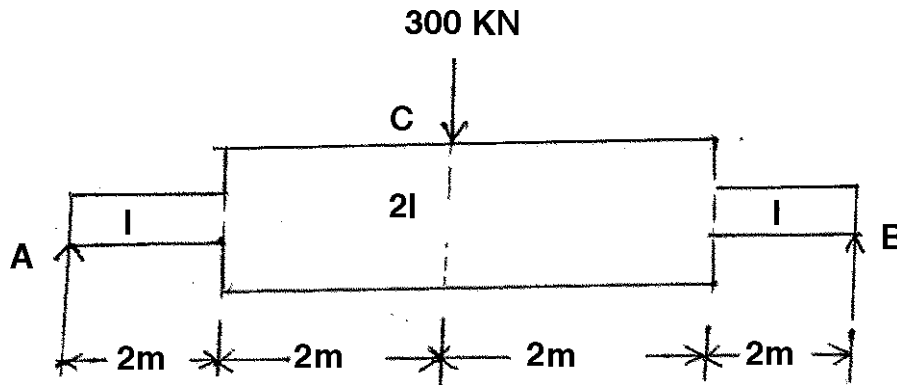
6. A beam 6 m long is subjected to a 450 KNm clockwise couple. If uniform flexural rigidity EI of the beam  $8 \times 10^4$  KN m<sup>2</sup>, using Macaulay's method
- a) Determine deflection at the point of application of couple 9
- b) The max. deflection.



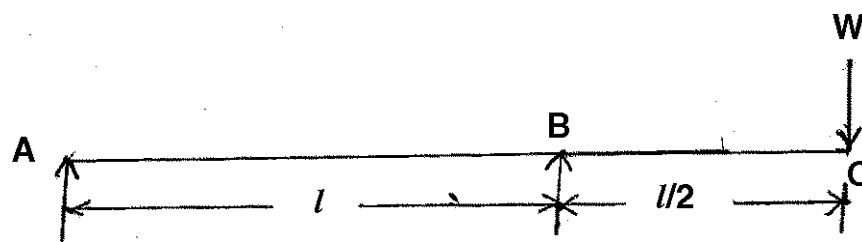




7. Using conjugate beam method determine the mid span deflection of the beam. Take  $E = 200 \times 10^6 \text{ KN/m}^2$  and  $I = 200 \times 10^{-4} \text{ m}^4$ . 10

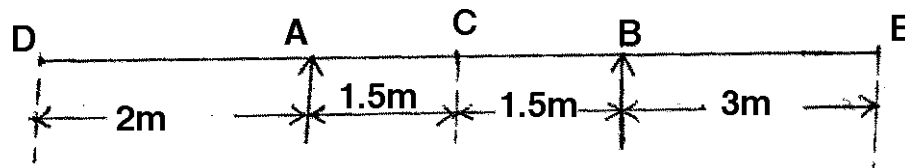


8. a) Find the vertical deflection of the load W for the beam shown in fig. using Strain Energy Method. (Using Castiglione's theorem). 7



- b) Explain Castiglione's 1<sup>st</sup> theorem. 2

9. Two wheel loads 200 kN and 80 kN spaced at 0.8 m apart move on the span of the girder of span 8 m. Find maximum positive and maximum negative S.F. at the section 3.5 m from the left. Use ILD method. 9







Seat No.	
----------	--

Set	S
-----	---

**S.E. (Civil) (Part – II) (CGPA Pattern) Examination, 2017  
STRUCTURAL MECHANICS – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Assume **suitable** data if required.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14
- 1) A compressive member always tends to buckle in the direction of 1  
a) Axis of load b) Minimum cross-section  
c) Least radius of gyration d) None of the above
- 2) Euler's critical load for a column of length  $l$ , moment of inertia  $I$ , modulus of elasticity  $E$ , one end is fixed and other free is given by 1  
a)  $\frac{\pi^2 EI}{4l^2}$  b)  $\frac{\pi^2 EI}{2l^2}$  c)  $\frac{\pi^2 EI}{l^2}$  d)  $4\frac{\pi^2 EI}{l^2}$
- 3) A simply supported beam of span ( $l$ ) carries a point load of ( $W$ ) at centre. The deflection at centre will be 1  
a)  $\frac{W l^3}{48EI}$  b)  $\frac{W l^3}{348EI}$  c)  $\frac{W l^3}{8EI}$  d)  $\frac{W l^3}{4EI}$
- 4) ILD for S.F. at a section for simply supported beam shown in fig. 2
- 
- 5) Influence line concept is applicable for 1  
a) Static load b) Moving load c) Rolling load d) Both b) and c)
- 6) Which of the following theory is suitable for ductile material ? 1  
a) Maximum principal stress theory b) Maximum principal strain theory  
c) Maximum shear stress theory d) Distortion energy theory

P.T.O.



- 7) A cantilever beam 3 m long carries a point load of 2 KN at a distance of 2 m from the fixed end. Then slope at free end of cantilever is **2**  
Take  $EI = 8 \times 10^{12}$  N-mm<sup>2</sup>  
a) 0.05 rad                      b) 0.0005 rad                      c) 0.5 rad                      d) 5.005 rad
- 8) The equivalent bending moment under combined action of bending moment M and torque T is **1**  
a)  $T_e = (M^2 + T^2)$                       b)  $T_e = (M^2 + T^2)^{1/2}$   
c)  $T_e = (M^2 + T^2)^{3/2}$                       d)  $T_e = (M^2 + T^2)^2$
- 9) A simply supported girder has a span of 12 m. A 200 kN wheel load moves from one end to other end on the span of the girder. The maximum B.M. occur at a section 4 m from left end is **2**  
a) 53333 kNm                      b) 533.33 kNm                      c) 53.33 kNm                      d) 5.333 kNm
- 10) If a member subjected to an axial tensile load, the plane normal to the axis of loading carries **1**  
a) min. normal stress                      b) maximum normal stress  
c) maximum shear stress                      d) none of the above
- 11) The maximum strain energy stored in a body is known as **1**  
a) Impact                      b) Proof resilience  
c) Both a) and b)                      d) Modules of resilience
-



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA Pattern) Examination, 2017  
STRUCTURAL MECHANICS – II**

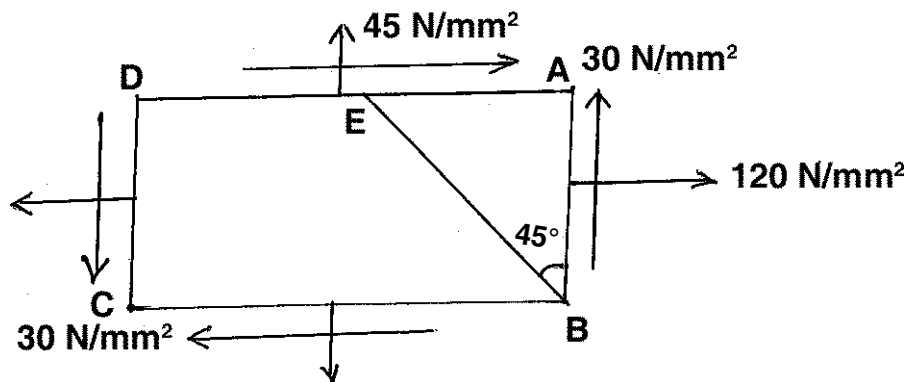
Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

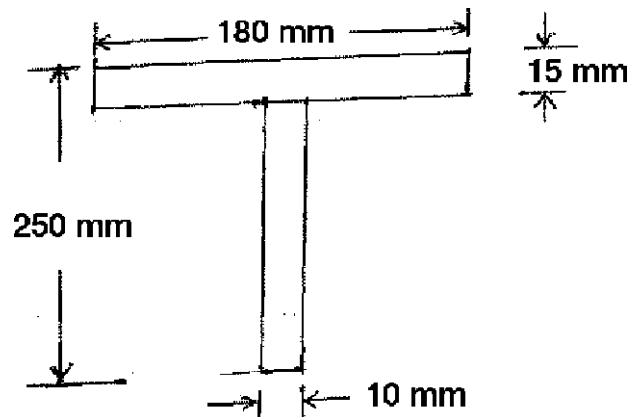
**Instructions :** 1) Solve **any three** questions from Section – I and Section – II.  
2) Assume suitable data **if** required.

SECTION – I

2. a) Show stresses acting on stress element ABCD. Determine normal and tangential stresses on the plane BE inclined at 45° to the plane AB. 7

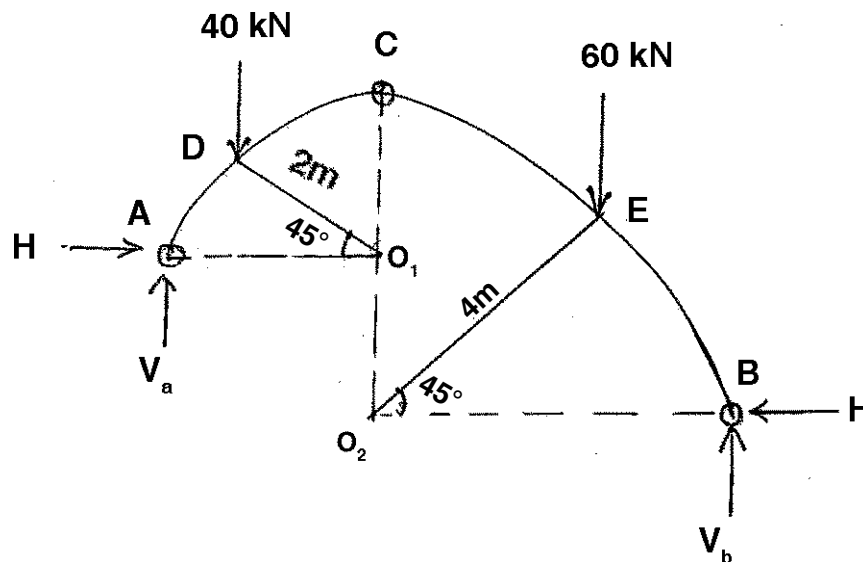


- b) Principle stresses and strains. 2
3. a) Derive crippling load for column whose both ends are hinged. 3
- b) Shows a T section column of mild steel 3.5 m long with both ends fixed. Find safe -axial load on the column. Take  $\sigma_c = 335 \text{ N/mm}^2$  and Rankine's constant  $\alpha = 1/7500$  and factor of safety of 3. 7



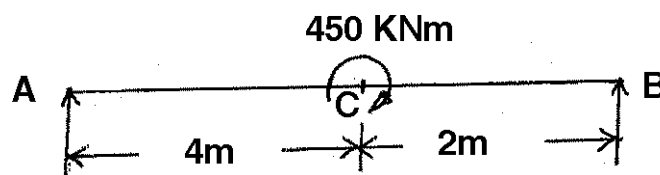


4. a) Explain equivalent torque and equivalent moment. 3
- b) A solid shaft is subjected to a bending moment of 2.3 kNm and twisting moment of 3.45 kNm. Find the diameter of the shaft if the permissible tensile and shear stress not to exceed 703 and 421.8 MN/m<sup>2</sup> respectively. 6
5. Shows three hinged arch consists of two quadrantal parts AC and CB of radii 2 m and 4 m respectively. Calculate reaction at supports and bending moments under the loads. 9



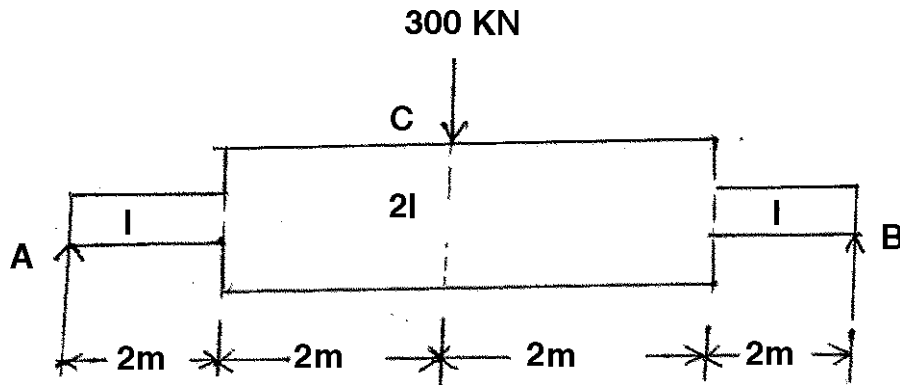
## SECTION – II

6. A beam 6 m long is subjected to a 450 kNm clockwise couple. If uniform flexural rigidity EI of the beam  $8 \times 10^4$  kN m<sup>2</sup>, using Macaulay's method
- a) Determine deflection at the point of application of couple
- b) The max. deflection. 9

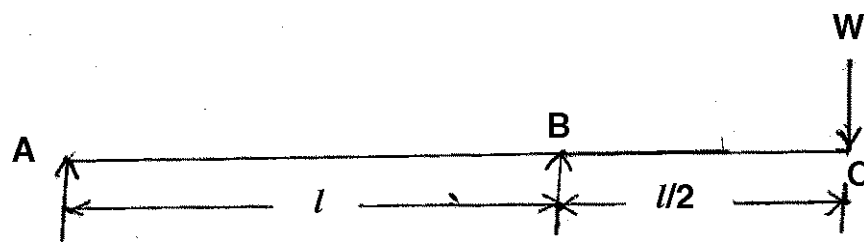




7. Using conjugate beam method determine the mid span deflection of the beam.  
Take  $E = 200 \times 10^6 \text{ KN/m}^2$  and  $I = 200 \times 10^{-4} \text{ m}^4$ . 10

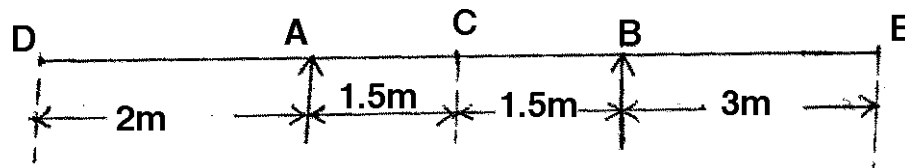


8. a) Find the vertical deflection of the load W for the beam shown in fig. using Strain Energy Method. (Using Castiglione's theorem). 7



- b) Explain Castiglione's 1<sup>st</sup> theorem. 2

9. Two wheel loads 200 kN and 80 kN spaced at 0.8 m apart move on the span of the girder of span 8 m. Find maximum positive and maximum negative S.F. at the section 3.5 m from the left. Use ILD method. 9









SLR-TJ – 30

Seat No.	
----------	--

Set **P**

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
SURVEYING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(14×1=14)

- 1) If only horizontal cross-wires is/are provided in the stadia diaphragm of a tacheometer, these may be  
a) one                      b) two                      c) three                      d) four
- 2) A subtense bar can be used to determine  
a) long distances up to 1 km                      b) short distances up to 200 m  
c) short distances up to a few centimetres      d) Very long distances up to 100 m
- 3) Overturning vehicles on a curve can be avoided by using a  
a) Compound curve      b) Vertical curve      c) Reverse curve      d) Transition curve
- 4) The long chord and tangent length of a circular curve of radius R will be equal if the angle of deflection is  
a) 30°                      b) 60°                      c) 120°                      d) 150°
- 5) The shape of a vertical curve generally provided for, is  
a) Circular                      b) Parabolic                      c) elliptical                      d) hyperbolic
- 6) Geostationary satellites have  
a) same distance from earth's centre                      b) same speed as earth's rotation  
c) same mass as global weight                      d) same angle with geodetic stations

P.T.O.



- 7) Selective availability in GPS is a  
a) Natural error      b) Intentional error      c) Systematic error      d) Bias
- 8) Which of the following remote sensing systems employs only one detector ?  
a) Scanning system      b) Framing system      c) Both      d) None
- 9) Which one is not an example of surface phenomena ?  
a) Emission      b) Scattering      c) Reflection      d) Absorption
- 10) A passive sensor uses which of the following sources of energy ?  
a) Sun      b) Flash Light      c) Its own source      d) Moon
- 11) Cell-like units are characteristics of  
a) Raster data structures      b) Cellular data structures  
c) Both (a) and (b)      d) vector data structures
- 12) In a raster overlay, a point is represented by a  
a) string of cells      b) group of cells      c) single cell      d) all of these
- 13) In project survey reconnaissance is carried out by using  
a) theodolite      b) Dumpy level      c) Minor instruments      d) Planimeter
- 14) Setting out of bridge involves determination of  
a) Length of centre line and height of piers  
b) Direction of centre line and height of piers  
c) Length of centre line and position of piers  
d) None of these
-



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
SURVEYING – II**

Day and Date : Wednesday, 22-11-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Q. 2 and Q. 6 are **compulsory**, attempt **any two** out of Q. 3 to Q. 5 and **any two** out of Q. 7 to Q. 9.
  - 2) Assume suitable data if **necessary** but mention it clearly.

SECTION – I

2. a) A fixed hair tacheometer fitted with an anallatic lens with an instrument constant of 100, was used to determine the slope between two points P and Q . The following readings were taken. If the staff was held vertically compute the gradient from P to Q. 6

Instrument Station	Staff Station	Bearing	Vertical Angle	Staff reading (m)
A	P	345°	+15°	0.915,1.750,2.585
	Q	75°	+10°	0.760,2.240,3.715

- b) What are the various types of direct readings tacheometers ? Explain any one in detail. 4
3. a) Calculate the data required for setting out a curve by the deflection angle method, considering the following information. 6
- i) Angle of intersection = 145°
  - ii) Chainage of point of intersection = 1580 m
  - iii) Degree of curve = 5°
  - iv) Least count of theodolite = 20"
  - v) Peg interval = 30 m
- b) Draw the neat sketch and show various elements of different shapes of transition curves. 3



4. a) Describe GPS receivers and its types. **5**
- b) What are the three segments of GPS ? Explain any one in detail. **4**
5. a) Calculate the reduced levels of the various station pegs on a vertical curve connecting two uniform grades of +0.5 % and – 7% . The chainage and reduced level of the point of intersection are 500 m and 330.75m , respectively. Take the rate of change of grade as 0.1% per 30 m. **6**
- b) Define and write expression for the following. **3**
- i) Degree of curve
  - ii) Shift of curve
  - iii) Superelevation.

## SECTION – II

6. a) On an aerial photograph taken with a camera of 20 cm focal length, a line AB measures 12 cm. On a map drawn to a scale of 1/44500, the same line measures 2.66 cm. If the average height of area above MSL is 500m, calculate the flying height of the aircraft. **6**
- b) Define
- i) Scale
  - ii) Tilt
  - iii) Principal point
  - iv) Isocentre. **4**
7. a) Explain the interaction mechanism of EM Radiation with atmosphere. **5**
- b) Write a note on applications of remote sensing. **4**
8. a) Write short note on :
- i) Spatial data and non spatial data
  - ii) Vector data and Raster data. **6**
- b) Discuss how closely GIS is related to remote sensing. **3**
9. a) Explain setting out of Culvert **4**
- b) Explain procedure of project survey for road. **5**



SLR-TJ – 30

Seat No.	
----------	--

Set **Q**

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
SURVEYING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(14×1=14)

- 1) Which of the following remote sensing systems employs only one detector ?  
a) Scanning system    b) Framing system    c) Both    d) None
- 2) Which one is not an example of surface phenomena ?  
a) Emission    b) Scattering    c) Reflection    d) Absorption
- 3) A passive sensor uses which of the following sources of energy ?  
a) Sun    b) Flash Light    c) Its own source    d) Moon
- 4) Cell-like units are characteristics of  
a) Raster data structures    b) Cellular data structures  
c) Both (a) and (b)    d) vector data structures
- 5) In a raster overlay, a point is represented by a  
a) string of cells    b) group of cells    c) single cell    d) all of these
- 6) In project survey reconnaissance is carried out by using  
a) theodolite    b) Dumpy level    c) Minor instruments    d) Planimeter
- 7) Setting out of bridge involves determination of  
a) Length of centre line and height of piers  
b) Direction of centre line and height of piers  
c) Length of centre line and position of piers  
d) None of these

P.T.O.



- 8) If only horizontal cross-wires is/are provided in the stadia diaphragm of a tacheometer, these may be
- a) one                      b) two                      c) three                      d) four
- 9) A subtense bar can be used to determine
- a) long distances up to 1 km                      b) short distances up to 200 m  
c) short distances up to a few centimetres      d) Very long distances up to 100 km
- 10) Overturning vehicles on a curve can be avoided by using a
- a) Compound curve      b) Vertical curve      c) Reverse curve      d) Transition curve
- 11) The long chord and tangent length of a circular curve of radius R will be equal if the angle of deflection is
- a)  $30^\circ$                       b)  $60^\circ$                       c)  $120^\circ$                       d)  $150^\circ$
- 12) The shape of a vertical curve generally provided for, is
- a) Circular                      b) Parabolic                      c) elliptical                      d) hyperbolic
- 13) Geostationary satellites have
- a) same distance from earth's centre                      b) same speed as earth's rotation  
c) same mass as global weight                      d) same angle with geodetic stations
- 14) Selective availability in GPS is a
- a) Natural error                      b) Intentional error      c) Systematic error      d) Bias
-



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
SURVEYING – II**

Day and Date : Wednesday, 22-11-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Q. 2 and Q. 6 are **compulsory**, attempt **any two** out of Q. 3 to Q. 5 and **any two** out of Q. 7 to Q. 9.
  - 2) Assume suitable data if **necessary** but mention it clearly.

SECTION – I

2. a) A fixed hair tacheometer fitted with an anallatic lens with an instrument constant of 100, was used to determine the slope between two points P and Q . The following readings were taken. If the staff was held vertically compute the gradient from P to Q. 6

Instrument Station	Staff Station	Bearing	Vertical Angle	Staff reading (m)
A	P	345°	+15°	0.915,1.750,2.585
	Q	75°	+10°	0.760,2.240,3.715

- b) What are the various types of direct readings tacheometers ? Explain any one in detail. 4
3. a) Calculate the data required for setting out a curve by the deflection angle method, considering the following information. 6
- i) Angle of intersection = 145°
  - ii) Chainage of point of intersection = 1580 m
  - iii) Degree of curve = 5°
  - iv) Least count of theodolite = 20"
  - v) Peg interval = 30 m
- b) Draw the neat sketch and show various elements of different shapes of transition curves. 3



4. a) Describe GPS receivers and its types. **5**
- b) What are the three segments of GPS ? Explain any one in detail. **4**
5. a) Calculate the reduced levels of the various station pegs on a vertical curve connecting two uniform grades of +0.5 % and – 7% . The chainage and reduced level of the point of intersection are 500 m and 330.75m , respectively. Take the rate of change of grade as 0.1% per 30 m. **6**
- b) Define and write expression for the following. **3**
- i) Degree of curve
  - ii) Shift of curve
  - iii) Superelevation.

## SECTION – II

6. a) On an aerial photograph taken with a camera of 20 cm focal length, a line AB measures 12 cm. On a map drawn to a scale of 1/44500, the same line measures 2.66 cm. If the average height of area above MSL is 500m, calculate the flying height of the aircraft. **6**
- b) Define
- i) Scale
  - ii) Tilt
  - iii) Principal point
  - iv) Isocentre. **4**
7. a) Explain the interaction mechanism of EM Radiation with atmosphere. **5**
- b) Write a note on applications of remote sensing. **4**
8. a) Write short note on :
- i) Spatial data and non spatial data
  - ii) Vector data and Raster data. **6**
- b) Discuss how closely GIS is related to remote sensing. **3**
9. a) Explain setting out of Culvert **4**
- b) Explain procedure of project survey for road. **5**





SLR-TJ – 30

Seat No.	
----------	--

Set **R**

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
SURVEYING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

**(14×1=14)**

- 1) The shape of a vertical curve generally provided for, is
  - a) Circular
  - b) Parabolic
  - c) elliptical
  - d) hyperbolic
- 2) Geostationary satellites have
  - a) same distance from earth's centre
  - b) same speed as earth's rotation
  - c) same mass as global weight
  - d) same angle with geodetic stations
- 3) Selective availability in GPS is a
  - a) Natural error
  - b) Intentional error
  - c) Systematic error
  - d) Bias
- 4) Which of the following remote sensing systems employs only one detector ?
  - a) Scanning system
  - b) Framing system
  - c) Both
  - d) None
- 5) Which one is not an example of surface phenomena ?
  - a) Emission
  - b) Scattering
  - c) Reflection
  - d) Absorption
- 6) A passive sensor uses which of the following sources of energy ?
  - a) Sun
  - b) Flash Light
  - c) Its own source
  - d) Moon
- 7) Cell-like units are characteristics of
  - a) Raster data structures
  - b) Cellular data structures
  - c) Both (a) and (b)
  - d) vector data structures

P.T.O.



- 8) In a raster overlay, a point is represented by a  
a) string of cells      b) group of cells      c) single cell      d) all of these
- 9) In project survey reconnaissance is carried out by using  
a) theodolite      b) Dumpy level      c) Minor instruments      d) Planimeter
- 10) Setting out of bridge involves determination of  
a) Length of centre line and height of piers  
b) Direction of centre line and height of piers  
c) Length of centre line and position of piers  
d) None of these
- 11) If only horizontal cross-wires is/are provided in the stadia diaphragm of a tacheometer, these may be  
a) one      b) two      c) three      d) four
- 12) A subtense bar can be used to determine  
a) long distances up to 1 km      b) short distances up to 200 m  
c) short distances up to a few centimetres      d) Very long distances up to 100 km
- 13) Overturning vehicles on a curve can be avoided by using a  
a) Compound curve      b) Vertical curve      c) Reverse curve      d) Transition curve
- 14) The long chord and tangent length of a circular curve of radius R will be equal if the angle of deflection is  
a)  $30^\circ$       b)  $60^\circ$       c)  $120^\circ$       d)  $150^\circ$
-



<b>Seat No.</b>	
-----------------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
SURVEYING – II**

Day and Date : Wednesday, 22-11-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Q. 2 and Q. 6 are **compulsory**, attempt **any two** out of Q. 3 to Q. 5 and **any two** out of Q. 7 to Q. 9.
  - 2) Assume suitable data if **necessary** but mention it clearly.

SECTION – I

2. a) A fixed hair tacheometer fitted with an anallatic lens with an instrument constant of 100, was used to determine the slope between two points P and Q . The following readings were taken. If the staff was held vertically compute the gradient from P to Q. 6

Instrument Station	Staff Station	Bearing	Vertical Angle	Staff reading (m)
A	P	345°	+15°	0.915,1.750,2.585
	Q	75°	+10°	0.760,2.240,3.715

- b) What are the various types of direct readings tacheometers ? Explain any one in detail. 4
3. a) Calculate the data required for setting out a curve by the deflection angle method, considering the following information. 6
- i) Angle of intersection = 145°
  - ii) Chainage of point of intersection = 1580 m
  - iii) Degree of curve = 5°
  - iv) Least count of theodolite = 20"
  - v) Peg interval = 30 m
- b) Draw the neat sketch and show various elements of different shapes of transition curves. 3



4. a) Describe GPS receivers and its types. **5**
- b) What are the three segments of GPS ? Explain any one in detail. **4**
5. a) Calculate the reduced levels of the various station pegs on a vertical curve connecting two uniform grades of +0.5 % and – 7% . The chainage and reduced level of the point of intersection are 500 m and 330.75m , respectively. Take the rate of change of grade as 0.1% per 30 m. **6**
- b) Define and write expression for the following. **3**
- i) Degree of curve
  - ii) Shift of curve
  - iii) Superelevation.

## SECTION – II

6. a) On an aerial photograph taken with a camera of 20 cm focal length, a line AB measures 12 cm. On a map drawn to a scale of 1/44500, the same line measures 2.66 cm. If the average height of area above MSL is 500m, calculate the flying height of the aircraft. **6**
- b) Define
- i) Scale
  - ii) Tilt
  - iii) Principal point
  - iv) Isocentre. **4**
7. a) Explain the interaction mechanism of EM Radiation with atmosphere. **5**
- b) Write a note on applications of remote sensing. **4**
8. a) Write short note on :
- i) Spatial data and non spatial data
  - ii) Vector data and Raster data. **6**
- b) Discuss how closely GIS is related to remote sensing. **3**
9. a) Explain setting out of Culvert **4**
- b) Explain procedure of project survey for road. **5**



SLR-TJ – 30

Seat No.	
----------	--

Set **S**

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
SURVEYING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

**(14×1=14)**

- 1) A passive sensor uses which of the following sources of energy ?  
a) Sun                      b) Flash Light              c) Its own source              d) Moon
- 2) Cell-like units are characteristics of  
a) Raster data structures                      b) Cellular data structures  
c) Both (a) and (b)                      d) vector data structures
- 3) In a raster overlay, a point is represented by a  
a) string of cells              b) group of cells              c) single cell              d) all of these
- 4) In project survey reconnaissance is carried out by using  
a) theodolite              b) Dumpy level              c) Minor instruments              d) Planimeter
- 5) Setting out of bridge involves determination of  
a) Length of centre line and height of piers  
b) Direction of centre line and height of piers  
c) Length of centre line and position of piers  
d) None of these

P.T.O.



- 6) If only horizontal cross-wires is/are provided in the stadia diaphragm of a tacheometer, these may be
- a) one                      b) two                      c) three                      d) four
- 7) A subtense bar can be used to determine
- a) long distances up to 1 km                      b) short distances up to 200 m  
c) short distances up to a few centimetres      d) Very long distances up to 100 km
- 8) Overturning vehicles on a curve can be avoided by using a
- a) Compound curve      b) Vertical curve      c) Reverse curve      d) Transition curve
- 9) The long chord and tangent length of a circular curve of radius R will be equal if the angle of deflection is
- a)  $30^\circ$                       b)  $60^\circ$                       c)  $120^\circ$                       d)  $150^\circ$
- 10) The shape of a vertical curve generally provided for, is
- a) Circular                      b) Parabolic                      c) elliptical                      d) hyperbolic
- 11) Geostationary satellites have
- a) same distance from earth's centre                      b) same speed as earth's rotation  
c) same mass as global weight                      d) same angle with geodetic stations
- 12) Selective availability in GPS is a
- a) Natural error                      b) Intentional error      c) Systematic error      d) Bias
- 13) Which of the following remote sensing systems employs only one detector ?
- a) Scanning system      b) Framing system      c) Both                      d) None
- 14) Which one is not an example of surface phenomena ?
- a) Emission                      b) Scattering                      c) Reflection                      d) Absorption
-



<b>Seat No.</b>	
-----------------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
SURVEYING – II**

Day and Date : Wednesday, 22-11-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Q. 2 and Q. 6 are **compulsory**, attempt **any two** out of Q. 3 to Q. 5 and **any two** out of Q. 7 to Q. 9.
  - 2) Assume suitable data if **necessary** but mention it clearly.

SECTION – I

2. a) A fixed hair tacheometer fitted with an anallatic lens with an instrument constant of 100, was used to determine the slope between two points P and Q . The following readings were taken. If the staff was held vertically compute the gradient from P to Q. 6

Instrument Station	Staff Station	Bearing	Vertical Angle	Staff reading (m)
A	P	345°	+15°	0.915,1.750,2.585
	Q	75°	+10°	0.760,2.240,3.715

- b) What are the various types of direct readings tacheometers ? Explain any one in detail. 4
3. a) Calculate the data required for setting out a curve by the deflection angle method, considering the following information. 6
- i) Angle of intersection = 145°
  - ii) Chainage of point of intersection = 1580 m
  - iii) Degree of curve = 5°
  - iv) Least count of theodolite = 20"
  - v) Peg interval = 30 m
- b) Draw the neat sketch and show various elements of different shapes of transition curves. 3



4. a) Describe GPS receivers and its types. **5**
- b) What are the three segments of GPS ? Explain any one in detail. **4**
5. a) Calculate the reduced levels of the various station pegs on a vertical curve connecting two uniform grades of +0.5 % and – 7% . The chainage and reduced level of the point of intersection are 500 m and 330.75m , respectively. Take the rate of change of grade as 0.1% per 30 m. **6**
- b) Define and write expression for the following. **3**
- i) Degree of curve
  - ii) Shift of curve
  - iii) Superelevation.

## SECTION – II

6. a) On an aerial photograph taken with a camera of 20 cm focal length, a line AB measures 12 cm. On a map drawn to a scale of 1/44500, the same line measures 2.66 cm. If the average height of area above MSL is 500m, calculate the flying height of the aircraft. **6**
- b) Define
- i) Scale
  - ii) Tilt
  - iii) Principal point
  - iv) Isocentre. **4**
7. a) Explain the interaction mechanism of EM Radiation with atmosphere. **5**
- b) Write a note on applications of remote sensing. **4**
8. a) Write short note on :
- i) Spatial data and non spatial data
  - ii) Vector data and Raster data. **6**
- b) Discuss how closely GIS is related to remote sensing. **3**
9. a) Explain setting out of Culvert **4**
- b) Explain procedure of project survey for road. **5**





SLR-TJ – 31

Seat No.	
----------	--

Set	<b>P</b>
-----	----------

**S.E. (Civil) (Part – II) Examination, 2017  
BUILDING CONSTRUCTION AND DESIGN (CGPA)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Section II to be written in answer book.**
  - 3) **Section I to be drawn on full imperial drawing sheet. Use both sides of the sheet.**
  - 4) **Figures to the right indicate full marks.**
  - 5) **Assume suitable data wherever necessary and mention it clearly.**
  - 6) **Retain all projection/construction lines on drawing sheet.**
  - 7) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.**
  - 8) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. State whether the following statements are **True** or **False** : **14**
- 1) For reading room it needs at **N-aspect**.
  - 2) Maximum permissible built up area for plot of size between 200 m<sup>2</sup> to 500 m<sup>2</sup> **60%**.
  - 3) Village road building line is actual limited in urban area located at distance of **12 m**.
  - 4) The minimum heights for individual rooms as specified by National Building Code of India for habitable rooms is **2.75 m**.
  - 5) Window opening in dry hot climate should be **1/10<sup>th</sup>** of the floor area.
  - 6) For issuing **Plinth Checking Certificate** Side/front/rear margins/distances from plot boundary are checked.

P.T.O.



- 7) For better roominess the desirable ratio of length to breadth of room is **1.2** to **1.5**.
  - 8) FSI means **Fire to Safety Index** in building planning.
  - 9) For water closet the minimum area should be **1.8 Sq.m**.
  - 10) Hot-Humid Zone is also called **Wet-Zone**.
  - 11) Height of individual bath-rooms or water closets is **2500 mm**.
  - 12) The maximum height generally limited on the basis of the width of street, if width of street is up to 8 m height of building is **1.5 times width of street**.
  - 13) Plumbing systems involves installation of power **cables**.
  - 14) Height of the building is restricted by a line drawn from rear boundary of plot at angle of  $43\frac{1}{2}^{\circ}$ .
-



Seat No.	
-------------	--

**S.E. (Civil) (Part – II) Examination, 2017  
BUILDING CONSTRUCTION AND DESIGN (CGPA)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

- Instructions :**
- 1) **All** questions are **compulsory**.
  - 2) Section II to be written in **answer book**.
  - 3) Section I to be drawn on **full imperial drawing sheet**.  
**Use** both sides of the sheet.
  - 4) Figures to the **right** indicate **full** marks.
  - 5) **Assume** suitable data **wherever** necessary and mention it clearly.
  - 6) Retain **all** projection/construction lines on drawing sheet.

SECTION – I

2. Design and draw to scale of 1:50 a bungalow for Class I Officer. Provide for the following areas/rooms.

- 1) A living room 15 m<sup>2</sup>
- 2) A kitchen 9 m<sup>2</sup>
- 3) Two Bed room 12 m<sup>2</sup>
- 4) Toilet block of adequate size
- 5) Guest room 9 m<sup>2</sup>
- 6) Staircase.

Assume suitable data and mention it clearly.

Draw detailed plan, 1:50.

**16**

Draw sectional elevation passing through staircase and toilet block, scale 1:50. **12**

SECTION – II

3. Answer **any seven** of the following : **(7×4=28)**
- 1) Explain Building Orientation under Indian conditions w.r.t. principal of planning.
  - 2) Write a note on Commencement Certificate and Plinth Completion Certificate.

**Set P**



- 3) Explain Rehabilitation of structures.
  - 4) Explain Building Rainwater outlet, Rainwater Gutters and down take systems.
  - 5) Define ventilation and discuss necessity of ventilation. What are various ventilation systems.
  - 6) Write a note on Miscellaneous finishes
    - i) POP
    - ii) Wall paper
  - 7) Draw neat schematic diagram for two pipe system for waste water discharge from different floors to ground for three story building.
  - 8) Differentiate between Plastering and Pointing.
  - 9) Write detailed procedure of wood varnishing.
-



SLR-TJ – 31

Seat No.	
----------	--

Set	Q
-----	---

**S.E. (Civil) (Part – II) Examination, 2017  
BUILDING CONSTRUCTION AND DESIGN (CGPA)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Section II to be written in answer book.**
  - 3) **Section I to be drawn on full imperial drawing sheet. Use both sides of the sheet.**
  - 4) **Figures to the right indicate full marks.**
  - 5) **Assume suitable data wherever necessary and mention it clearly.**
  - 6) **Retain all projection/construction lines on drawing sheet.**
  - 7) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.**
  - 8) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. State whether the following statements are **True** or **False** : **14**
- 1) FSI means **Fire to Safety Index** in building planning.
  - 2) For water closet the minimum area should be **1.8 Sq.m.**
  - 3) Hot-Humid Zone is also called **Wet-Zone.**
  - 4) Height of individual bath-rooms or water closets is **2500 mm.**
  - 5) The maximum height generally limited on the basis of the width of street, if width of street is up to 8 m height of building is **1.5 times width of street.**
  - 6) Plumbing systems involves installation of power **cables.**
  - 7) Height of the building is restricted by a line drawn from rear boundary of plot

at angle of  $43\frac{1}{2}^{\circ}$ .

P.T.O.



- 8) For reading room it needs at **N-aspect**.
  - 9) Maximum permissible built up area for plot of size between 200 m<sup>2</sup> to 500 m<sup>2</sup> **60%**.
  - 10) Village road building line is actual limited in urban area located at distance of **12 m**.
  - 11) The minimum heights for individual rooms as specified by National Building Code of India for habitable rooms is **2.75 m**.
  - 12) Window opening in dry hot climate should be **1/10<sup>th</sup>** of the floor area.
  - 13) For issuing **Plinth Checking Certificate** Side/front/rear margins/distances from plot boundary are checked.
  - 14) For better roominess the desirable ratio of length to breadth of room is **1.2 to 1.5**.
-



Seat No.	
-------------	--

**S.E. (Civil) (Part – II) Examination, 2017  
BUILDING CONSTRUCTION AND DESIGN (CGPA)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

- Instructions :**
- 1) **All** questions are **compulsory**.
  - 2) Section II to be written in **answer book**.
  - 3) Section I to be drawn on **full imperial drawing sheet**.  
**Use both sides of the sheet.**
  - 4) Figures to the **right** indicate **full** marks.
  - 5) **Assume** suitable data **wherever** necessary and mention it clearly.
  - 6) Retain **all** projection/construction lines on drawing sheet.

SECTION – I

2. Design and draw to scale of 1:50 a bungalow for Class I Officer. Provide for the following areas/rooms.

- 1) A living room 15 m<sup>2</sup>
- 2) A kitchen 9 m<sup>2</sup>
- 3) Two Bed room 12 m<sup>2</sup>
- 4) Toilet block of adequate size
- 5) Guest room 9 m<sup>2</sup>
- 6) Staircase.

Assume suitable data and mention it clearly.

Draw detailed plan, 1:50.

**16**

Draw sectional elevation passing through staircase and toilet block, scale 1:50. **12**

SECTION – II

3. Answer **any seven** of the following :

**(7×4=28)**

- 1) Explain Building Orientation under Indian conditions w.r.t. principal of planning.
- 2) Write a note on Commencement Certificate and Plinth Completion Certificate.

**Set Q**



- 3) Explain Rehabilitation of structures.
  - 4) Explain Building Rainwater outlet, Rainwater Gutters and down take systems.
  - 5) Define ventilation and discuss necessity of ventilation. What are various ventilation systems.
  - 6) Write a note on Miscellaneous finishes
    - i) POP
    - ii) Wall paper
  - 7) Draw neat schematic diagram for two pipe system for waste water discharge from different floors to ground for three story building.
  - 8) Differentiate between Plastering and Pointing.
  - 9) Write detailed procedure of wood varnishing.
-





SLR-TJ – 31

Seat No.	
----------	--

Set	<b>R</b>
-----	----------

**S.E. (Civil) (Part – II) Examination, 2017  
BUILDING CONSTRUCTION AND DESIGN (CGPA)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Section II to be written in answer book.**
  - 3) **Section I to be drawn on full imperial drawing sheet. Use both sides of the sheet.**
  - 4) **Figures to the right indicate full marks.**
  - 5) **Assume suitable data wherever necessary and mention it clearly.**
  - 6) **Retain all projection/construction lines on drawing sheet.**
  - 7) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.**
  - 8) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. State whether the following statements are **True** or **False** : **14**
- 1) Window opening in dry hot climate should be **1/10<sup>th</sup>** of the floor area.
  - 2) For issuing **Plinth Checking Certificate** Side/front/rear margins/distances from plot boundary are checked.
  - 3) For better roominess the desirable ratio of length to breadth of room is **1.2 to 1.5**.
  - 4) FSI means **Fire to Safety Index** in building planning.
  - 5) For water closet the minimum area should be **1.8 Sq.m.**
  - 6) Hot-Humid Zone is also called **Wet-Zone**.
  - 7) Height of individual bath-rooms or water closets is **2500 mm**.

P.T.O.



- 8) The maximum height generally limited on the basis of the width of street, if width of street is up to 8 m height of building is **1.5 times width of street**.
  - 9) Plumbing systems involves installation of power **cables**.
  - 10) Height of the building is restricted by a line drawn from rear boundary of plot at angle of  $43\frac{1}{2}^{\circ}$ .
  - 11) For reading room it needs at **N-aspect**.
  - 12) Maximum permissible built up area for plot of size between 200 m<sup>2</sup> to 500 m<sup>2</sup> **60%**.
  - 13) Village road building line is actual limited in urban area located at distance of **12 m**.
  - 14) The minimum heights for individual rooms as specified by National Building Code of India for habitable rooms is **2.75 m**.
-



Seat No.	
-------------	--

**S.E. (Civil) (Part – II) Examination, 2017  
BUILDING CONSTRUCTION AND DESIGN (CGPA)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Section II to be written in answer book.**
  - 3) **Section I to be drawn on full imperial drawing sheet.**  
**Use both sides of the sheet.**
  - 4) **Figures to the right indicate full marks.**
  - 5) **Assume suitable data wherever necessary and mention it clearly.**
  - 6) **Retain all projection/construction lines on drawing sheet.**

SECTION – I

2. Design and draw to scale of 1:50 a bungalow for Class I Officer. Provide for the following areas/rooms.

- 1) A living room 15 m<sup>2</sup>
- 2) A kitchen 9 m<sup>2</sup>
- 3) Two Bed room 12 m<sup>2</sup>
- 4) Toilet block of adequate size
- 5) Guest room 9 m<sup>2</sup>
- 6) Staircase.

Assume suitable data and mention it clearly.

Draw detailed plan, 1:50.

16

Draw sectional elevation passing through staircase and toilet block, scale 1:50. 12

SECTION – II

3. Answer **any seven** of the following :

(7×4=28)

- 1) Explain Building Orientation under Indian conditions w.r.t. principal of planning.
- 2) Write a note on Commencement Certificate and Plinth Completion Certificate.

Set R



- 3) Explain Rehabilitation of structures.
  - 4) Explain Building Rainwater outlet, Rainwater Gutters and down take systems.
  - 5) Define ventilation and discuss necessity of ventilation. What are various ventilation systems.
  - 6) Write a note on Miscellaneous finishes
    - i) POP
    - ii) Wall paper
  - 7) Draw neat schematic diagram for two pipe system for waste water discharge from different floors to ground for three story building.
  - 8) Differentiate between Plastering and Pointing.
  - 9) Write detailed procedure of wood varnishing.
-



SLR-TJ – 31

Seat No.	
----------	--

Set	<b>S</b>
-----	----------

**S.E. (Civil) (Part – II) Examination, 2017  
BUILDING CONSTRUCTION AND DESIGN (CGPA)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Section II to be written in answer book.**
  - 3) **Section I to be drawn on full imperial drawing sheet. Use both sides of the sheet.**
  - 4) **Figures to the right indicate full marks.**
  - 5) **Assume suitable data wherever necessary and mention it clearly.**
  - 6) **Retain all projection/construction lines on drawing sheet.**
  - 7) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.**
  - 8) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. State whether the following statements are **True** or **False** : **14**
- 1) Hot-Humid Zone is also called **Wet-Zone**.
  - 2) Height of individual bath-rooms or water closets is **2500 mm**.
  - 3) The maximum height generally limited on the basis of the width of street, if width of street is up to 8 m height of building is **1.5 times width of street**.
  - 4) Plumbing systems involves installation of power **cables**.
  - 5) Height of the building is restricted by a line drawn from rear boundary of plot at angle of  $43\frac{1}{2}^\circ$ .
  - 6) For reading room it needs at **N-aspect**.

P.T.O.



- 7) Maximum permissible built up area for plot of size between 200 m<sup>2</sup> to 500 m<sup>2</sup> **60%**.
  - 8) Village road building line is actual limited in urban area located at distance of **12 m**.
  - 9) The minimum heights for individual rooms as specified by National Building Code of India for habitable rooms is **2.75 m**.
  - 10) Window opening in dry hot climate should be **1/10<sup>th</sup>** of the floor area.
  - 11) For issuing **Plinth Checking Certificate** Side/front/rear margins/distances from plot boundary are checked.
  - 12) For better roominess the desirable ratio of length to breadth of room is **1.2 to 1.5**.
  - 13) FSI means **Fire to Safety Index** in building planning.
  - 14) For water closet the minimum area should be **1.8 Sq.m**.
-



Seat No.	
-------------	--

**S.E. (Civil) (Part – II) Examination, 2017  
BUILDING CONSTRUCTION AND DESIGN (CGPA)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

- Instructions :**
- 1) **All** questions are **compulsory**.
  - 2) Section II to be written in **answer book**.
  - 3) Section I to be drawn on **full imperial drawing sheet**.  
**Use** both sides of the sheet.
  - 4) Figures to the **right** indicate **full** marks.
  - 5) **Assume** suitable data **wherever** necessary and mention it clearly.
  - 6) Retain **all** projection/construction lines on drawing sheet.

SECTION – I

2. Design and draw to scale of 1:50 a bungalow for Class I Officer. Provide for the following areas/rooms.

- 1) A living room 15 m<sup>2</sup>
- 2) A kitchen 9 m<sup>2</sup>
- 3) Two Bed room 12 m<sup>2</sup>
- 4) Toilet block of adequate size
- 5) Guest room 9 m<sup>2</sup>
- 6) Staircase.

Assume suitable data and mention it clearly.

Draw detailed plan, 1:50.

**16**

Draw sectional elevation passing through staircase and toilet block, scale 1:50. **12**

SECTION – II

3. Answer **any seven** of the following : **(7×4=28)**
- 1) Explain Building Orientation under Indian conditions w.r.t. principal of planning.
  - 2) Write a note on Commencement Certificate and Plinth Completion Certificate.

**Set S**



- 3) Explain Rehabilitation of structures.
  - 4) Explain Building Rainwater outlet, Rainwater Gutters and down take systems.
  - 5) Define ventilation and discuss necessity of ventilation. What are various ventilation systems.
  - 6) Write a note on Miscellaneous finishes
    - i) POP
    - ii) Wall paper
  - 7) Draw neat schematic diagram for two pipe system for waste water discharge from different floors to ground for three story building.
  - 8) Differentiate between Plastering and Pointing.
  - 9) Write detailed procedure of wood varnishing.
-





SLR-TJ – 32

Seat No.	
----------	--

Set 

P
---

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
FLUID MECHANICS – II**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Q. 2 from Section I and Q. 6 from Section II are **compulsory**. Solve **any two** questions from Q. 3, 4 and 5 from Section I. And solve **any two** questions from Q. 7, 8 and 9 from Section II.
- 3) Assume **suitable** data if necessary and state it **clearly**.
- 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternative : **(14×1=14)**
- 1) A channel with constant bed slope and same cross section along its length is known as
    - a) Natural channel
    - b) Artificial channel
    - c) Prismatic channel
    - d) Open channel
  - 2) In an open channel flow, shooting flow cannot
    - a) Occur just after hydraulic jump
    - b) Be gradually varied
    - c) Follow tranquil flow
    - d) None of above
  - 3) The strength of jump is govern by
    - a) Upstream velocity
    - b) Downstream velocity
    - c) Upstream Froude number
    - d) Bed slope
  - 4) Conveyance of channel section is directly proportional to
    - a) Discharge
    - b) Area of cross section
    - c) Bed slope
    - d) Manning's coefficient

P.T.O.



- 5) For Cipoletti weir slope of sloping side is  
 a) 1(H) : 4(V)      b) 4(H) : 1(V)      c) 2(H) : 2(V)      d) 2(H) : 4(V)
- 6) Francis formula for rectangular weir with two end contractions is given by  
 a)  $Q = 1.84 [L - 0.2 H] H^{3/2}$       b)  $Q = 1.84 [L - 0.2 H] H^{5/2}$   
 c)  $Q = 1.84 [L + 0.2 H] H^{5/2}$       d) None of above
- 7) An error of 1% in measurement of head (H) will produce \_\_\_\_\_ % of error in discharge over a rectangular notch or weir.  
 a) 1      b) 1.5      c) 2      d) 2.5
- 8) For a turbine mechanical efficiency is  
 a)  $\frac{\text{Shaft power}}{\text{Runner power}}$       b)  $\frac{\text{Runner power}}{\text{Water power}}$       c)  $\frac{\text{Runner power}}{\text{Shaft power}}$       d)  $\frac{\text{Water power}}{\text{Shaft power}}$
- 9) Dimensions of dynamic viscosity are  
 a)  $[L^{-2} T^{-1}]$       b)  $[M^1 L^{-2} T^{-2}]$       c)  $[L^{+2} T^{-1}]$       d)  $[M^1 L^{-1} T^{-1}]$
- 10) Specific speed of turbine is  
 a)  $\frac{N\sqrt{P}}{H}$       b)  $\frac{N\sqrt{P}}{H^2}$       c)  $\frac{N\sqrt{P}}{H^{3/4}}$       d)  $\frac{N\sqrt{P}}{H^{5/4}}$
- 11) If centrifugal pumps are connected in series then  
 a) Discharge increases      b) Head increases  
 c) Discharge decreases      d) Head decreases
- 12) For a centrifugal pump relation between static head  $H_s$ , delivery head  $h_d$  and suction head  $h_s$  is given as  
 a)  $H_s = h_s + h_d$       b)  $H_s = h_s - h_d$       c)  $H_s = h_s - (h_d/2)$       d)  $h_d = H_s + h_s$
- 13) Kinematic similarity exist between model and prototype if there  
 a) Linear dimensions are same  
 b) Velocity and acceleration at corresponding points are same  
 c) Force acting at corresponding points are same  
 d) None of above
- 14) Model is  
 a) Actual machine      b) Small scale replica of machine  
 c) Large scale replica of machine      d) Both a) and b)



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
FLUID MECHANICS – II**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) *Q. 2 from Section I and Q. 6 from Section II are compulsory. Solve any two questions from Q. 3, 4 and 5 from Section I. And solve any two questions from Q. 7, 8 and 9 from Section II.*  
2) *Assume suitable data if necessary and state it clearly.*

SECTION – I

2. a) Explain the terms : 2  
i) Kinetic energy correction factor.  
ii) Momentum correction factor.
- b) Draw the neat sketches give conditions of formation of  $M_3$ ,  $S_1$  water surface profiles. 2
- c) A rectangular weir 6 m long is divided into 3 bays by two vertical posts, each 0.3 cm wide. Find the discharge, when the head is 0.45 m. 6
3. a) For a hydraulic jump show that energy loss 4
- $$E_l = \frac{(y_2 - y_1)^3}{4y_1y_2}$$
- b) What do you mean by specific energy ? Explain with neat sketch specific energy curve. What is its significance ? 5
4. a) Explain with neat sketch velocity distribution in open channel. 3  
b) Explain different types of nappe with neat sketches. 3  
c) What do you mean by ventilation of weirs ? Why it is necessary. 3



5. a) What do you mean by calibration of weirs ? How and why it is carried out ? **4**
- b) The depth of flow at certain depth of channel of 4 m wide is 0.5 m the discharge through channel is  $16 \text{ m}^3/\text{sec}$ . If the hydraulic jump takes place on downstream side, find the depth of flow after the jump, height of jump and energy loss per kg of water. **5**

## SECTION – II

6. a) Derive an expression for force exerted by jet on stationary inclined plate. **3**
- b) Explain operating characteristics of pump with neat sketches. **3**
- c) What are the scale ratios ? Give their applications. **4**
7. a) Explain with neat sketch inlet and outlet velocity triangles. **3**
- b) Two jets strikes on the buckets of a Pelton wheel, which is having shaft power as 15450 kW. Diameter of each jet is given as 200 mm. If the net head on turbine is 400 mm. Find overall efficiency of turbine. Take  $C_v = 1.0$  **6**
8. a) With neat sketch explain different heads of centrifugal pump. **3**
- b) A centrifugal pump has an impeller of 0.5 m outer diameter and when running at 600 rpm. Discharges water at 8000 litres/min against a head of 8.5 m. The water enters the impeller without whirl and shock. The inner diameter is 0.25 m, and the vanes are set back at outlet at an angle of  $45^\circ$  and the area of flow, which is constant from inlet to outlet of impeller, is  $0.06 \text{ m}^2$ . Determine (i) Manometric efficiency and (ii) Vane angle at inlet. **6**
9. a) What do you mean by dimensionless numbers ? Explain any two dimensionless numbers. **4**
- b) An orifice to carry water is calibrated with air in geometrical similar model at (1/5) prototype scale. To obtain dynamically similar flow what should be discharge ratio (air to water) ? Assume ratio of kinematic viscosity of air to water as 12.5. **5**
-



Seat No.	
----------	--

Set 

Q
---

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
FLUID MECHANICS – II**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Q. 2 from Section I and Q. 6 from Section II are **compulsory**. Solve **any two** questions from Q. 3, 4 and 5 from Section I. And solve **any two** questions from Q. 7, 8 and 9 from Section II.
- 3) Assume **suitable** data if necessary and state it **clearly**.
- 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternative :

**(14×1=14)**

1) For a turbine mechanical efficiency is

- a)  $\frac{\text{Shaft power}}{\text{Runner power}}$     b)  $\frac{\text{Runner power}}{\text{Water power}}$     c)  $\frac{\text{Runner power}}{\text{Shaft power}}$     d)  $\frac{\text{Water power}}{\text{Shaft power}}$

2) Dimensions of dynamic viscosity are

- a)  $[L^{-2} T^{-1}]$     b)  $[M^1 L^{-2} T^{-2}]$     c)  $[L^{+2} T^{-1}]$     d)  $[M^1 L^{-1} T^{-1}]$

3) Specific speed of turbine is

- a)  $\frac{N\sqrt{P}}{H}$     b)  $\frac{N\sqrt{P}}{H^2}$     c)  $\frac{N\sqrt{P}}{H^{3/4}}$     d)  $\frac{N\sqrt{P}}{H^{5/4}}$

4) If centrifugal pumps are connected in series then

- a) Discharge increases    b) Head increases  
c) Discharge decreases    d) Head decreases

5) For a centrifugal pump relation between static head  $H_s$ , delivery head  $h_d$  and suction head  $h_s$  is given as

- a)  $H_s = h_s + h_d$     b)  $H_s = h_s - h_d$     c)  $H_s = h_s - (h_d/2)$     d)  $h_d = H_s + h_s$

P.T.O.



- 6) Kinematic similarity exist between model and prototype if there
- Linear dimensions are same
  - Velocity and acceleration at corresponding points are same
  - Force acting at corresponding points are same
  - None of above
- 7) Model is
- Actual machine
  - Small scale replica of machine
  - Large scale replica of machine
  - Both a) and b)
- 8) A channel with constant bed slope and same cross section along its length is known as
- Natural channel
  - Artificial channel
  - Prismatic channel
  - Open channel
- 9) In an open channel flow, shooting flow cannot
- Occur just after hydraulic jump
  - Be gradually varied
  - Follow tranquil flow
  - None of above
- 10) The strength of jump is govern by
- Upstream velocity
  - Downstream velocity
  - Upstream Froude number
  - Bed slope
- 11) Conveyance of channel section is directly proportional to
- Discharge
  - Area of cross section
  - Bed slope
  - Manning's coefficient
- 12) For Cipolletti weir slope of sloping side is
- 1(H) : 4(V)
  - 4(H) : 1(V)
  - 2(H) : 2(V)
  - 2(H) : 4(V)
- 13) Francis formula for rectangular weir with two end contractions is given by
- $Q = 1.84 [L - 0.2 H] H^{3/2}$
  - $Q = 1.84 [L - 0.2 H] H^{5/2}$
  - $Q = 1.84 [L + 0.2 H] H^{5/2}$
  - None of above
- 14) An error of 1% in measurement of head (H) will produce \_\_\_\_\_ % of error in discharge over a rectangular notch or weir.
- 1
  - 1.5
  - 2
  - 2.5
-



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
FLUID MECHANICS – II**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) Q. 2 from Section I and Q. 6 from Section II are **compulsory**.  
Solve **any two** questions from Q. 3, 4 and 5 from Section I.  
And solve **any two** questions from Q. 7, 8 and 9 from Section II.  
2) Assume **suitable** data if necessary and state it **clearly**.

SECTION – I

2. a) Explain the terms : 2  
i) Kinetic energy correction factor.  
ii) Momentum correction factor.
- b) Draw the neat sketches give conditions of formation of  $M_3$ ,  $S_1$  water surface profiles. 2
- c) A rectangular weir 6 m long is divided into 3 bays by two vertical posts, each 0.3 cm wide. Find the discharge, when the head is 0.45 m. 6
3. a) For a hydraulic jump show that energy loss 4
- $$E_l = \frac{(y_2 - y_1)^3}{4y_1y_2}$$
- b) What do you mean by specific energy ? Explain with neat sketch specific energy curve. What is its significance ? 5
4. a) Explain with neat sketch velocity distribution in open channel. 3  
b) Explain different types of nappe with neat sketches. 3  
c) What do you mean by ventilation of weirs ? Why it is necessary. 3

Set Q



5. a) What do you mean by calibration of weirs ? How and why it is carried out ? **4**
- b) The depth of flow at certain depth of channel of 4 m wide is 0.5 m the discharge through channel is  $16 \text{ m}^3/\text{sec}$ . If the hydraulic jump takes place on downstream side, find the depth of flow after the jump, height of jump and energy loss per kg of water. **5**

### SECTION – II

6. a) Derive an expression for force exerted by jet on stationary inclined plate. **3**
- b) Explain operating characteristics of pump with neat sketches. **3**
- c) What are the scale ratios ? Give their applications. **4**
7. a) Explain with neat sketch inlet and outlet velocity triangles. **3**
- b) Two jets strikes on the buckets of a Pelton wheel, which is having shaft power as 15450 kW. Diameter of each jet is given as 200 mm. If the net head on turbine is 400 mm. Find overall efficiency of turbine. Take  $C_v = 1.0$  **6**
8. a) With neat sketch explain different heads of centrifugal pump. **3**
- b) A centrifugal pump has an impeller of 0.5 m outer diameter and when running at 600 rpm. Discharges water at 8000 litres/min against a head of 8.5 m. The water enters the impeller without whirl and shock. The inner diameter is 0.25 m, and the vanes are set back at outlet at an angle of  $45^\circ$  and the area of flow, which is constant from inlet to outlet of impeller, is  $0.06 \text{ m}^2$ . Determine (i) Manometric efficiency and (ii) Vane angle at inlet. **6**
9. a) What do you mean by dimensionless numbers ? Explain any two dimensionless numbers. **4**
- b) An orifice to carry water is calibrated with air in geometrical similar model at (1/5) prototype scale. To obtain dynamically similar flow what should be discharge ratio (air to water) ? Assume ratio of kinematic viscosity of air to water as 12.5. **5**
-





SLR-TJ – 32

Seat No.	
----------	--

Set 

R
---

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
FLUID MECHANICS – II**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Q. 2 from Section I and Q. 6 from Section II are **compulsory**. Solve **any two** questions from Q. 3, 4 and 5 from Section I. And solve **any two** questions from Q. 7, 8 and 9 from Section II.
- 3) Assume **suitable** data if necessary and state it **clearly**.
- 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternative : **(14×1=14)**
- 1) For Cipolletti weir slope of sloping side is  
a) 1(H) : 4(V)      b) 4(H) : 1(V)      c) 2(H) : 2(V)      d) 2(H) : 4(V)
- 2) Francis formula for rectangular weir with two end contractions is given by  
a)  $Q = 1.84 [L - 0.2 H] H^{3/2}$       b)  $Q = 1.84 [L - 0.2 H] H^{5/2}$   
c)  $Q = 1.84 [L + 0.2 H] H^{5/2}$       d) None of above
- 3) An error of 1% in measurement of head (H) will produce \_\_\_\_\_ % of error in discharge over a rectangular notch or weir.  
a) 1      b) 1.5      c) 2      d) 2.5
- 4) For a turbine mechanical efficiency is  
a)  $\frac{\text{Shaft power}}{\text{Runner power}}$       b)  $\frac{\text{Runner power}}{\text{Water power}}$       c)  $\frac{\text{Runner power}}{\text{Shaft power}}$       d)  $\frac{\text{Water power}}{\text{Shaft power}}$
- 5) Dimensions of dynamic viscosity are  
a)  $[L^{-2} T^{-1}]$       b)  $[M^1 L^{-2} T^{-2}]$       c)  $[L^{+2} T^{-1}]$       d)  $[M^1 L^{-1} T^{-1}]$

P.T.O.



- 6) Specific speed of turbine is
- a)  $\frac{N\sqrt{P}}{H}$       b)  $\frac{N\sqrt{P}}{H^2}$       c)  $\frac{N\sqrt{P}}{H^{3/4}}$       d)  $\frac{N\sqrt{P}}{H^{5/4}}$
- 7) If centrifugal pumps are connected in series then
- a) Discharge increases      b) Head increases  
c) Discharge decreases      d) Head decreases
- 8) For a centrifugal pump relation between static head  $H_s$ , delivery head  $h_d$  and suction head  $h_s$  is given as
- a)  $H_s = h_s + h_d$       b)  $H_s = h_s - h_d$       c)  $H_s = h_s - (h_d/2)$       d)  $h_d = H_s + h_s$
- 9) Kinematic similarity exist between model and prototype if there
- a) Linear dimensions are same  
b) Velocity and acceleration at corresponding points are same  
c) Force acting at corresponding points are same  
d) None of above
- 10) Model is
- a) Actual machine      b) Small scale replica of machine  
c) Large scale replica of machine      d) Both a) and b)
- 11) A channel with constant bed slope and same cross section along its length is known as
- a) Natural channel      b) Artificial channel  
c) Prismatic channel      d) Open channel
- 12) In an open channel flow, shooting flow cannot
- a) Occur just after hydraulic jump      b) Be gradually varied  
c) Follow tranquil flow      d) None of above
- 13) The strength of jump is govern by
- a) Upstream velocity      b) Downstream velocity  
c) Upstream Froude number      d) Bed slope
- 14) Conveyance of channel section is directly proportional to
- a) Discharge      b) Area of cross section  
c) Bed slope      d) Manning's coefficient



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
FLUID MECHANICS – II**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) Q. 2 from Section I and Q. 6 from Section II are **compulsory**.  
Solve **any two** questions from Q. 3, 4 and 5 from Section I.  
And solve **any two** questions from Q. 7, 8 and 9 from Section II.  
2) Assume **suitable** data if necessary and state it **clearly**.

SECTION – I

2. a) Explain the terms : 2  
i) Kinetic energy correction factor.  
ii) Momentum correction factor.
- b) Draw the neat sketches give conditions of formation of M<sub>3</sub>, S<sub>1</sub> water surface profiles. 2
- c) A rectangular weir 6 m long is divided into 3 bays by two vertical posts, each 0.3 cm wide. Find the discharge, when the head is 0.45 m. 6
3. a) For a hydraulic jump show that energy loss 4
- $$E_l = \frac{(y_2 - y_1)^3}{4y_1y_2}$$
- b) What do you mean by specific energy ? Explain with neat sketch specific energy curve. What is its significance ? 5
4. a) Explain with neat sketch velocity distribution in open channel. 3  
b) Explain different types of nappe with neat sketches. 3  
c) What do you mean by ventilation of weirs ? Why it is necessary. 3



5. a) What do you mean by calibration of weirs ? How and why it is carried out ? **4**
- b) The depth of flow at certain depth of channel of 4 m wide is 0.5 m the discharge through channel is  $16 \text{ m}^3/\text{sec}$ . If the hydraulic jump takes place on downstream side, find the depth of flow after the jump, height of jump and energy loss per kg of water. **5**

## SECTION – II

6. a) Derive an expression for force exerted by jet on stationary inclined plate. **3**
- b) Explain operating characteristics of pump with neat sketches. **3**
- c) What are the scale ratios ? Give their applications. **4**
7. a) Explain with neat sketch inlet and outlet velocity triangles. **3**
- b) Two jets strikes on the buckets of a Pelton wheel, which is having shaft power as 15450 kW. Diameter of each jet is given as 200 mm. If the net head on turbine is 400 mm. Find overall efficiency of turbine. Take  $C_v = 1.0$  **6**
8. a) With neat sketch explain different heads of centrifugal pump. **3**
- b) A centrifugal pump has an impeller of 0.5 m outer diameter and when running at 600 rpm. Discharges water at 8000 litres/min against a head of 8.5 m. The water enters the impeller without whirl and shock. The inner diameter is 0.25 m, and the vanes are set back at outlet at an angle of  $45^\circ$  and the area of flow, which is constant from inlet to outlet of impeller, is  $0.06 \text{ m}^2$ . Determine (i) Manometric efficiency and (ii) Vane angle at inlet. **6**
9. a) What do you mean by dimensionless numbers ? Explain any two dimensionless numbers. **4**
- b) An orifice to carry water is calibrated with air in geometrical similar model at (1/5) prototype scale. To obtain dynamically similar flow what should be discharge ratio (air to water) ? Assume ratio of kinematic viscosity of air to water as 12.5. **5**
-



SLR-TJ – 32

Seat No.	
----------	--

Set 

S
---

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
FLUID MECHANICS – II**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Q. 2 from Section I and Q. 6 from Section II are **compulsory**. Solve **any two** questions from Q. 3, 4 and 5 from Section I. And solve **any two** questions from Q. 7, 8 and 9 from Section II.
- 3) Assume **suitable** data if necessary and state it **clearly**.
- 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternative :

(14×1=14)

1) Specific speed of turbine is

a)  $\frac{N\sqrt{P}}{H}$

b)  $\frac{N\sqrt{P}}{H^2}$

c)  $\frac{N\sqrt{P}}{H^{3/4}}$

d)  $\frac{N\sqrt{P}}{H^{5/4}}$

2) If centrifugal pumps are connected in series then

a) Discharge increases

b) Head increases

c) Discharge decreases

d) Head decreases

3) For a centrifugal pump relation between static head  $H_s$ , delivery head  $h_d$  and suction head  $h_s$  is given as

a)  $H_s = h_s + h_d$

b)  $H_s = h_s - h_d$

c)  $H_s = h_s - (h_d/2)$

d)  $h_d = H_s + h_s$

4) Kinematic similarity exist between model and prototype if there

a) Linear dimensions are same

b) Velocity and acceleration at corresponding points are same

c) Force acting at corresponding points are same

d) None of above

P.T.O.



- 5) Model is
- a) Actual machine                      b) Small scale replica of machine  
c) Large scale replica of machine    d) Both a) and b)
- 6) A channel with constant bed slope and same cross section along its length is known as
- a) Natural channel                      b) Artificial channel  
c) Prismatic channel                  d) Open channel
- 7) In an open channel flow, shooting flow cannot
- a) Occur just after hydraulic jump    b) Be gradually varied  
c) Follow tranquil flow                d) None of above
- 8) The strength of jump is govern by
- a) Upstream velocity                  b) Downstream velocity  
c) Upstream Froude number          d) Bed slope
- 9) Conveyance of channel section is directly proportional to
- a) Discharge                              b) Area of cross section  
c) Bed slope                                d) Manning's coefficient
- 10) For Cipolletti weir slope of sloping side is
- a) 1(H) : 4(V)            b) 4(H) : 1(V)            c) 2(H) : 2(V)            d) 2(H) : 4(V)
- 11) Francis formula for rectangular weir with two end contractions is given by
- a)  $Q = 1.84 [L - 0.2 H] H^{3/2}$             b)  $Q = 1.84 [L - 0.2 H] H^{5/2}$   
c)  $Q = 1.84 [L + 0.2 H] H^{5/2}$             d) None of above
- 12) An error of 1% in measurement of head (H) will produce \_\_\_\_\_ % of error in discharge over a rectangular notch or weir.
- a) 1                                      b) 1.5                                      c) 2                                      d) 2.5
- 13) For a turbine mechanical efficiency is
- a)  $\frac{\text{Shaft power}}{\text{Runner power}}$     b)  $\frac{\text{Runner power}}{\text{Water power}}$     c)  $\frac{\text{Runner power}}{\text{Shaft power}}$     d)  $\frac{\text{Water power}}{\text{Shaft power}}$
- 14) Dimensions of dynamic viscosity are
- a)  $[L^{-2} T^{-1}]$                       b)  $[M^1 L^{-2} T^{-2}]$                       c)  $[L^{+2} T^{-1}]$                       d)  $[M^1 L^{-1} T^{-1}]$
-



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
FLUID MECHANICS – II**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) *Q. 2 from Section I and Q. 6 from Section II are compulsory. Solve any two questions from Q. 3, 4 and 5 from Section I. And solve any two questions from Q. 7, 8 and 9 from Section II.*  
2) *Assume suitable data if necessary and state it clearly.*

SECTION – I

2. a) Explain the terms : 2  
i) Kinetic energy correction factor.  
ii) Momentum correction factor.
- b) Draw the neat sketches give conditions of formation of  $M_3$ ,  $S_1$  water surface profiles. 2
- c) A rectangular weir 6 m long is divided into 3 bays by two vertical posts, each 0.3 cm wide. Find the discharge, when the head is 0.45 m. 6
3. a) For a hydraulic jump show that energy loss 4
- $$E_l = \frac{(y_2 - y_1)^3}{4y_1y_2}$$
- b) What do you mean by specific energy ? Explain with neat sketch specific energy curve. What is its significance ? 5
4. a) Explain with neat sketch velocity distribution in open channel. 3  
b) Explain different types of nappe with neat sketches. 3  
c) What do you mean by ventilation of weirs ? Why it is necessary. 3



5. a) What do you mean by calibration of weirs ? How and why it is carried out ? **4**
- b) The depth of flow at certain depth of channel of 4 m wide is 0.5 m the discharge through channel is  $16 \text{ m}^3/\text{sec}$ . If the hydraulic jump takes place on downstream side, find the depth of flow after the jump, height of jump and energy loss per kg of water. **5**

## SECTION – II

6. a) Derive an expression for force exerted by jet on stationary inclined plate. **3**
- b) Explain operating characteristics of pump with neat sketches. **3**
- c) What are the scale ratios ? Give their applications. **4**
7. a) Explain with neat sketch inlet and outlet velocity triangles. **3**
- b) Two jets strikes on the buckets of a Pelton wheel, which is having shaft power as 15450 kW. Diameter of each jet is given as 200 mm. If the net head on turbine is 400 mm. Find overall efficiency of turbine. Take  $C_v = 1.0$  **6**
8. a) With neat sketch explain different heads of centrifugal pump. **3**
- b) A centrifugal pump has an impeller of 0.5 m outer diameter and when running at 600 rpm. Discharges water at 8000 litres/min against a head of 8.5 m. The water enters the impeller without whirl and shock. The inner diameter is 0.25 m, and the vanes are set back at outlet at an angle of  $45^\circ$  and the area of flow, which is constant from inlet to outlet of impeller, is  $0.06 \text{ m}^2$ . Determine (i) Manometric efficiency and (ii) Vane angle at inlet. **6**
9. a) What do you mean by dimensionless numbers ? Explain any two dimensionless numbers. **4**
- b) An orifice to carry water is calibrated with air in geometrical similar model at (1/5) prototype scale. To obtain dynamically similar flow what should be discharge ratio (air to water) ? Assume ratio of kinematic viscosity of air to water as 12.5. **5**
-





SLR-TJ – 33

Seat No.	
-------------	--

Set	<b>P</b>
-----	----------

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – I**

Day and Date : Saturday, 25-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) A stream that provides water to the water trade is termed as
  - a) affluent
  - b) influent
  - c) ephemeral
  - d) effluent
- 2) A hydrograph is a relation between time in hours and
  - a) Rainfall in mm
  - b) Percolation in mm
  - c) Surface runoff in cumec
  - d) Evaporation in mm
- 3) A one day rainfall of 18 hours found to have a return period of 50 year. The probability that a one day rainfall of this or large magnitude will not occur at station C during next 50 years is
  - a) 0.636
  - b) 0.020
  - c) 0.364
  - d) 0.371
- 4) An isohyet is a line joining points having
  - a) Equal evaporation value
  - b) Equal barometric pressure
  - c) Equal height above the MSL
  - d) Equal rainfall depth in a given duration
- 5) Which of the following formations neither contains water nor transmits it ?
  - a) Aquiclude
  - b) Aquifer
  - c) Aquifuge
  - d) Aquitard
- 6) The upper limit of area of a basin for the application of unit hydrograph is
  - a) 1000 km<sup>2</sup>
  - b) 1500 km<sup>2</sup>
  - c) 5000 km<sup>2</sup>
  - d) 10,000 km<sup>2</sup>
- 7) Orographic precipitation occurs due to lifting of air mass because of
  - a) Presence of mountain barriers
  - b) Extra tropical cyclones
  - c) Density difference of air mass
  - d) Difference of air temperature

P.T.O.



- 8) In field under furrow irrigation, 'furrows' are referred to represent
- a) Ridges on which crops are grown
  - b) Narrow ditches which carry irrigation water
  - c) Both (a) and (b)
  - d) Neither (a) nor (b)
- 9) Irrigation is basically required in
- a) Humid regions
  - b) Arid regions
  - c) Semi Arid regions
  - d) All the above
- 10) The efficiency of water application does not depend up on
- a) Climatic condition
  - b) Type of soil
  - c) Method of application
  - d) Geometry of conveyance system
- 11) For a crop, consumptive use of water is equal to the depth of water
- a) Transpired by the crop
  - b) Evaporated by the crop
  - c) Used in transpiration, evaporation and quantity of water evaporated from adjacent soil
  - d) Transpired and evaporated by the crop
- 12) Which of the following is the costlier system ?
- a) Gravity irrigation
  - b) Lift irrigation
  - c) Drip irrigation
  - d) Combined (a) and (b) above
- 13) The most economical method of soil conservation is
- a) Construct a check dam
  - b) Construct a contour bund
  - c) Drain the soil
  - d) Afforestation
- 14) Given that the base period is 100 days and the duty of canal is 1000 hector/cumec, the depth of water will be
- a) 0.864 cm
  - b) 8.64 cm
  - c) 86.40 cm
  - d) 864.00 cm
-



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – I**

Day and Date : Saturday, 25-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) Solve **any three** questions from **each** Section.  
2) Make suitable assumptions only if **necessary**. But state them **clearly**.

SECTION – I

2. a) Explain with neat sketch of hydrology cycle. 4  
b) In a catchments area covering 200 km<sup>2</sup>, the average annual precipitation observed at 6 rain gauge stations are as follows :

Station	A	B	C	D	E	F
Precipitation (mm)	82.5	102.9	180.3	110.3	98.8	136.7

Find the number of additional rain gauge stations and also the rain gauge density, if the permissible error is 10%. 6

3. a) Define runoff. Explain the factors affecting the runoff. 3  
b) The storm over a catchment 50 km<sup>2</sup> was having the following intensity  
40 mm/hr for 1 hr,  
70 mm/hr for 2 hr,  
30 mm/hr for 1 hr.

The infiltration rate of the catchment area is as follows

20% area  $\phi = 10$  mm/hr

60% area  $\phi = 15$  mm/hr

Remaining area is impervious. Find the runoff due to storm. 6

Set P



4. a) What is a unit hydrograph ? List the assumptions in the unit hydrograph theory. **3**
- b) The following are the data obtained in the stream gauging operation. A current meter with equation of  $V = (0.32 N + 0.032)$  m/s, velocity measured at depth of 0.6. Where N is no. of revolutions per seconds. Calculate stream flow. **6**

<b>Distance (m)</b>	0	2	4	6	9	12	15	18	20	22	23	24
<b>Depth (m)</b>	0	0.5	1.10	1.95	2.25	1.85	1.75	1.65	1.50	1.25	0.75	0
<b>No. of Revolutions</b>	0	80	83	131	139	121	114	109	92	85	70	0
<b>Observation Time (s)</b>	0	180	120	120	120	120	120	120	120	120	150	0

5. a) Explain the terms :
- Confined Aquifer
  - Unconfined Aquifer and
  - Aquiclude.
- b) Design an open well in fine sand to give a discharge of 0.004 cumec when worked under depression head of 3.0 meters. Specific yield of an open well in sand may be taken as 0.5 per hour, per square meter of area under unit depression head. **6**

#### SECTION – II

6. a) Discuss the Himalayan River Component of national prospective plan of India for interbasin transfer of water. **4**
- b) Table below gives necessary data about the crop, their duty and the area under each crop, commanded by a canal taking off from storage reservoir. Find the reservoir capacity if the canal losses are 20% and reservoir losses are 12%. **6**

<b>Crop</b>	<b>Base period (Days)</b>	<b>Duty at field (ha/cumec)</b>	<b>Area under Crop the crop (ha)</b>
<b>Wheat</b>	120	1800	4800
<b>Sugarcane</b>	360	800	5600
<b>Cotton</b>	200	1400	2400
<b>Rice</b>	120	900	3200
<b>Vegetables</b>	120	700	1400



7. a) Discuss the various types of soils in India with reference to their suitability for irrigation. 4
- b) State the main component of Drip irrigation system and describe the function of each. 5
8. a) Discuss the role of co-operative water users organizations in 'on farm water distribution', for canal irrigation system. 4
- b) Describe with a neat sketch, general layout of a lift irrigation scheme. Briefly explain the 'Jack Well', 5
9. Write a note on :
- i) Percolation Tank
  - ii) Warabandi System
  - iii) Rainwater Harvesting. 9
-





SLR-TJ – 33

Seat  
No.

--

Set

Q

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – I**

Day and Date : Saturday, 25-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) In field under furrow irrigation, 'furrows' are referred to represent
  - a) Ridges on which crops are grown
  - b) Narrow ditches which carry irrigation water
  - c) Both (a) and (b)
  - d) Neither (a) nor (b)
- 2) Irrigation is basically required in
  - a) Humid regions
  - b) Arid regions
  - c) Semi Arid regions
  - d) All the above
- 3) The efficiency of water application does not depend up on
  - a) Climatic condition
  - b) Type of soil
  - c) Method of application
  - d) Geometry of conveyance system
- 4) For a crop, consumptive use of water is equal to the depth of water
  - a) Transpired by the crop
  - b) Evaporated by the crop
  - c) Used in transpiration, evaporation and quantity of water evaporated from adjacent soil
  - d) Transpired and evaporated by the crop
- 5) Which of the following is the costlier system ?
  - a) Gravity irrigation
  - b) Lift irrigation
  - c) Drip irrigation
  - d) Combined (a) and (b) above

P.T.O.



- 6) The most economical method of soil conservation is
- a) Construct a check dam
  - b) Construct a contour bund
  - c) Drain the soil
  - d) Afforestation
- 7) Given that the base period is 100 days and the duty of canal is 1000 hector/cumec, the depth of water will be
- a) 0.864 cm
  - b) 8.64 cm
  - c) 86.40 cm
  - d) 864.00 cm
- 8) A stream that provides water to the water trade is termed as
- a) affluent
  - b) influent
  - c) ephemeral
  - d) effluent
- 9) A hydrograph is a relation between time in hours and
- a) Rainfall in mm
  - b) Percolation in mm
  - c) Surface runoff in cumec
  - d) Evaporation in mm
- 10) A one day rainfall of 18 hours found to have a return period of 50 year. The probability that a one day rainfall of this or large magnitude will not occur at station C during next 50 years is
- a) 0.636
  - b) 0.020
  - c) 0.364
  - d) 0.371
- 11) An isohyet is a line joining points having
- a) Equal evaporation value
  - b) Equal barometric pressure
  - c) Equal height above the MSL
  - d) Equal rainfall depth in a given duration
- 12) Which of the following formations neither contains water nor transmits it ?
- a) Aquiclude
  - b) Aquifer
  - c) Aquifuge
  - d) Aquitard
- 13) The upper limit of area of a basin for the application of unit hydrograph is
- a) 1000 km<sup>2</sup>
  - b) 1500 km<sup>2</sup>
  - c) 5000 km<sup>2</sup>
  - d) 10,000 km<sup>2</sup>
- 14) Orographic precipitation occurs due to lifting of air mass because of
- a) Presence of mountain barriers
  - b) Extra tropical cyclones
  - c) Density difference of air mass
  - d) Difference of air temperature
-





Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – I**

Day and Date : Saturday, 25-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) Solve **any three** questions from **each** Section.  
2) Make suitable assumptions only if **necessary**. But state them **clearly**.

SECTION – I

2. a) Explain with neat sketch of hydrology cycle. 4
- b) In a catchments area covering 200 km<sup>2</sup>, the average annual precipitation observed at 6 rain gauge stations are as follows :

Station	A	B	C	D	E	F
Precipitation (mm)	82.5	102.9	180.3	110.3	98.8	136.7

Find the number of additional rain gauge stations and also the rain gauge density, if the permissible error is 10%. 6

3. a) Define runoff. Explain the factors affecting the runoff. 3
- b) The storm over a catchment 50 km<sup>2</sup> was having the following intensity
- 40 mm/hr for 1 hr,  
70 mm/hr for 2 hr,  
30 mm/hr for 1 hr.

The infiltration rate of the catchment area is as follows

20% area  $\phi = 10$  mm/hr

60% area  $\phi = 15$  mm/hr

Remaining area is impervious. Find the runoff due to storm. 6

Set Q



4. a) What is a unit hydrograph ? List the assumptions in the unit hydrograph theory. **3**
- b) The following are the data obtained in the stream gauging operation. A current meter with equation of  $V = (0.32 N + 0.032)$  m/s, velocity measured at depth of 0.6. Where N is no. of revolutions per seconds. Calculate stream flow. **6**

<b>Distance (m)</b>	0	2	4	6	9	12	15	18	20	22	23	24
<b>Depth (m)</b>	0	0.5	1.10	1.95	2.25	1.85	1.75	1.65	1.50	1.25	0.75	0
<b>No. of Revolutions</b>	0	80	83	131	139	121	114	109	92	85	70	0
<b>Observation Time (s)</b>	0	180	120	120	120	120	120	120	120	120	150	0

5. a) Explain the terms :
- Confined Aquifer
  - Unconfined Aquifer and
  - Aquiclude.
- b) Design an open well in fine sand to give a discharge of 0.004 cumec when worked under depression head of 3.0 meters. Specific yield of an open well in sand may be taken as 0.5 per hour, per square meter of area under unit depression head. **6**

#### SECTION – II

6. a) Discuss the Himalayan River Component of national prospective plan of India for interbasin transfer of water. **4**
- b) Table below gives necessary data about the crop, their duty and the area under each crop, commanded by a canal taking off from storage reservoir. Find the reservoir capacity if the canal losses are 20% and reservoir losses are 12%. **6**

<b>Crop</b>	<b>Base period (Days)</b>	<b>Duty at field (ha/cumec)</b>	<b>Area under Crop the crop (ha)</b>
<b>Wheat</b>	120	1800	4800
<b>Sugarcane</b>	360	800	5600
<b>Cotton</b>	200	1400	2400
<b>Rice</b>	120	900	3200
<b>Vegetables</b>	120	700	1400



7. a) Discuss the various types of soils in India with reference to their suitability for irrigation. 4
- b) State the main component of Drip irrigation system and describe the function of each. 5
8. a) Discuss the role of co-operative water users organizations in 'on farm water distribution', for canal irrigation system. 4
- b) Describe with a neat sketch, general layout of a lift irrigation scheme. Briefly explain the 'Jack Well', 5
9. Write a note on :
- i) Percolation Tank
  - ii) Warabandi System
  - iii) Rainwater Harvesting. 9
-





SLR-TJ – 33

Seat No.	
-------------	--

Set	<b>R</b>
-----	----------

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – I**

Day and Date : Saturday, 25-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) Which of the following formations neither contains water nor transmits it ?  
a) Aquiclude      b) Aquifer      c) Aquifuge      d) Aquitard
- 2) The upper limit of area of a basin for the application of unit hydrograph is  
a) 1000 km<sup>2</sup>      b) 1500 km<sup>2</sup>  
c) 5000 km<sup>2</sup>      d) 10,000 km<sup>2</sup>
- 3) Orographic precipitation occurs due to lifting of air mass because of  
a) Presence of mountain barriers      b) Extra tropical cyclones  
c) Density difference of air mass      d) Difference of air temperature
- 4) In field under furrow irrigation, 'furrows' are referred to represent  
a) Ridges on which crops are grown  
b) Narrow ditches which carry irrigation water  
c) Both (a) and (b)  
d) Neither (a) nor (b)
- 5) Irrigation is basically required in  
a) Humid regions      b) Arid regions  
c) Semi Arid regions      d) All the above
- 6) The efficiency of water application does not depend up on  
a) Climatic condition      b) Type of soil  
c) Method of application      d) Geometry of conveyance system
- 7) For a crop, consumptive use of water is equal to the depth of water  
a) Transpired by the crop  
b) Evaporated by the crop  
c) Used in transpiration, evaporation and quantity of water evaporated from adjacent soil  
d) Transpired and evaporated by the crop

P.T.O.



- 8) Which of the following is the costlier system ?
- a) Gravity irrigation
  - b) Lift irrigation
  - c) Drip irrigation
  - d) Combined (a) and (b) above
- 9) The most economical method of soil conservation is
- a) Construct a check dam
  - b) Construct a contour bund
  - c) Drain the soil
  - d) Afforestation
- 10) Given that the base period is 100 days and the duty of canal is 1000 hector/cumec, the depth of water will be
- a) 0.864 cm
  - b) 8.64 cm
  - c) 86.40 cm
  - d) 864.00 cm
- 11) A stream that provides water to the water trade is termed as
- a) affluent
  - b) influent
  - c) ephemeral
  - d) effluent
- 12) A hydrograph is a relation between time in hours and
- a) Rainfall in mm
  - b) Percolation in mm
  - c) Surface runoff in cumec
  - d) Evaporation in mm
- 13) A one day rainfall of 18 hours found to have a return period of 50 year. The probability that a one day rainfall of this or large magnitude will not occur at station C during next 50 years is
- a) 0.636
  - b) 0.020
  - c) 0.364
  - d) 0.371
- 14) An isohyet is a line joining points having
- a) Equal evaporation value
  - b) Equal barometric pressure
  - c) Equal height above the MSL
  - d) Equal rainfall depth in a given duration
-



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – I**

Day and Date : Saturday, 25-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) Solve **any three** questions from **each** Section.  
2) Make suitable assumptions only if **necessary**. But state them **clearly**.

SECTION – I

2. a) Explain with neat sketch of hydrology cycle. 4
- b) In a catchments area covering 200 km<sup>2</sup>, the average annual precipitation observed at 6 rain gauge stations are as follows :

Station	A	B	C	D	E	F
Precipitation (mm)	82.5	102.9	180.3	110.3	98.8	136.7

Find the number of additional rain gauge stations and also the rain gauge density, if the permissible error is 10%. 6

3. a) Define runoff. Explain the factors affecting the runoff. 3
- b) The storm over a catchment 50 km<sup>2</sup> was having the following intensity
- 40 mm/hr for 1 hr,  
70 mm/hr for 2 hr,  
30 mm/hr for 1 hr.

The infiltration rate of the catchment area is as follows

20% area  $\phi = 10$  mm/hr

60% area  $\phi = 15$  mm/hr

Remaining area is impervious. Find the runoff due to storm. 6

Set R



4. a) What is a unit hydrograph ? List the assumptions in the unit hydrograph theory. **3**
- b) The following are the data obtained in the stream gauging operation. A current meter with equation of  $V = (0.32 N + 0.032)$  m/s, velocity measured at depth of 0.6. Where N is no. of revolutions per seconds. Calculate stream flow. **6**

<b>Distance (m)</b>	0	2	4	6	9	12	15	18	20	22	23	24
<b>Depth (m)</b>	0	0.5	1.10	1.95	2.25	1.85	1.75	1.65	1.50	1.25	0.75	0
<b>No. of Revolutions</b>	0	80	83	131	139	121	114	109	92	85	70	0
<b>Observation Time (s)</b>	0	180	120	120	120	120	120	120	120	120	150	0

5. a) Explain the terms :
- Confined Aquifer
  - Unconfined Aquifer and
  - Aquiclude.
- b) Design an open well in fine sand to give a discharge of 0.004 cumec when worked under depression head of 3.0 meters. Specific yield of an open well in sand may be taken as 0.5 per hour, per square meter of area under unit depression head. **6**

## SECTION – II

6. a) Discuss the Himalayan River Component of national prospective plan of India for interbasin transfer of water. **4**
- b) Table below gives necessary data about the crop, their duty and the area under each crop, commanded by a canal taking off from storage reservoir. Find the reservoir capacity if the canal losses are 20% and reservoir losses are 12%. **6**

<b>Crop</b>	<b>Base period (Days)</b>	<b>Duty at field (ha/cumec)</b>	<b>Area under Crop the crop (ha)</b>
<b>Wheat</b>	120	1800	4800
<b>Sugarcane</b>	360	800	5600
<b>Cotton</b>	200	1400	2400
<b>Rice</b>	120	900	3200
<b>Vegetables</b>	120	700	1400





7. a) Discuss the various types of soils in India with reference to their suitability for irrigation. 4
- b) State the main component of Drip irrigation system and describe the function of each. 5
8. a) Discuss the role of co-operative water users organizations in 'on farm water distribution', for canal irrigation system. 4
- b) Describe with a neat sketch, general layout of a lift irrigation scheme. Briefly explain the 'Jack Well', 5
9. Write a note on :
- i) Percolation Tank
  - ii) Warabandi System
  - iii) Rainwater Harvesting. 9
-





SLR-TJ – 33

Seat No.	
----------	--

Set	S
-----	---

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – I**

Day and Date : Saturday, 25-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) The efficiency of water application does not depend up on
  - a) Climatic condition
  - b) Type of soil
  - c) Method of application
  - d) Geometry of conveyance system
- 2) For a crop, consumptive use of water is equal to the depth of water
  - a) Transpired by the crop
  - b) Evaporated by the crop
  - c) Used in transpiration, evaporation and quantity of water evaporated from adjacent soil
  - d) Transpired and evaporated by the crop
- 3) Which of the following is the costlier system ?
  - a) Gravity irrigation
  - b) Lift irrigation
  - c) Drip irrigation
  - d) Combined (a) and (b) above
- 4) The most economical method of soil conservation is
  - a) Construct a check dam
  - b) Construct a contour bund
  - c) Drain the soil
  - d) Afforestation
- 5) Given that the base period is 100 days and the duty of canal is 1000 hector/cumec, the depth of water will be
  - a) 0.864 cm
  - b) 8.64 cm
  - c) 86.40 cm
  - d) 864.00 cm
- 6) A stream that provides water to the water trade is termed as
  - a) affluent
  - b) influent
  - c) ephemeral
  - d) effluent

P.T.O.



- 7) A hydrograph is a relation between time in hours and
- a) Rainfall in mm
  - b) Percolation in mm
  - c) Surface runoff in cumec
  - d) Evaporation in mm
- 8) A one day rainfall of 18 hours found to have a return period of 50 year. The probability that a one day rainfall of this or large magnitude will not occur at station C during next 50 years is
- a) 0.636
  - b) 0.020
  - c) 0.364
  - d) 0.371
- 9) An isohyet is a line joining points having
- a) Equal evaporation value
  - b) Equal barometric pressure
  - c) Equal height above the MSL
  - d) Equal rainfall depth in a given duration
- 10) Which of the following formations neither contains water nor transmits it ?
- a) Aquiclude
  - b) Aquifer
  - c) Aquifuge
  - d) Aquitard
- 11) The upper limit of area of a basin for the application of unit hydrograph is
- a) 1000 km<sup>2</sup>
  - b) 1500 km<sup>2</sup>
  - c) 5000 km<sup>2</sup>
  - d) 10,000 km<sup>2</sup>
- 12) Orographic precipitation occurs due to lifting of air mass because of
- a) Presence of mountain barriers
  - b) Extra tropical cyclones
  - c) Density difference of air mass
  - d) Difference of air temperature
- 13) In field under furrow irrigation, 'furrows' are referred to represent
- a) Ridges on which crops are grown
  - b) Narrow ditches which carry irrigation water
  - c) Both (a) and (b)
  - d) Neither (a) nor (b)
- 14) Irrigation is basically required in
- a) Humid regions
  - b) Arid regions
  - c) Semi Arid regions
  - d) All the above
-



Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – I**

Day and Date : Saturday, 25-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

**Instructions :** 1) Solve **any three** questions from **each** Section.  
2) Make suitable assumptions only if **necessary**. But state them **clearly**.

SECTION – I

2. a) Explain with neat sketch of hydrology cycle. 4  
b) In a catchments area covering 200 km<sup>2</sup>, the average annual precipitation observed at 6 rain gauge stations are as follows :

Station	A	B	C	D	E	F
Precipitation (mm)	82.5	102.9	180.3	110.3	98.8	136.7

Find the number of additional rain gauge stations and also the rain gauge density, if the permissible error is 10%. 6

3. a) Define runoff. Explain the factors affecting the runoff. 3  
b) The storm over a catchment 50 km<sup>2</sup> was having the following intensity  
40 mm/hr for 1 hr,  
70 mm/hr for 2 hr,  
30 mm/hr for 1 hr.

The infiltration rate of the catchment area is as follows

20% area  $\phi = 10$  mm/hr

60% area  $\phi = 15$  mm/hr

Remaining area is impervious. Find the runoff due to storm. 6

Set S



4. a) What is a unit hydrograph ? List the assumptions in the unit hydrograph theory. **3**
- b) The following are the data obtained in the stream gauging operation. A current meter with equation of  $V = (0.32 N + 0.032)$  m/s, velocity measured at depth of 0.6. Where N is no. of revolutions per seconds. Calculate stream flow. **6**

<b>Distance (m)</b>	0	2	4	6	9	12	15	18	20	22	23	24
<b>Depth (m)</b>	0	0.5	1.10	1.95	2.25	1.85	1.75	1.65	1.50	1.25	0.75	0
<b>No. of Revolutions</b>	0	80	83	131	139	121	114	109	92	85	70	0
<b>Observation Time (s)</b>	0	180	120	120	120	120	120	120	120	120	150	0

5. a) Explain the terms :
- Confined Aquifer
  - Unconfined Aquifer and
  - Aquiclude.
- b) Design an open well in fine sand to give a discharge of 0.004 cumec when worked under depression head of 3.0 meters. Specific yield of an open well in sand may be taken as 0.5 per hour, per square meter of area under unit depression head. **6**

#### SECTION – II

6. a) Discuss the Himalayan River Component of national prospective plan of India for interbasin transfer of water. **4**
- b) Table below gives necessary data about the crop, their duty and the area under each crop, commanded by a canal taking off from storage reservoir. Find the reservoir capacity if the canal losses are 20% and reservoir losses are 12%. **6**

<b>Crop</b>	<b>Base period (Days)</b>	<b>Duty at field (ha/cumec)</b>	<b>Area under Crop the crop (ha)</b>
<b>Wheat</b>	120	1800	4800
<b>Sugarcane</b>	360	800	5600
<b>Cotton</b>	200	1400	2400
<b>Rice</b>	120	900	3200
<b>Vegetables</b>	120	700	1400



7. a) Discuss the various types of soils in India with reference to their suitability for irrigation. **4**
- b) State the main component of Drip irrigation system and describe the function of each. **5**
8. a) Discuss the role of co-operative water users organizations in 'on farm water distribution', for canal irrigation system. **4**
- b) Describe with a neat sketch, general layout of a lift irrigation scheme. Briefly explain the 'Jack Well', **5**
9. Write a note on :
- i) Percolation Tank
  - ii) Warabandi System
  - iii) Rainwater Harvesting. **9**
-







Seat No.	
----------	--

Set	P
-----	---

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGG. MATHEMATICS – III**

Day and Date : Monday, 27-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to the **right** indicate **full** marks.  
4) **Use of non-programmable calculator is allowed.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

**(14×1=14)**

- 1) The particular integral of  $(D^2 - 4)y = \cos 2x$  is  
a)  $\frac{x}{4} \sin 2x$       b)  $-\frac{1}{4} \cos 2x$       c)  $-\frac{1}{8} \cos 2x$       d)  $-\frac{x}{8} \sin 2x$
- 2) The general solution of  $(D^2 - D - 2)y = 0$  is  
a)  $y = c_1 e^{-x} + c_2 e^{2x}$       b)  $y = c_1 e^x + c_2 e^{-2x}$   
c)  $y = c_1 e^x + c_2 e^{2x}$       d)  $y = c_1 e^{-x} + c_2 e^{-2x}$
- 3) To transform  $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} = 1$  into linear differential equation with constant coefficients, the required substitution is  
a)  $x = \sin t$       b)  $x = \log t$       c)  $x = e^t$       d)  $x = e^{-t}$
- 4) The solution of  $q = e^{-p}$  is  
a)  $z = ax + by + c$       b)  $z = ax + e^{-a}y + c$   
c)  $z = ax + e^{ay} + c$       d)  $z = ax + y^{-b} + c$
- 5) The solution of  $px + qy = z$  is  
a)  $\phi\left(\frac{x}{y}, \frac{y}{z}\right) = 0$       b)  $\phi(x + y, y + z) = 0$   
c)  $\phi\left(\frac{x^2}{y}, \frac{y^2}{z}\right) = 0$       d)  $\phi(xy, yz) = 0$



- 6) If  $L\{f(t)\} = \phi(s)$ , then  $L\left\{\int_0^t f(x)dx\right\}$  is
- a)  $\int_0^s \phi(s)ds$       b)  $s\phi(s)$       c)  $-\phi'(s)$       d)  $\frac{1}{s}\phi(s)$
- 7) Laplace transform of  $t^3e^{-3t}$  is
- a)  $\frac{7}{(s+3)^3}$       b)  $\frac{6}{(s+3)^4}$       c)  $\frac{6}{(s+3)^3}$       d)  $\frac{6}{(s-3)^4}$
- 8) The conditions for expansion of a function in Fourier series are known as
- a) Harmonic conditions      b) Dirichlet's conditions  
c) Periodic conditions      d) Riemann's conditions
- 9) In the cosine series expansion of  $\sin x$  in  $(0, \pi)$  the constant term is
- a)  $\frac{1}{2}$       b)  $\frac{2}{\pi}$       c)  $\pi$       d)  $\frac{\pi}{2}$
- 10) The directional derivative of  $\phi = x^2 + y^2 + z^2$  at  $(1, 1, 1)$  along the x-axis is
- a) 1      b) 0      c) 2      d) 3
- 11) A vector function  $\bar{f}$  is called solenoidal if
- a)  $\text{curl } \bar{f} = \bar{0}$       b)  $\text{grad } \bar{f} = 0$       c)  $\text{div } \bar{f} = 0$       d)  $\text{div } \bar{f} \neq 0$
- 12) For binomial distribution mean = 12 and variance = 4, then the values of n, p, q are respectively
- a) 9,  $\frac{1}{3}$ ,  $\frac{2}{3}$       b) 4,  $\frac{1}{2}$ ,  $\frac{1}{2}$   
c) 9,  $\frac{2}{3}$ ,  $\frac{1}{3}$       d) 18,  $\frac{2}{3}$ ,  $\frac{1}{3}$
- 13) A continuous random variable has the following probability density function,  $f(x) = kx(1-x)$ ,  $0 \leq x \leq 1$  then  $k =$  \_\_\_\_\_
- a) 2      b) 3      c) 5      d) 6
- 14) If the points in the scatter diagram lie on a rising line then  $r =$  \_\_\_\_\_
- a) 1      b) -1      c) 0      d) -2

---



Seat No.	
-------------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGG. MATHEMATICS – III**

Day and Date : Monday, 27-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions:** 1) Solve **any three** questions from **each** Section.  
2) Figures to the **right** indicate **full** marks.  
3) **Use** of non-programmable calculator is **allowed**.

SECTION – I

2. a) Solve  $(D^2 + 4D + 5)y = -2\cosh x$ . 3  
 b) Solve  $(D^2 - 2D + 1)y = x\sin x$ . 3  
 c) Solve  $x^2 \frac{d^3y}{dx^3} + 3x \frac{d^2y}{dx^2} + \frac{dy}{dx} = x^2 \log x$ . 4
- OR
- c) Solve  $(3x + 2)^2 \frac{d^2y}{dx^2} + 3(3x + 2) \frac{dy}{dx} - 36y = 3x^2 + 4x + 1$ .
3. a) Solve  $(D^3 - D^2 - 6D)y = x^2 + a^2 \cos x$ . 4  
 b) The deflection of a strut with one end built in and other supported and subjected to end-thrust P satisfies the equation  $\frac{d^2y}{dx^2} + a^2y = \frac{a^2R}{P}(l - x)$ .  
 Given that  $\frac{dy}{dx} = 0, y = 0$  when  $x = 0$  and  $y = 0$  when  $x = l$ , prove that  
 $y = \frac{R}{P} \left[ \frac{\sin ax}{a} - l \cos ax + l - x \right]$  where  $al = \tan al$  and  $l$  is the length of the strut. 5
4. Attempt **any three** : 9  
 a) Find  $L \left\{ \frac{e^{at} - \cos bt}{t} \right\}$ .

Set P



b) Find  $L^{-1}\left\{\frac{s+4}{s(s-1)(s^2+4)}\right\}$ .

c) Evaluate  $\int_0^{\infty} e^{-3t} t^2 \sinh 2t dt$ , by using Laplace transform.

d) Find  $L^{-1}\left\{\frac{s^2}{(s^2+9)^2}\right\}$ , by convolution theorem.

5. a) Solve  $p - 2q = (y + 1)e^{3x}$ . **3**
- b) Solve  $p^2 - pq = 1 - z^2$ . **3**
- c) Solve  $yp + xq + pq = 0$ . **3**

### SECTION – II

6. a) If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals
- i) exactly three
  - ii) more than 2 will suffer a bad reaction. **3**
- b) Five dice are thrown together 96 times. The number of times 4, 5 or 6 was actually obtained is given below. Fit a binomial distribution if the dice are unbiased. **3**

**No. of dice showing 4, 5, 6 :**    0    1    2    3    4    5

**Frequency :**                            1    10    24    35    18    8

- c) A vector field  $\vec{f}$  is given by **3**

$$\vec{f} = (y \sin z - \sin x) \mathbf{i} + (x \sin z + 2yz) \mathbf{j} + (xy \cos z + y^2) \mathbf{k},$$

Prove that it is irrotational and hence, find its scalar potential.



7. a) Find half range sine series for  $f(x) = x \sin x$  in  $(0, \pi)$ . 5
- b) To find correlation coefficient of a bivariate data following results were obtained :  
 $n = 25, \sum x = 125, \sum y = 100, \sum x^2 = 650, \sum y^2 = 460, \sum xy = 508$ . At the time of checking it was discovered that two pairs of  $(x, y)$ ,  $(8, 12), (6, 8)$  were wrongly recorded as  $(6, 14), (8, 6)$ . Find the correct correlation coefficient. 4
8. a) In an examination given by 500 candidates the average and standard deviation of marks obtained are 40 and 10 respectively. Assuming the distribution of marks to be normal. Find approximately
- I) How many will pass if 50 is fixed as minimum ?
- II) What should be the minimum if 350 candidates are to pass ? 5
- [Given : For S.N.V.Z. area from  $z = 0$  to  $z = 0.525$  is 5.2] and that between  $z = 0$  to  $z = 1$  is 0.3413.
- b) Fit a second degree parabolic curve to the following data : 4
- |            |   |   |   |   |    |    |    |    |   |
|------------|---|---|---|---|----|----|----|----|---|
| <b>x :</b> | 1 | 2 | 3 | 4 | 5  | 6  | 7  | 8  | 9 |
| <b>y :</b> | 2 | 6 | 7 | 8 | 10 | 11 | 11 | 10 | 9 |
9. a) Find the values of  $a, b, c$  if the directional derivative of  $\phi = ax^2y + byz + cz^2x^3$  at  $(1, 2, -1)$  has maximum magnitude 64 in the direction parallel to the  $z$ -axis. 5

OR

- a) Obtain the Fourier series for  $f(x) = |x|, -\pi \leq x < \pi$ . Hence show that
- $$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$$
- b) Find the equations of the lines of regression from the following data : 5
- |                         |    |    |    |    |    |    |    |    |    |    |
|-------------------------|----|----|----|----|----|----|----|----|----|----|
| <b>Age of husband :</b> | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| <b>Age of wife :</b>    | 17 | 17 | 18 | 18 | 18 | 19 | 19 | 20 | 21 | 22 |
- Also estimate age of wife when that of husband is 30 and find  $r$ .





SLR-TJ – 34

Seat No.	
----------	--

Set	Q
-----	---

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGG. MATHEMATICS – III**

Day and Date : Monday, 27-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to the **right** indicate **full** marks.  
4) **Use of non-programmable calculator is allowed.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(14×1=14)

- 1) The conditions for expansion of a function in Fourier series are known as
  - a) Harmonic conditions
  - b) Dirichlet's conditions
  - c) Periodic conditions
  - d) Riemann's conditions
- 2) In the cosine series expansion of  $\sin x$  in  $(0, \pi)$  the constant term is
  - a)  $\frac{1}{2}$
  - b)  $\frac{2}{\pi}$
  - c)  $\pi$
  - d)  $\frac{\pi}{2}$
- 3) The directional derivative of  $\phi = x^2 + y^2 + z^2$  at  $(1, 1, 1)$  along the x-axis is
  - a) 1
  - b) 0
  - c) 2
  - d) 3
- 4) A vector function  $\bar{f}$  is called solenoidal if
  - a)  $\text{curl } \bar{f} = \bar{0}$
  - b)  $\text{grad } \bar{f} = 0$
  - c)  $\text{div } \bar{f} = 0$
  - d)  $\text{div } \bar{f} \neq 0$
- 5) For binomial distribution mean = 12 and variance = 4, then the values of n, p, q are respectively
  - a) 9,  $\frac{1}{3}$ ,  $\frac{2}{3}$
  - b) 4,  $\frac{1}{2}$ ,  $\frac{1}{2}$
  - c) 9,  $\frac{2}{3}$ ,  $\frac{1}{3}$
  - d) 18,  $\frac{2}{3}$ ,  $\frac{1}{3}$
- 6) A continuous random variable has the following probability density function,  $f(x) = kx(1 - x)$ ,  $0 \leq x \leq 1$  then  $k =$  \_\_\_\_\_
  - a) 2
  - b) 3
  - c) 5
  - d) 6

P.T.O.



- 7) If the points in the scatter diagram lie on a rising line then  $r =$  \_\_\_\_\_  
 a) 1                                      b) -1                                      c) 0                                      d) -2
- 8) The particular integral of  $(D^2 - 4)y = \cos 2x$  is  
 a)  $\frac{x}{4} \sin 2x$                       b)  $-\frac{1}{4} \cos 2x$                       c)  $-\frac{1}{8} \cos 2x$                       d)  $-\frac{x}{8} \sin 2x$
- 9) The general solution of  $(D^2 - D - 2)y = 0$  is  
 a)  $y = c_1 e^{-x} + c_2 e^{2x}$                       b)  $y = c_1 e^x + c_2 e^{-2x}$   
 c)  $y = c_1 e^x + c_2 e^{2x}$                       d)  $y = c_1 e^{-x} + c_2 e^{-2x}$
- 10) To transform  $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} = 1$  into linear differential equation with constant coefficients, the required substitution is  
 a)  $x = \sin t$                       b)  $x = \log t$                       c)  $x = e^t$                       d)  $x = e^{-t}$
- 11) The solution of  $q = e^{-p}$  is  
 a)  $z = ax + by + c$                       b)  $z = ax + e^{-a}y + c$   
 c)  $z = ax + e^a y + c$                       d)  $z = ax + y^{-b} + c$
- 12) The solution of  $px + qy = z$  is  
 a)  $\phi\left(\frac{x}{y}, \frac{y}{z}\right) = 0$                       b)  $\phi(x + y, y + z) = 0$   
 c)  $\phi\left(\frac{x^2}{y}, \frac{y^2}{z}\right) = 0$                       d)  $\phi(xy, yz) = 0$
- 13) If  $L\{f(t)\} = \phi(s)$ , then  $L\left\{\int_0^t f(x) dx\right\}$  is  
 a)  $\int_0^s \phi(s) ds$                       b)  $s\phi(s)$                       c)  $-\phi'(s)$                       d)  $\frac{1}{s}\phi(s)$
- 14) Laplace transform of  $t^3 e^{-3t}$  is  
 a)  $\frac{7}{(s+3)^3}$                       b)  $\frac{6}{(s+3)^4}$                       c)  $\frac{6}{(s+3)^3}$                       d)  $\frac{6}{(s-3)^4}$





Seat No.	
----------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGG. MATHEMATICS – III**

Day and Date : Monday, 27-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions:** 1) Solve **any three** questions from **each** Section.  
2) Figures to the **right** indicate **full** marks.  
3) **Use** of non-programmable calculator is **allowed**.

SECTION – I

2. a) Solve  $(D^2 + 4D + 5)y = -2\cosh x$ . 3  
 b) Solve  $(D^2 - 2D + 1)y = x\sin x$ . 3  
 c) Solve  $x^2 \frac{d^3y}{dx^3} + 3x \frac{d^2y}{dx^2} + \frac{dy}{dx} = x^2 \log x$ . 4
- OR
- c) Solve  $(3x+2)^2 \frac{d^2y}{dx^2} + 3(3x+2) \frac{dy}{dx} - 36y = 3x^2 + 4x + 1$ .
3. a) Solve  $(D^3 - D^2 - 6D)y = x^2 + a^2 \cos x$ . 4  
 b) The deflection of a strut with one end built in and other supported and subjected to end-thrust P satisfies the equation  $\frac{d^2y}{dx^2} + a^2y = \frac{a^2R}{P}(l-x)$ .  
 Given that  $\frac{dy}{dx} = 0$ ,  $y = 0$  when  $x = 0$  and  $y = 0$  when  $x = l$ , prove that  

$$y = \frac{R}{P} \left[ \frac{\sin ax}{a} - l \cos ax + l - x \right]$$
 where  $al = \tan al$  and  $l$  is the length of the strut. 5
4. Attempt **any three** : 9  
 a) Find  $L \left\{ \frac{e^{at} - \cos bt}{t} \right\}$ .

Set Q



b) Find  $L^{-1}\left\{\frac{s+4}{s(s-1)(s^2+4)}\right\}$ .

c) Evaluate  $\int_0^{\infty} e^{-3t} t^2 \sinh 2t dt$ , by using Laplace transform.

d) Find  $L^{-1}\left\{\frac{s^2}{(s^2+9)^2}\right\}$ , by convolution theorem.

5. a) Solve  $p - 2q = (y + 1)e^{3x}$ . **3**
- b) Solve  $p^2 - pq = 1 - z^2$ . **3**
- c) Solve  $yp + xq + pq = 0$ . **3**

### SECTION – II

6. a) If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals
- i) exactly three
  - ii) more than 2 will suffer a bad reaction. **3**
- b) Five dice are thrown together 96 times. The number of times 4, 5 or 6 was actually obtained is given below. Fit a binomial distribution if the dice are unbiased. **3**

**No. of dice showing 4, 5, 6 :**    0    1    2    3    4    5

**Frequency :**                            1    10    24    35    18    8

- c) A vector field  $\vec{f}$  is given by **3**

$$\vec{f} = (y \sin z - \sin x) \mathbf{i} + (x \sin z + 2yz) \mathbf{j} + (xy \cos z + y^2) \mathbf{k},$$

Prove that it is irrotational and hence, find its scalar potential.



7. a) Find half range sine series for  $f(x) = x \sin x$  in  $(0, \pi)$ . 5
- b) To find correlation coefficient of a bivariate data following results were obtained :  
 $n = 25, \sum x = 125, \sum y = 100, \sum x^2 = 650, \sum y^2 = 460, \sum xy = 508$ . At the time of checking it was discovered that two pairs of  $(x, y)$ ,  $(8, 12), (6, 8)$  were wrongly recorded as  $(6, 14), (8, 6)$ . Find the correct correlation coefficient. 4
8. a) In an examination given by 500 candidates the average and standard deviation of marks obtained are 40 and 10 respectively. Assuming the distribution of marks to be normal. Find approximately
- I) How many will pass if 50 is fixed as minimum ?
- II) What should be the minimum if 350 candidates are to pass ? 5
- [Given : For S.N.V.Z. area from  $z = 0$  to  $z = 0.525$  is 5.2] and that between  $z = 0$  to  $z = 1$  is 0.3413.
- b) Fit a second degree parabolic curve to the following data : 4
- |            |   |   |   |   |    |    |    |    |   |
|------------|---|---|---|---|----|----|----|----|---|
| <b>x :</b> | 1 | 2 | 3 | 4 | 5  | 6  | 7  | 8  | 9 |
| <b>y :</b> | 2 | 6 | 7 | 8 | 10 | 11 | 11 | 10 | 9 |
9. a) Find the values of  $a, b, c$  if the directional derivative of  $\phi = ax^2y + byz + cz^2x^3$  at  $(1, 2, -1)$  has maximum magnitude 64 in the direction parallel to the  $z$ -axis. 5

OR

- a) Obtain the Fourier series for  $f(x) = |x|, -\pi \leq x < \pi$ . Hence show that
- $$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$$
- b) Find the equations of the lines of regression from the following data : 5
- |                         |    |    |    |    |    |    |    |    |    |    |
|-------------------------|----|----|----|----|----|----|----|----|----|----|
| <b>Age of husband :</b> | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| <b>Age of wife :</b>    | 17 | 17 | 18 | 18 | 18 | 19 | 19 | 20 | 21 | 22 |
- Also estimate age of wife when that of husband is 30 and find  $r$ .





SLR-TJ – 34

Seat No.	
----------	--

Set	R
-----	---

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGG. MATHEMATICS – III**

Day and Date : Monday, 27-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to the **right** indicate **full** marks.  
4) **Use of non-programmable calculator is allowed.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(14×1=14)

1) The solution of  $px + qy = z$  is

a)  $\phi\left(\frac{x}{y}, \frac{y}{z}\right) = 0$

b)  $\phi(x + y, y + z) = 0$

c)  $\phi\left(\frac{x^2}{y}, \frac{y^2}{z}\right) = 0$

d)  $\phi(xy, yz) = 0$

2) If  $L\{f(t)\} = \phi(s)$ , then  $L\left\{\int_0^t f(x)dx\right\}$  is

a)  $\int_0^s \phi(s)ds$

b)  $s\phi(s)$

c)  $-\phi'(s)$

d)  $\frac{1}{s}\phi(s)$

3) Laplace transform of  $t^3e^{-3t}$  is

a)  $\frac{7}{(s+3)^3}$

b)  $\frac{6}{(s+3)^4}$

c)  $\frac{6}{(s+3)^3}$

d)  $\frac{6}{(s-3)^4}$

4) The conditions for expansion of a function in Fourier series are known as

a) Harmonic conditions

b) Dirichlet's conditions

c) Periodic conditions

d) Riemann's conditions

P.T.O.



- 5) In the cosine series expansion of  $\sin x$  in  $(0, \pi)$  the constant term is
- a)  $\frac{1}{2}$                       b)  $\frac{2}{\pi}$                       c)  $\pi$                       d)  $\frac{\pi}{2}$
- 6) The directional derivative of  $\phi = x^2 + y^2 + z^2$  at  $(1, 1, 1)$  along the x-axis is
- a) 1                      b) 0                      c) 2                      d) 3
- 7) A vector function  $\bar{f}$  is called solenoidal if
- a)  $\text{curl } \bar{f} = \bar{0}$                       b)  $\text{grad } \bar{f} = 0$                       c)  $\text{div } \bar{f} = 0$                       d)  $\text{div } \bar{f} \neq 0$
- 8) For binomial distribution mean = 12 and variance = 4, then the values of n, p, q are respectively
- a) 9,  $\frac{1}{3}$ ,  $\frac{2}{3}$                       b) 4,  $\frac{1}{2}$ ,  $\frac{1}{2}$   
 c) 9,  $\frac{2}{3}$ ,  $\frac{1}{3}$                       d) 18,  $\frac{2}{3}$ ,  $\frac{1}{3}$
- 9) A continuous random variable has the following probability density function,  $f(x) = kx(1 - x)$ ,  $0 \leq x \leq 1$  then  $k =$  \_\_\_\_\_
- a) 2                      b) 3                      c) 5                      d) 6
- 10) If the points in the scatter diagram lie on a rising line then  $r =$  \_\_\_\_\_
- a) 1                      b) -1                      c) 0                      d) -2
- 11) The particular integral of  $(D^2 - 4)y = \cos 2x$  is
- a)  $\frac{x}{4} \sin 2x$                       b)  $-\frac{1}{4} \cos 2x$                       c)  $-\frac{1}{8} \cos 2x$                       d)  $-\frac{x}{8} \sin 2x$
- 12) The general solution of  $(D^2 - D - 2)y = 0$  is
- a)  $y = c_1 e^{-x} + c_2 e^{2x}$                       b)  $y = c_1 e^x + c_2 e^{-2x}$   
 c)  $y = c_1 e^x + c_2 e^{2x}$                       d)  $y = c_1 e^{-x} + c_2 e^{-2x}$
- 13) To transform  $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} = 1$  into linear differential equation with constant coefficients, the required substitution is
- a)  $x = \sin t$                       b)  $x = \log t$                       c)  $x = e^t$                       d)  $x = e^{-t}$
- 14) The solution of  $q = e^{-p}$  is
- a)  $z = ax + by + c$                       b)  $z = ax + e^{-a}y + c$   
 c)  $z = ax + e^a y + c$                       d)  $z = ax + y^{-b} + c$



Seat No.	
-------------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGG. MATHEMATICS – III**

Day and Date : Monday, 27-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions:** 1) Solve **any three** questions from **each** Section.  
2) Figures to the **right** indicate **full** marks.  
3) **Use** of non-programmable calculator is **allowed**.

SECTION – I

2. a) Solve  $(D^2 + 4D + 5)y = -2\cosh x$ . 3

b) Solve  $(D^2 - 2D + 1)y = x\sin x$ . 3

c) Solve  $x^2 \frac{d^3y}{dx^3} + 3x \frac{d^2y}{dx^2} + \frac{dy}{dx} = x^2 \log x$ . 4

OR

c) Solve  $(3x + 2)^2 \frac{d^2y}{dx^2} + 3(3x + 2) \frac{dy}{dx} - 36y = 3x^2 + 4x + 1$ .

3. a) Solve  $(D^3 - D^2 - 6D)y = x^2 + a^2 \cos x$ . 4

b) The deflection of a strut with one end built in and other supported and subjected

to end-thrust P satisfies the equation  $\frac{d^2y}{dx^2} + a^2y = \frac{a^2R}{P}(l - x)$ .

Given that  $\frac{dy}{dx} = 0, y = 0$  when  $x = 0$  and  $y = 0$  when  $x = l$ , prove that

$y = \frac{R}{P} \left[ \frac{\sin ax}{a} - l \cos ax + l - x \right]$  where  $al = \tan a$  and  $l$  is the length of the strut. 5

4. Attempt **any three** : 9

a) Find  $L \left\{ \frac{e^{at} - \cos bt}{t} \right\}$ .

Set R



b) Find  $L^{-1}\left\{\frac{s+4}{s(s-1)(s^2+4)}\right\}$ .

c) Evaluate  $\int_0^{\infty} e^{-3t} t^2 \sinh 2t dt$ , by using Laplace transform.

d) Find  $L^{-1}\left\{\frac{s^2}{(s^2+9)^2}\right\}$ , by convolution theorem.

5. a) Solve  $p - 2q = (y + 1)e^{3x}$ . **3**
- b) Solve  $p^2 - pq = 1 - z^2$ . **3**
- c) Solve  $yp + xq + pq = 0$ . **3**

### SECTION – II

6. a) If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals
- i) exactly three
- ii) more than 2 will suffer a bad reaction. **3**
- b) Five dice are thrown together 96 times. The number of times 4, 5 or 6 was actually obtained is given below. Fit a binomial distribution if the dice are unbiased. **3**

**No. of dice showing 4, 5, 6 :**    0    1    2    3    4    5

**Frequency :**                            1    10    24    35    18    8

- c) A vector field  $\vec{f}$  is given by **3**

$$\vec{f} = (y \sin z - \sin x) \mathbf{i} + (x \sin z + 2yz) \mathbf{j} + (xy \cos z + y^2) \mathbf{k},$$

Prove that it is irrotational and hence, find its scalar potential.





7. a) Find half range sine series for  $f(x) = x \sin x$  in  $(0, \pi)$ . 5
- b) To find correlation coefficient of a bivariate data following results were obtained :  
 $n = 25, \sum x = 125, \sum y = 100, \sum x^2 = 650, \sum y^2 = 460, \sum xy = 508$ . At the time of checking it was discovered that two pairs of  $(x, y)$ ,  $(8, 12), (6, 8)$  were wrongly recorded as  $(6, 14), (8, 6)$ . Find the correct correlation coefficient. 4
8. a) In an examination given by 500 candidates the average and standard deviation of marks obtained are 40 and 10 respectively. Assuming the distribution of marks to be normal. Find approximately
- I) How many will pass if 50 is fixed as minimum ?
- II) What should be the minimum if 350 candidates are to pass ? 5
- [Given : For S.N.V.Z. area from  $z = 0$  to  $z = 0.525$  is 5.2] and that between  $z = 0$  to  $z = 1$  is 0.3413.
- b) Fit a second degree parabolic curve to the following data : 4
- |            |   |   |   |   |    |    |    |    |   |
|------------|---|---|---|---|----|----|----|----|---|
| <b>x :</b> | 1 | 2 | 3 | 4 | 5  | 6  | 7  | 8  | 9 |
| <b>y :</b> | 2 | 6 | 7 | 8 | 10 | 11 | 11 | 10 | 9 |
9. a) Find the values of a, b, c if the directional derivative of  $\phi = ax^2y + byz + cz^2x^3$  at  $(1, 2, -1)$  has maximum magnitude 64 in the direction parallel to the z-axis. 5

OR

- a) Obtain the Fourier series for  $f(x) = |x|, -\pi \leq x < \pi$ . Hence show that
- $$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$$
- b) Find the equations of the lines of regression from the following data : 5
- |                         |    |    |    |    |    |    |    |    |    |    |
|-------------------------|----|----|----|----|----|----|----|----|----|----|
| <b>Age of husband :</b> | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| <b>Age of wife :</b>    | 17 | 17 | 18 | 18 | 18 | 19 | 19 | 20 | 21 | 22 |
- Also estimate age of wife when that of husband is 30 and find r.





SLR-TJ – 34

Seat No.	
----------	--

Set **S**

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGG. MATHEMATICS – III**

Day and Date : Monday, 27-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to the **right** indicate **full** marks.  
4) **Use of non-programmable calculator is allowed.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(14×1=14)

- 1) The directional derivative of  $\phi = x^2 + y^2 + z^2$  at  $(1, 1, 1)$  along the x-axis is  
a) 1                      b) 0                      c) 2                      d) 3
- 2) A vector function  $\bar{f}$  is called solenoidal if  
a)  $\text{curl } \bar{f} = \bar{0}$               b)  $\text{grad } \bar{f} = 0$               c)  $\text{div } \bar{f} = 0$               d)  $\text{div } \bar{f} \neq 0$
- 3) For binomial distribution mean = 12 and variance = 4, then the values of n, p, q are respectively  
a) 9,  $\frac{1}{3}$ ,  $\frac{2}{3}$                       b) 4,  $\frac{1}{2}$ ,  $\frac{1}{2}$   
c) 9,  $\frac{2}{3}$ ,  $\frac{1}{3}$                       d) 18,  $\frac{2}{3}$ ,  $\frac{1}{3}$
- 4) A continuous random variable has the following probability density function,  $f(x) = kx(1 - x)$ ,  $0 \leq x \leq 1$  then  $k =$  \_\_\_\_\_  
a) 2                      b) 3                      c) 5                      d) 6
- 5) If the points in the scatter diagram lie on a rising line then  $r =$  \_\_\_\_\_  
a) 1                      b) -1                      c) 0                      d) -2
- 6) The particular integral of  $(D^2 - 4)y = \cos 2x$  is  
a)  $\frac{x}{4} \sin 2x$               b)  $-\frac{1}{4} \cos 2x$               c)  $-\frac{1}{8} \cos 2x$               d)  $-\frac{x}{8} \sin 2x$

P.T.O.



7) The general solution of  $(D^2 - D - 2)y = 0$  is

a)  $y = c_1 e^{-x} + c_2 e^{2x}$

b)  $y = c_1 e^x + c_2 e^{-2x}$

c)  $y = c_1 e^x + c_2 e^{2x}$

d)  $y = c_1 e^{-x} + c_2 e^{-2x}$

8) To transform  $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} = 1$  into linear differential equation with constant coefficients, the required substitution is

a)  $x = \sin t$

b)  $x = \log t$

c)  $x = e^t$

d)  $x = e^{-t}$

9) The solution of  $q = e^{-p}$  is

a)  $z = ax + by + c$

b)  $z = ax + e^{-a}y + c$

c)  $z = ax + e^{ay} + c$

d)  $z = ax + y^{-b} + c$

10) The solution of  $px + qy = z$  is

a)  $\phi\left(\frac{x}{y}, \frac{y}{z}\right) = 0$

b)  $\phi(x + y, y + z) = 0$

c)  $\phi\left(\frac{x^2}{y}, \frac{y^2}{z}\right) = 0$

d)  $\phi(xy, yz) = 0$

11) If  $L\{f(t)\} = \phi(s)$ , then  $L\left\{\int_0^t f(x)dx\right\}$  is

a)  $\int_0^s \phi(s)ds$

b)  $s\phi(s)$

c)  $-\phi'(s)$

d)  $\frac{1}{s}\phi(s)$

12) Laplace transform of  $t^3 e^{-3t}$  is

a)  $\frac{7}{(s+3)^3}$

b)  $\frac{6}{(s+3)^4}$

c)  $\frac{6}{(s+3)^3}$

d)  $\frac{6}{(s-3)^4}$

13) The conditions for expansion of a function in Fourier series are known as

a) Harmonic conditions

b) Dirichlet's conditions

c) Periodic conditions

d) Riemann's conditions

14) In the cosine series expansion of  $\sin x$  in  $(0, \pi)$  the constant term is

a)  $\frac{1}{2}$

b)  $\frac{2}{\pi}$

c)  $\pi$

d)  $\frac{\pi}{2}$



Seat No.	
-------------	--

**S.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGG. MATHEMATICS – III**

Day and Date : Monday, 27-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions:** 1) Solve **any three** questions from **each** Section.  
2) Figures to the **right** indicate **full** marks.  
3) **Use** of non-programmable calculator is **allowed**.

SECTION – I

2. a) Solve  $(D^2 + 4D + 5)y = -2\cosh x$ . 3  
 b) Solve  $(D^2 - 2D + 1)y = x\sin x$ . 3  
 c) Solve  $x^2 \frac{d^3y}{dx^3} + 3x \frac{d^2y}{dx^2} + \frac{dy}{dx} = x^2 \log x$ . 4
- OR
- c) Solve  $(3x + 2)^2 \frac{d^2y}{dx^2} + 3(3x + 2) \frac{dy}{dx} - 36y = 3x^2 + 4x + 1$ .
3. a) Solve  $(D^3 - D^2 - 6D)y = x^2 + a^2 \cos x$ . 4  
 b) The deflection of a strut with one end built in and other supported and subjected to end-thrust P satisfies the equation  $\frac{d^2y}{dx^2} + a^2y = \frac{a^2R}{P}(l - x)$ .  
 Given that  $\frac{dy}{dx} = 0, y = 0$  when  $x = 0$  and  $y = 0$  when  $x = l$ , prove that  

$$y = \frac{R}{P} \left[ \frac{\sin ax}{a} - l \cos ax + l - x \right]$$
 where  $al = \tan al$  and  $l$  is the length of the strut. 5
4. Attempt **any three** : 9  
 a) Find  $L \left\{ \frac{e^{at} - \cos bt}{t} \right\}$ .

Set S



b) Find  $L^{-1}\left\{\frac{s+4}{s(s-1)(s^2+4)}\right\}$ .

c) Evaluate  $\int_0^{\infty} e^{-3t} t^2 \sinh 2t dt$ , by using Laplace transform.

d) Find  $L^{-1}\left\{\frac{s^2}{(s^2+9)^2}\right\}$ , by convolution theorem.

5. a) Solve  $p - 2q = (y + 1)e^{3x}$ . **3**
- b) Solve  $p^2 - pq = 1 - z^2$ . **3**
- c) Solve  $yp + xq + pq = 0$ . **3**

### SECTION – II

6. a) If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals
- i) exactly three
  - ii) more than 2 will suffer a bad reaction. **3**
- b) Five dice are thrown together 96 times. The number of times 4, 5 or 6 was actually obtained is given below. Fit a binomial distribution if the dice are unbiased. **3**

**No. of dice showing 4, 5, 6 :**    0    1    2    3    4    5

**Frequency :**                            1    10    24    35    18    8

- c) A vector field  $\vec{f}$  is given by **3**

$$\vec{f} = (y \sin z - \sin x) \mathbf{i} + (x \sin z + 2yz) \mathbf{j} + (xy \cos z + y^2) \mathbf{k},$$

Prove that it is irrotational and hence, find its scalar potential.



7. a) Find half range sine series for  $f(x) = x \sin x$  in  $(0, \pi)$ . 5
- b) To find correlation coefficient of a bivariate data following results were obtained :  
 $n = 25, \sum x = 125, \sum y = 100, \sum x^2 = 650, \sum y^2 = 460, \sum xy = 508$ . At the time of checking it was discovered that two pairs of  $(x, y)$ ,  $(8, 12), (6, 8)$  were wrongly recorded as  $(6, 14), (8, 6)$ . Find the correct correlation coefficient. 4
8. a) In an examination given by 500 candidates the average and standard deviation of marks obtained are 40 and 10 respectively. Assuming the distribution of marks to be normal. Find approximately
- I) How many will pass if 50 is fixed as minimum ?
- II) What should be the minimum if 350 candidates are to pass ? 5
- [Given : For S.N.V.Z. area from  $z = 0$  to  $z = 0.525$  is 5.2] and that between  $z = 0$  to  $z = 1$  is 0.3413.
- b) Fit a second degree parabolic curve to the following data : 4
- |            |   |   |   |   |    |    |    |    |   |
|------------|---|---|---|---|----|----|----|----|---|
| <b>x :</b> | 1 | 2 | 3 | 4 | 5  | 6  | 7  | 8  | 9 |
| <b>y :</b> | 2 | 6 | 7 | 8 | 10 | 11 | 11 | 10 | 9 |
9. a) Find the values of  $a, b, c$  if the directional derivative of  $\phi = ax^2y + byz + cz^2x^3$  at  $(1, 2, -1)$  has maximum magnitude 64 in the direction parallel to the  $z$ -axis. 5

OR

- a) Obtain the Fourier series for  $f(x) = |x|, -\pi \leq x < \pi$ . Hence show that
- $$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$$
- b) Find the equations of the lines of regression from the following data : 5
- |                         |    |    |    |    |    |    |    |    |    |    |
|-------------------------|----|----|----|----|----|----|----|----|----|----|
| <b>Age of husband :</b> | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| <b>Age of wife :</b>    | 17 | 17 | 18 | 18 | 18 | 19 | 19 | 20 | 21 | 22 |
- Also estimate age of wife when that of husband is 30 and find  $r$ .







SLR-TJ – 35

Seat No.	
----------	--

Set	<b>P</b>
-----	----------

**T.E. (Civil Engineering) (Part – I) (CGPA) Examination, 2017  
DESIGN OF STEEL STRUCTURES**

Day and Date : Wednesday, 29-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- N.B. :**
- 1) Q. No. 1 is **compulsory** and attempt **any three** questions from **each** Section.
  - 2) **Use** of IS 800-2007 and IS 875 are **allowed**, but **not allowed** for MCQ (Q. No. 1).
  - 3) **Use** of scientific non programmable calculator is **allowed**.
  - 4) Figures to the **right** indicates the **full** marks.
  - 5) Assume suitable data **if necessary** and mention it **clearly** before the solution.
  - 6) **Draw** the appropriate sketches **whenever** necessary.
  - 7) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 8) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answers :

- i) The design wind speed depends upon
  - a) Risk coefficient
  - b) Topography of the area
  - c) Size of the structure
  - d) All of the above
- ii) A frame has an indeterminacy of 2 and the numbers of possible plastic hinges are 3. The collapse will be
  - a) Partial
  - b) Complete
  - c) Over complete
  - d) Can not be ascertained
- iii) For a combination of dead load and earthquake load, the partial safety factors for limit state of strength are respectively
  - a) 1.5, 1
  - b) 1.2, 1
  - c) 1.2, 1.2
  - d) 1, 1.2

P.T.O.



- iv) Proof stress for minimum bolt tension is given by  
a)  $0.5 f_{ub}$                       b)  $0.6 f_{ub}$                       c)  $0.7 f_{ub}$                       d)  $0.8 f_{ub}$
- v) Which of the following is the mode of failure in a fillet weld material ?  
a) Tension                      b) Shear                      c) Bearing                      d) Crushing
- vi) The slenderness ratio in a tension member as per IS code where reversal of stress is due to loads other than wind or seismic should not exceed  
a) 350                      b) 180                      c) 100                      d) 60
- vii) Which of the following is a correct match ?  
a) purlin – ISLC                      b) girder – ISHB  
c) Joist – ISF                      d) castelled girder – ISA
- viii) The deflection of steel beams in buildings other than industrial building is limited to span divided by  
a) 180                      b) 250                      c) 300                      d) 325
- ix) As per the IS 800 purlins are designed as a  
a) Simply supported beams                      b) Cantilever beams  
c) Continuous beams                      d) Compression member
- x) Sag rods are designed as  
a) Compression members                      b) Tension members  
c) Laterally supported beams                      d) Laterally unsupported beams
- xi) A beam section is classed as low shear case when the factored shear force is less than  
a)  $0.4 V_d$                       b)  $0.6 V_d$                       c)  $0.8 V_d$                       d)  $V_d$
- xii) In case of an axially loaded column machined for full bearing, the fastenings connecting the column to the base plate in gusseted base are designed for  
a) 100% of column load                      b) 50% of column load  
c) 25% of column load                      d) Errection loads only
- xiii) The self weight of a roof truss ( $N/mm^2$ ) may be obtained by  
a)  $(1+5)5$                       b)  $(1/3+5)10$                       c)  $(1-5)5$                       d)  $(1/3-5)10$
- xiv) For economical spacing of roof truss, if t, p, r are the cost of truss, purlin and roof coverings respectively, then  
a)  $t = p + r$                       b)  $t = 2p + r$                       c)  $t = p + 3r$                       d)  $t = p + 2r$
-



Seat No.	
----------	--

**T.E. (Civil Engineering) (Part – I) (CGPA) Examination, 2017  
DESIGN OF STEEL STRUCTURES**

Day and Date : Wednesday, 29-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- N.B. :** 1) Attempt **any three** questions from **each** Section.  
2) **Use** of IS 800-2007 and IS 875 are **allowed**, but **not** allowed for MCQ (Q. No. 1).  
3) **Use** of scientific non programmable calculator is **allowed**.  
4) Figures to the **right** indicates the **full** marks.  
5) Assume suitable data **if necessary** and mention it **clearly** before the solution.  
6) **Draw** the appropriate sketches **whenever** necessary.

SECTION – I

2. A portal frame ABCD hinged at A and at D and subjected to two point loads  $W$  and  $W$  acting at mid point of BC and at B respectively. Take  $AB = L$ ,  $BC = 2L$  and  $CD = L$ . Find the collapse load  $W$  and draw the bending moment diagram. **9**
3. An unequal angle 1.5 m long, of a truss is connected to the gusset plate. It carries ultimate tension of 230 KN. Design the section using 4 mm weld. Assume  $f_y = 250$  MPa and  $f_u = 410$  MPa. **9**
4. A double angle discontinues strut is to carry a factored axial compression of 178 KN. The length of the strut between the centres of intersection is 3.08 m. Design the member for the following two cases. **9**
- a) Angles placed back to back on opposite side of gusset.
- b) Angles placed on the same side of gusset.
5. Attempt **any three** : **9**
- a) State the theorem of plastic analysis.
- b) Explain complete, partial and over complete collapse.
- c) Write a short note on failure modes of axially loaded column.
- d) Classify the following sections, where  $f_y = 250$  MPa.
- i) ISMB 400 @ 61.67 Kg/m
- ii) ISHB 400 @ 77.4 Kg/m.
- iii) ISA 75 × 75 × 8.

Set P



## SECTION – II

6. Design A simply supported beam of span 8 m effective span carrying a total factored load of 90 KN/m. The depth of beam should not exceed 500 mm. The compression flange of the beam is laterally supported by floor construction. **9**
7. Determine the design panel point loads of fink type roof truss for an industrial building for the following data :
- Overall length of building = 48 m  
Overall width of building = 16.5 m  
Width (c/c of roof columns) = 16 m  
c/c spacing of trusses = 8 m  
Rise of truss =  $\frac{1}{4}$  of span  
Self weight of purlins = 318 N/m  
Height of columns = 11 m  
Roofing and side coverings = Asbestos cement sheet (dead weight = 171 N/m)  
The building is located in industrial area Allhabad. Both the ends of the truss are hinged.  
Use steel grade of Fe 410. **9**
8. Design battening for column consisting of 2 ISLC 300 placed face to face over total width of 300 mm. Length of column is 4 m with both ends hinged.  
Take  $f_y = 250$  MPa. **10**
9. A column ISHB 350 @661.2 N/m carries an axial compressive factored load of 1700 KN. Design a suitable welded gusset base. The base rests on M15 grade concrete pedestal. **9**
-



SLR-TJ – 35

Seat No.	
----------	--

Set	Q
-----	---

**T.E. (Civil Engineering) (Part – I) (CGPA) Examination, 2017  
DESIGN OF STEEL STRUCTURES**

Day and Date : Wednesday, 29-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- N.B. :**
- 1) Q. No. 1 is **compulsory** and attempt **any three** questions from **each** Section.
  - 2) **Use** of IS 800-2007 and IS 875 are **allowed**, but **not allowed** for MCQ (Q. No. 1).
  - 3) **Use** of scientific non programmable calculator is **allowed**.
  - 4) Figures to the **right** indicates the **full** marks.
  - 5) Assume suitable data **if necessary** and mention it **clearly** before the solution.
  - 6) **Draw** the appropriate sketches **whenever** necessary.
  - 7) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 8) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answers :

- i) The deflection of steel beams in buildings other than industrial building is limited to span divided by  
a) 180                      b) 250                      c) 300                      d) 325
- ii) As per the IS 800 purlins are designed as a  
a) Simply supported beams                      b) Cantilever beams  
c) Continuous beams                      d) Compression member
- iii) Sag rods are designed as  
a) Compression members                      b) Tension members  
c) Laterally supported beams                      d) Laterally unsupported beams

P.T.O.



- iv) A beam section is classed as low shear case when the factored shear force is less than  
a)  $0.4 V_d$                       b)  $0.6 V_d$                       c)  $0.8 V_d$                       d)  $V_d$
- v) In case of an axially loaded column machined for full bearing, the fastenings connecting the column to the base plate in gusseted base are designed for  
a) 100% of column load                      b) 50% of column load  
c) 25% of column load                      d) Erection loads only
- vi) The self weight of a roof truss ( $N/mm^2$ ) may be obtained by  
a)  $(1+5)5$                       b)  $(1/3+5)10$                       c)  $(1-5)5$                       d)  $(1/3 - 5)10$
- vii) For economical spacing of roof truss, if t, p, r are the cost of truss, purlin and roof coverings respectively, then  
a)  $t = p + r$                       b)  $t = 2p + r$                       c)  $t = p + 3r$                       d)  $t = p + 2r$
- viii) The design wind speed depends upon  
a) Risk coefficient                      b) Topography of the area  
c) Size of the structure                      d) All of the above
- ix) A frame has an indeterminacy of 2 and the numbers of possible plastic hinges are 3. The collapse will be  
a) Partial                      b) Complete  
c) Over complete                      d) Can not be ascertained
- x) For a combination of dead load and earthquake load, the partial safety factors for limit state of strength are respectively  
a) 1.5, 1                      b) 1.2, 1                      c) 1.2, 1.2                      d) 1, 1.2
- xi) Proof stress for minimum bolt tension is given by  
a)  $0.5 f_{ub}$                       b)  $0.6 f_{ub}$                       c)  $0.7 f_{ub}$                       d)  $0.8 f_{ub}$
- xii) Which of the following is the mode of failure in a fillet weld material ?  
a) Tension                      b) Shear                      c) Bearing                      d) Crushing
- xiii) The slenderness ratio in a tension member as per IS code where reversal of stress is due to loads other than wind or seismic should not exceed  
a) 350                      b) 180                      c) 100                      d) 60
- xiv) Which of the following is a correct match ?  
a) purlin – ISLC                      b) girder – ISHB  
c) Joist – ISF                      d) castelled girder – ISA
-



Seat No.	
----------	--

**T.E. (Civil Engineering) (Part – I) (CGPA) Examination, 2017  
DESIGN OF STEEL STRUCTURES**

Day and Date : Wednesday, 29-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- N.B. :** 1) Attempt **any three** questions from **each** Section.  
2) **Use** of IS 800-2007 and IS 875 are **allowed**, but **not** allowed for MCQ (Q. No. 1).  
3) **Use** of scientific non programmable calculator is **allowed**.  
4) Figures to the **right** indicates the **full** marks.  
5) Assume suitable data **if necessary** and mention it **clearly** before the solution.  
6) **Draw** the appropriate sketches **whenever** necessary.

SECTION – I

2. A portal frame ABCD hinged at A and at D and subjected to two point loads  $W$  and  $W$  acting at mid point of BC and at B respectively. Take  $AB = L$ ,  $BC = 2L$  and  $CD = L$ . Find the collapse load  $W$  and draw the bending moment diagram. **9**
3. An unequal angle 1.5 m long, of a truss is connected to the gusset plate. It carries ultimate tension of 230 KN. Design the section using 4 mm weld. Assume  $f_y = 250$  MPa and  $f_u = 410$  MPa. **9**
4. A double angle discontinues strut is to carry a factored axial compression of 178 KN. The length of the strut between the centres of intersection is 3.08 m. Design the member for the following two cases. **9**
- a) Angles placed back to back on opposite side of gusset.
- b) Angles placed on the same side of gusset.
5. Attempt **any three** : **9**
- a) State the theorem of plastic analysis.
- b) Explain complete, partial and over complete collapse.
- c) Write a short note on failure modes of axially loaded column.
- d) Classify the following sections, where  $f_y = 250$  MPa.
- i) ISMB 400 @ 61.67 Kg/m
- ii) ISHB 400 @ 77.4 Kg/m.
- iii) ISA 75 × 75 × 8.

Set Q



## SECTION – II

6. Design A simply supported beam of span 8 m effective span carrying a total factored load of 90 KN/m. The depth of beam should not exceed 500 mm. The compression flange of the beam is laterally supported by floor construction. **9**
7. Determine the design panel point loads of fink type roof truss for an industrial building for the following data :
- Overall length of building = 48 m  
Overall width of building = 16.5 m  
Width (c/c of roof columns) = 16 m  
c/c spacing of trusses = 8 m  
Rise of truss =  $\frac{1}{4}$  of span  
Self weight of purlins = 318 N/m  
Height of columns = 11 m  
Roofing and side coverings = Asbestos cement sheet (dead weight = 171 N/m)  
The building is located in industrial area Allhabad. Both the ends of the truss are hinged.  
Use steel grade of Fe 410. **9**
8. Design battening for column consisting of 2 ISLC 300 placed face to face over total width of 300 mm. Length of column is 4 m with both ends hinged.  
Take  $f_y = 250$  MPa. **10**
9. A column ISHB 350 @661.2 N/m carries an axial compressive factored load of 1700 KN. Design a suitable welded gusset base. The base rests on M15 grade concrete pedestal. **9**
-





SLR-TJ – 35

Seat No.	
----------	--

Set	R
-----	---

**T.E. (Civil Engineering) (Part – I) (CGPA) Examination, 2017  
DESIGN OF STEEL STRUCTURES**

Day and Date : Wednesday, 29-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- N.B. :** 1) Q. No. 1 is **compulsory** and attempt **any three** questions from **each** Section.  
2) **Use** of IS 800-2007 and IS 875 are **allowed**, but **not allowed** for MCQ (Q. No. 1).  
3) **Use** of scientific non programmable calculator is **allowed**.  
4) Figures to the **right** indicates the **full** marks.  
5) Assume suitable data **if necessary** and mention it **clearly** before the solution.  
6) **Draw** the appropriate sketches **whenever** necessary.  
7) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
8) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answers :

- i) Which of the following is the mode of failure in a fillet weld material ?  
a) Tension                      b) Shear                      c) Bearing                      d) Crushing
- ii) The slenderness ratio in a tension member as per IS code where reversal of stress is due to loads other than wind or seismic should not exceed  
a) 350                      b) 180                      c) 100                      d) 60
- iii) Which of the following is a correct match ?  
a) purlin – ISLC                      b) girder – ISHB  
c) Joist – ISF                      d) castelled girder – ISA
- iv) The deflection of steel beams in buildings other than industrial building is limited to span divided by  
a) 180                      b) 250                      c) 300                      d) 325

P.T.O.



- v) As per the IS 800 purlins are designed as a
- a) Simply supported beams
  - b) Cantilever beams
  - c) Continuous beams
  - d) Compression member
- vi) Sag rods are designed as
- a) Compression members
  - b) Tension members
  - c) Laterally supported beams
  - d) Laterally unsupported beams
- vii) A beam section is classed as low shear case when the factored shear force is less than
- a)  $0.4 V_d$
  - b)  $0.6 V_d$
  - c)  $0.8 V_d$
  - d)  $V_d$
- viii) In case of an axially loaded column machined for full bearing, the fastenings connecting the column to the base plate in gusseted base are designed for
- a) 100% of column load
  - b) 50% of column load
  - c) 25% of column load
  - d) Erection loads only
- ix) The self weight of a roof truss ( $N/mm^2$ ) may be obtained by
- a)  $(1+5)5$
  - b)  $(1/3+5)10$
  - c)  $(1-5)5$
  - d)  $(1/3 - 5)10$
- x) For economical spacing of roof truss, if t, p, r are the cost of truss, purlin and roof coverings respectively, then
- a)  $t = p + r$
  - b)  $t = 2p + r$
  - c)  $t = p + 3r$
  - d)  $t = p + 2r$
- xi) The design wind speed depends upon
- a) Risk coefficient
  - b) Topography of the area
  - c) Size of the structure
  - d) All of the above
- xii) A frame has an indeterminacy of 2 and the numbers of possible plastic hinges are 3. The collapse will be
- a) Partial
  - b) Complete
  - c) Over complete
  - d) Can not be ascertained
- xiii) For a combination of dead load and earthquake load, the partial safety factors for limit state of strength are respectively
- a) 1.5, 1
  - b) 1.2, 1
  - c) 1.2, 1.2
  - d) 1, 1.2
- xiv) Proof stress for minimum bolt tension is given by
- a)  $0.5 f_{ub}$
  - b)  $0.6 f_{ub}$
  - c)  $0.7 f_{ub}$
  - d)  $0.8 f_{ub}$



Seat No.	
----------	--

**T.E. (Civil Engineering) (Part – I) (CGPA) Examination, 2017  
DESIGN OF STEEL STRUCTURES**

Day and Date : Wednesday, 29-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- N.B. :** 1) Attempt **any three** questions from **each** Section.  
2) **Use** of IS 800-2007 and IS 875 are **allowed**, but **not** allowed for MCQ (Q. No. 1).  
3) **Use** of scientific non programmable calculator is **allowed**.  
4) Figures to the **right** indicates the **full** marks.  
5) Assume suitable data **if necessary** and mention it **clearly** before the solution.  
6) **Draw** the appropriate sketches **whenever** necessary.

SECTION – I

2. A portal frame ABCD hinged at A and at D and subjected to two point loads  $W$  and  $W$  acting at mid point of BC and at B respectively. Take  $AB = L$ ,  $BC = 2L$  and  $CD = L$ . Find the collapse load  $W$  and draw the bending moment diagram. **9**
3. An unequal angle 1.5 m long, of a truss is connected to the gusset plate. It carries ultimate tension of 230 KN. Design the section using 4 mm weld. Assume  $f_y = 250$  MPa and  $f_u = 410$  MPa. **9**
4. A double angle discontinues strut is to carry a factored axial compression of 178 KN. The length of the strut between the centres of intersection is 3.08 m. Design the member for the following two cases. **9**
- a) Angles placed back to back on opposite side of gusset.
- b) Angles placed on the same side of gusset.
5. Attempt **any three** : **9**
- a) State the theorem of plastic analysis.
- b) Explain complete, partial and over complete collapse.
- c) Write a short note on failure modes of axially loaded column.
- d) Classify the following sections, where  $f_y = 250$  MPa.
- i) ISMB 400 @ 61.67 Kg/m
- ii) ISHB 400 @ 77.4 Kg/m.
- iii) ISA 75 × 75 × 8.

Set R



## SECTION – II

6. Design A simply supported beam of span 8 m effective span carrying a total factored load of 90 KN/m. The depth of beam should not exceed 500 mm. The compression flange of the beam is laterally supported by floor construction. **9**
7. Determine the design panel point loads of fink type roof truss for an industrial building for the following data :
- Overall length of building = 48 m  
Overall width of building = 16.5 m  
Width (c/c of roof columns) = 16 m  
c/c spacing of trusses = 8 m  
Rise of truss =  $\frac{1}{4}$  of span  
Self weight of purlins = 318 N/m  
Height of columns = 11 m  
Roofing and side coverings = Asbestos cement sheet (dead weight = 171 N/m)  
The building is located in industrial area Allhabad. Both the ends of the truss are hinged.  
Use steel grade of Fe 410. **9**
8. Design battening for column consisting of 2 ISLC 300 placed face to face over total width of 300 mm. Length of column is 4 m with both ends hinged.  
Take  $f_y = 250$  MPa. **10**
9. A column ISHB 350 @661.2 N/m carries an axial compressive factored load of 1700 KN. Design a suitable welded gusset base. The base rests on M15 grade concrete pedestal. **9**
-



SLR-TJ – 35

Seat No.	
----------	--

Set	S
-----	---

**T.E. (Civil Engineering) (Part – I) (CGPA) Examination, 2017  
DESIGN OF STEEL STRUCTURES**

Day and Date : Wednesday, 29-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- N.B. :**
- 1) Q. No. 1 is **compulsory** and attempt **any three** questions from **each** Section.
  - 2) **Use** of IS 800-2007 and IS 875 are **allowed**, but **not allowed** for MCQ (Q. No. 1).
  - 3) **Use** of scientific non programmable calculator is **allowed**.
  - 4) Figures to the **right** indicates the **full** marks.
  - 5) Assume suitable data **if necessary** and mention it **clearly** before the solution.
  - 6) **Draw** the appropriate sketches **whenever** necessary.
  - 7) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 8) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answers :

- i) Sag rods are designed as
  - a) Compression members
  - b) Tension members
  - c) Laterally supported beams
  - d) Laterally unsupported beams
- ii) A beam section is classed as low shear case when the factored shear force is less than
  - a)  $0.4 V_d$
  - b)  $0.6 V_d$
  - c)  $0.8 V_d$
  - d)  $V_d$
- iii) In case of an axially loaded column machined for full bearing, the fastenings connecting the column to the base plate in gusseted base are designed for
  - a) 100% of column load
  - b) 50% of column load
  - c) 25% of column load
  - d) Erection loads only

P.T.O.



- iv) The self weight of a roof truss ( $N/mm^2$ ) may be obtained by  
a)  $(1+5)5$                       b)  $(1/3+5)10$                       c)  $(1-5)5$                       d)  $(1/3-5)10$
- v) For economical spacing of roof truss, if t, p, r are the cost of truss, purlin and roof coverings respectively, then  
a)  $t = p + r$                       b)  $t = 2p + r$                       c)  $t = p + 3r$                       d)  $t = p + 2r$
- vi) The design wind speed depends upon  
a) Risk coefficient                      b) Topography of the area  
c) Size of the structure                      d) All of the above
- vii) A frame has an indeterminacy of 2 and the numbers of possible plastic hinges are 3. The collapse will be  
a) Partial                      b) Complete  
c) Over complete                      d) Can not be ascertained
- viii) For a combination of dead load and earthquake load, the partial safety factors for limit state of strength are respectively  
a) 1.5, 1                      b) 1.2, 1                      c) 1.2, 1.2                      d) 1, 1.2
- ix) Proof stress for minimum bolt tension is given by  
a)  $0.5 f_{ub}$                       b)  $0.6 f_{ub}$                       c)  $0.7 f_{ub}$                       d)  $0.8 f_{ub}$
- x) Which of the following is the mode of failure in a fillet weld material ?  
a) Tension                      b) Shear                      c) Bearing                      d) Crushing
- xi) The slenderness ratio in a tension member as per IS code where reversal of stress is due to loads other than wind or seismic should not exceed  
a) 350                      b) 180                      c) 100                      d) 60
- xii) Which of the following is a correct match ?  
a) purlin – ISLC                      b) girder – ISHB  
c) Joist – ISF                      d) castelled girder – ISA
- xiii) The deflection of steel beams in buildings other than industrial building is limited to span divided by  
a) 180                      b) 250                      c) 300                      d) 325
- xiv) As per the IS 800 purlins are designed as a  
a) Simply supported beams                      b) Cantilever beams  
c) Continuous beams                      d) Compression member
-



Seat No.	
----------	--

**T.E. (Civil Engineering) (Part – I) (CGPA) Examination, 2017  
DESIGN OF STEEL STRUCTURES**

Day and Date : Wednesday, 29-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- N.B. :** 1) Attempt **any three** questions from **each** Section.  
2) **Use** of IS 800-2007 and IS 875 are **allowed**, but **not** allowed for MCQ (Q. No. 1).  
3) **Use** of scientific non programmable calculator is **allowed**.  
4) Figures to the **right** indicates the **full** marks.  
5) Assume suitable data **if necessary** and mention it **clearly** before the solution.  
6) **Draw** the appropriate sketches **whenever** necessary.

SECTION – I

2. A portal frame ABCD hinged at A and at D and subjected to two point loads  $W$  and  $W$  acting at mid point of BC and at B respectively. Take  $AB = L$ ,  $BC = 2L$  and  $CD = L$ . Find the collapse load  $W$  and draw the bending moment diagram. **9**
3. An unequal angle 1.5 m long, of a truss is connected to the gusset plate. It carries ultimate tension of 230 KN. Design the section using 4 mm weld. Assume  $f_y = 250$  MPa and  $f_u = 410$  MPa. **9**
4. A double angle discontinues strut is to carry a factored axial compression of 178 KN. The length of the strut between the centres of intersection is 3.08 m. Design the member for the following two cases. **9**
- a) Angles placed back to back on opposite side of gusset.  
b) Angles placed on the same side of gusset.
5. Attempt **any three** : **9**
- a) State the theorem of plastic analysis.  
b) Explain complete, partial and over complete collapse.  
c) Write a short note on failure modes of axially loaded column.  
d) Classify the following sections, where  $f_y = 250$  MPa.  
i) ISMB 400 @ 61.67 Kg/m  
ii) ISHB 400 @ 77.4 Kg/m.  
iii) ISA 75 × 75 × 8.



## SECTION – II

6. Design A simply supported beam of span 8 m effective span carrying a total factored load of 90 KN/m. The depth of beam should not exceed 500 mm. The compression flange of the beam is laterally supported by floor construction. **9**
7. Determine the design panel point loads of fink type roof truss for an industrial building for the following data :
- Overall length of building = 48 m  
Overall width of building = 16.5 m  
Width (c/c of roof columns) = 16 m  
c/c spacing of trusses = 8 m  
Rise of truss =  $\frac{1}{4}$  of span  
Self weight of purlins = 318 N/m  
Height of columns = 11 m  
Roofing and side coverings = Asbestos cement sheet (dead weight = 171 N/m)  
The building is located in industrial area Allhabad. Both the ends of the truss are hinged.  
Use steel grade of Fe 410. **9**
8. Design battening for column consisting of 2 ISLC 300 placed face to face over total width of 300 mm. Length of column is 4 m with both ends hinged.  
Take  $f_y = 250$  MPa. **10**
9. A column ISHB 350 @661.2 N/m carries an axial compressive factored load of 1700 KN. Design a suitable welded gusset base. The base rests on M15 grade concrete pedestal. **9**
-





SLR-TJ – 36

Seat  
No.

Set

P

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – I**

Day and Date : Saturday, 2-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Solve **any three** question from **each** Section.
  - 2) Assume additional data, if required and state it **clearly**.
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.
  - 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) A soil sample (sp. gr. 2.7) has a degree of saturation of 40% at a water content of 20%. The void ratio of the sample is
  - a) 1.35
  - b) 0.03
  - c) 5.4
  - d) None of these
- 2) In order to prevent piping the exit gradient should be
  - a) Equal to the critical gradient
  - b) Much less than the critical gradient
  - c) Greater than the critical gradient
  - d) Not a function of the critical gradient
- 3) The flow index of a soil indicates
  - a) Variation of the plastic limit
  - b) The ratio of liquid limit to plastic limit
  - c) Variation of shear strength with water content
  - d) None of these
- 4) An unconfined compression test is good for
  - a) Granular soils
  - b) Saturated cohesive soils
  - c) Both granular and cohesive soils
  - d) None of these
- 5) Soil has its degree of saturation of 80% and void ratio of 0.6, its water content considering  $G = 2.7$  is
  - a) 20%
  - b) 48%
  - c) 17.77%
  - d) None

P.T.O.



- 6) A flow net is drawn for a weir. The total head loss is 8 m. Number of potential drops are 8 and the length of flow path of last flow field is 1 m. The exit gradient is
- a) 1                      b) 1.6                      c) 2.3                      d) 2.4
- 7) A soil has a liquid limit of 45% and lies above the A line when plotted on the plasticity chart. The group symbol of soil as per soil classification is
- a) CH                      b) CI                      c) CL                      d) MI
- 8) Compaction is a process is which
- a) Removal of water from the voids of the soil mass  
b) Removal of air from the voids of the soil mass  
c) Removal of both air and water from the voids of the soil mass  
d) None of the above
- 9) Consolidation process of soils is
- a) Slow process                      b) Dependent of permeability of soils  
c) Observed in fine grained soils                      d) All of these
- 10) For a degree of consolidation of 50%, the time factor  $T_v$  is
- a) 0.3927                      b) 0.1963                      c) 0.5000                      d) None
- 11) If a retaining wall carries a surcharge of  $20 \text{ kN/m}^2$ , the active earth pressure due to surcharge only at the bottom of the wall of 6 m high, with the backfill soil of angle of internal friction of  $30^\circ$  is
- a)  $6.67 \text{ kN/m}^2$                       b)  $60 \text{ kN/m}^2$                       c)  $20 \text{ kN/m}^2$                       d) None of these
- 12) Rehmann's method is a graphical method to find
- a) Passive earth pressure  
b) Active earth pressure  
c) Both active and passive earth pressure  
d) None of these
- 13) Factor(s) affecting compaction is (are)
- a) Water content  
b) Type of soil and amount of compaction  
c) Admixtures and method of compaction  
d) All of these
- 14) The process of consolidation will be
- a) Quicker in fine grained soil  
b) Quicker in a coarse grained soil  
c) The same in both coarse-grained and fine-grained soil  
d) None of these



Seat No.	
----------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – I**

Day and Date : Saturday, 2-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) Solve **any three** question from **each** Section.  
2) Assume additional data, if required and state it **clearly**.  
3) Figures to the **right** indicate **full** marks.

SECTION – I

2. A) Describe pycnometer and density bottle method for determination of specific gravity of soil. 4
- B) A soil sample has a liquid limit of 38% and plastic limit of 22%. The following data is available from sieve analysis test.

Sieve size	% passing
4.75	65
75 micron	18

Classify the soil according to IS classification system. 5

3. A) Write a detail note on Unconfined Compression Test. 5
- B) An undrained triaxial test on a sample of compacted soil gave the following results :

Cell pressure (kN/m <sup>2</sup> )	100	200	300
Deviatric stress (kN/m <sup>2</sup> )	140	180	230
Pore pressure (kN/m <sup>2</sup> )	50	80	130

Determine the effective strength parameters. 5

4. A) Write a note on characteristics of flow net. 4
- B) Flow net is developed for a homogeneous earth dam. Related data is as below.
- a) Flow head causing seepage : 12 m
  - b) Length of dam : 150 m
  - c) No. of potential drops : 12
  - d) No. of flow channels : 10
  - e) Co-efficient of permeability :  $6.4 \times 10^{-5}$  cm/sec. 5

Set P



5. A) Write short notes on **any two** : **4**
- a) Stress under the point load (Boussinesqs equation)
  - b) Core cutter method
  - c) Effective stress.
- B) Write a detail note on various drainage conditions of shear tests. **5**

### SECTION – II

6. Write short notes on/find : **(2½×4=10)**
- a) Field compaction control.
  - b) Primary consolidation.
  - c) Active earth pressure when the back of the wall is inclined.
  - d) Passive pressure for a vertical wall of 4 m high with a backfill of unit weight  $18 \text{ kN/m}^3$ ,  $\phi = 30^\circ$ .
7. A) Under consolidation pressure of  $2 \text{ kg/cm}^2$  the thickness of saturated clay sample is 21.8 mm with a water content of 14%. After increasing consolidation pressure to  $4.5 \text{ kg/cm}^2$ , the thickness decreases to 19.8 mm. Determine compression index ( $C_c$ ). Take  $G = 2.70$ . **6**
- B) Explain the spring analogy of consolidation. **3**
8. A) Cantilever retaining wall having vertical back face retains moist sandy soil as backfill. Height of backfill is 6 m. Water table is present at 3 m below G.L. Backfill has following properties,
- Dry unit weight of soil  $16 \text{ kN/m}^3$ ,  $\phi = 30^\circ$ , water content = 15%. Submerged unit weight is  $10 \text{ kN/m}^3$ . Draw active earth pressure diagram and determine total active force on retaining wall. **6**
- B) What do you mean by earth pressure at rest ? What will be the co-efficient of earth pressure at rest if Poisson's ratio ( $\mu$ ) of the soil is 0.4 ? **3**
9. A) Differentiate between Standard and Modified Proctor Test. **5**
- B) Explain the various types of rollers used for compaction in the field and their suitability. **4**



SLR-TJ – 36

Seat  
No.

Set **Q**

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – I**

Day and Date : Saturday, 2-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions:**
- 1) Solve **any three** question from **each** Section.
  - 2) Assume additional data, if required and state it **clearly**.
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.
  - 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) Compaction is a process is which
  - a) Removal of water from the voids of the soil mass
  - b) Removal of air from the voids of the soil mass
  - c) Removal of both air and water from the voids of the soil mass
  - d) None of the above
- 2) Consolidation process of soils is
  - a) Slow process
  - b) Dependent of permeability of soils
  - c) Observed in fine grained soils
  - d) All of these
- 3) For a degree of consolidation of 50%, the time factor  $T_v$  is
  - a) 0.3927
  - b) 0.1963
  - c) 0.5000
  - d) None
- 4) If a retaining wall carries a surcharge of  $20 \text{ kN/m}^2$ , the active earth pressure due to surcharge only at the bottom of the wall of 6 m high, with the backfill soil of angle of internal friction of  $30^\circ$  is
  - a)  $6.67 \text{ kN/m}^2$
  - b)  $60 \text{ kN/m}^2$
  - c)  $20 \text{ kN/m}^2$
  - d) None of these
- 5) Rehmann's method is a graphical method to find
  - a) Passive earth pressure
  - b) Active earth pressure
  - c) Both active and passive earth pressure
  - d) None of these

P.T.O.



- 6) Factor(s) affecting compaction is (are)
- Water content
  - Type of soil and amount of compaction
  - Admixtures and method of compaction
  - All of these
- 7) The process of consolidation will be
- Quicker in fine grained soil
  - Quicker in a coarse grained soil
  - The same in both coarse-grained and fine-grained soil
  - None of these
- 8) A soil sample (sp. gr. 2.7) has a degree of saturation of 40% at a water content of 20%. The void ratio of the sample is
- 1.35
  - 0.03
  - 5.4
  - None of these
- 9) In order to prevent piping the exit gradient should be
- Equal to the critical gradient
  - Much less than the critical gradient
  - Greater than the critical gradient
  - Not a function of the critical gradient
- 10) The flow index of a soil indicates
- Variation of the plastic limit
  - The ratio of liquid limit to plastic limit
  - Variation of shear strength with water content
  - None of these
- 11) An unconfined compression test is good for
- Granular soils
  - Saturated cohesive soils
  - Both granular and cohesive soils
  - None of these
- 12) Soil has its degree of saturation of 80% and void ratio of 0.6, its water content considering  $G = 2.7$  is
- 20%
  - 48%
  - 17.77%
  - None
- 13) A flow net is drawn for a weir. The total head loss is 8 m. Number of potential drops are 8 and the length of flow path of last flow field is 1 m. The exit gradient is
- 1
  - 1.6
  - 2.3
  - 2.4
- 14) A soil has a liquid limit of 45% and lies above the A line when plotted on the plasticity chart. The group symbol of soil as per soil classification is
- CH
  - CI
  - CL
  - MI



Seat No.	
----------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – I**

Day and Date : Saturday, 2-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) Solve **any three** question from **each** Section.  
2) Assume additional data, if required and state it **clearly**.  
3) Figures to the **right** indicate **full** marks.

SECTION – I

2. A) Describe pycnometer and density bottle method for determination of specific gravity of soil. 4
- B) A soil sample has a liquid limit of 38% and plastic limit of 22%. The following data is available from sieve analysis test.

Sieve size	% passing
4.75	65
75 micron	18

Classify the soil according to IS classification system. 5

3. A) Write a detail note on Unconfined Compression Test. 5
- B) An undrained triaxial test on a sample of compacted soil gave the following results :

Cell pressure (kN/m <sup>2</sup> )	100	200	300
Deviatric stress (kN/m <sup>2</sup> )	140	180	230
Pore pressure (kN/m <sup>2</sup> )	50	80	130

Determine the effective strength parameters. 5

4. A) Write a note on characteristics of flow net. 4
- B) Flow net is developed for a homogeneous earth dam. Related data is as below.
- a) Flow head causing seepage : 12 m
  - b) Length of dam : 150 m
  - c) No. of potential drops : 12
  - d) No. of flow channels : 10
  - e) Co-efficient of permeability :  $6.4 \times 10^{-5}$  cm/sec. 5

Set Q



5. A) Write short notes on **any two** : **4**
- a) Stress under the point load (Boussinesqs equation)
  - b) Core cutter method
  - c) Effective stress.
- B) Write a detail note on various drainage conditions of shear tests. **5**

### SECTION – II

6. Write short notes on/find : **(2½×4=10)**
- a) Field compaction control.
  - b) Primary consolidation.
  - c) Active earth pressure when the back of the wall is inclined.
  - d) Passive pressure for a vertical wall of 4 m high with a backfill of unit weight  $18 \text{ kN/m}^3$ ,  $\phi = 30^\circ$ .
7. A) Under consolidation pressure of  $2 \text{ kg/cm}^2$  the thickness of saturated clay sample is 21.8 mm with a water content of 14%. After increasing consolidation pressure to  $4.5 \text{ kg/cm}^2$ , the thickness decreases to 19.8 mm. Determine compression index ( $C_c$ ). Take  $G = 2.70$ . **6**
- B) Explain the spring analogy of consolidation. **3**
8. A) Cantilever retaining wall having vertical back face retains moist sandy soil as backfill. Height of backfill is 6 m. Water table is present at 3 m below G.L. Backfill has following properties,
- Dry unit weight of soil  $16 \text{ kN/m}^3$ ,  $\phi = 30^\circ$ , water content = 15%. Submerged unit weight is  $10 \text{ kN/m}^3$ . Draw active earth pressure diagram and determine total active force on retaining wall. **6**
- B) What do you mean by earth pressure at rest ? What will be the co-efficient of earth pressure at rest if Poisson's ratio ( $\mu$ ) of the soil is 0.4 ? **3**
9. A) Differentiate between Standard and Modified Proctor Test. **5**
- B) Explain the various types of rollers used for compaction in the field and their suitability. **4**





SLR-TJ – 36

Seat  
No.

Set **R**

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – I**

Day and Date : Saturday, 2-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Solve **any three** question from **each** Section.
  - 2) Assume additional data, if required and state it **clearly**.
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.
  - 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

**14**

- 1) Soil has its degree of saturation of 80% and void ratio of 0.6, its water content considering  $G = 2.7$  is  
a) 20%                      b) 48%                      c) 17.77%                      d) None
- 2) A flow net is drawn for a weir. The total head loss is 8 m. Number of potential drops are 8 and the length of flow path of last flow field is 1 m. The exit gradient is  
a) 1                              b) 1.6                              c) 2.3                              d) 2.4
- 3) A soil has a liquid limit of 45% and lies above the A line when plotted on the plasticity chart. The group symbol of soil as per soil classification is  
a) CH                              b) CI                              c) CL                              d) MI
- 4) Compaction is a process is which  
a) Removal of water from the voids of the soil mass  
b) Removal of air from the voids of the soil mass  
c) Removal of both air and water from the voids of the soil mass  
d) None of the above
- 5) Consolidation process of soils is  
a) Slow process                      b) Dependent of permeability of soils  
c) Observed in fine grained soils                      d) All of these

P.T.O.



- 6) For a degree of consolidation of 50%, the time factor  $T_v$  is  
a) 0.3927                      b) 0.1963                      c) 0.5000                      d) None
- 7) If a retaining wall carries a surcharge of  $20 \text{ kN/m}^2$ , the active earth pressure due to surcharge only at the bottom of the wall of 6 m high, with the backfill soil of angle of internal friction of  $30^\circ$  is  
a)  $6.67 \text{ kN/m}^2$               b)  $60 \text{ kN/m}^2$               c)  $20 \text{ kN/m}^2$               d) None of these
- 8) Rehmann's method is a graphical method to find  
a) Passive earth pressure  
b) Active earth pressure  
c) Both active and passive earth pressure  
d) None of these
- 9) Factor(s) affecting compaction is (are)  
a) Water content  
b) Type of soil and amount of compaction  
c) Admixtures and method of compaction  
d) All of these
- 10) The process of consolidation will be  
a) Quicker in fine grained soil  
b) Quicker in a coarse grained soil  
c) The same in both coarse-grained and fine-grained soil  
d) None of these
- 11) A soil sample (sp. gr. 2.7) has a degree of saturation of 40% at a water content of 20%. The void ratio of the sample is  
a) 1.35                      b) 0.03                      c) 5.4                      d) None of these
- 12) In order to prevent piping the exit gradient should be  
a) Equal to the critical gradient              b) Much less than the critical gradient  
c) Greater than the critical gradient              d) Not a function of the critical gradient
- 13) The flow index of a soil indicates  
a) Variation of the plastic limit  
b) The ratio of liquid limit to plastic limit  
c) Variation of shear strength with water content  
d) None of these
- 14) An unconfined compression test is good for  
a) Granular soils                                      b) Saturated cohesive soils  
c) Both granular and cohesive soils              d) None of these



Seat No.	
----------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – I**

Day and Date : Saturday, 2-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) Solve **any three** question from **each** Section.  
2) Assume additional data, if required and state it **clearly**.  
3) Figures to the **right** indicate **full** marks.

SECTION – I

2. A) Describe pycnometer and density bottle method for determination of specific gravity of soil. 4
- B) A soil sample has a liquid limit of 38% and plastic limit of 22%. The following data is available from sieve analysis test.

Sieve size	% passing
4.75	65
75 micron	18

Classify the soil according to IS classification system. 5

3. A) Write a detail note on Unconfined Compression Test. 5
- B) An undrained triaxial test on a sample of compacted soil gave the following results :

Cell pressure (kN/m <sup>2</sup> )	100	200	300
Deviatric stress (kN/m <sup>2</sup> )	140	180	230
Pore pressure (kN/m <sup>2</sup> )	50	80	130

Determine the effective strength parameters. 5

4. A) Write a note on characteristics of flow net. 4
- B) Flow net is developed for a homogeneous earth dam. Related data is as below.
- a) Flow head causing seepage : 12 m
  - b) Length of dam : 150 m
  - c) No. of potential drops : 12
  - d) No. of flow channels : 10
  - e) Co-efficient of permeability :  $6.4 \times 10^{-5}$  cm/sec. 5

Set R



5. A) Write short notes on **any two** : **4**
- a) Stress under the point load (Boussinesqs equation)
  - b) Core cutter method
  - c) Effective stress.
- B) Write a detail note on various drainage conditions of shear tests. **5**

### SECTION – II

6. Write short notes on/find : **(2½×4=10)**
- a) Field compaction control.
  - b) Primary consolidation.
  - c) Active earth pressure when the back of the wall is inclined.
  - d) Passive pressure for a vertical wall of 4 m high with a backfill of unit weight  $18 \text{ kN/m}^3$ ,  $\phi = 30^\circ$ .
7. A) Under consolidation pressure of  $2 \text{ kg/cm}^2$  the thickness of saturated clay sample is 21.8 mm with a water content of 14%. After increasing consolidation pressure to  $4.5 \text{ kg/cm}^2$ , the thickness decreases to 19.8 mm. Determine compression index ( $C_c$ ). Take  $G = 2.70$ . **6**
- B) Explain the spring analogy of consolidation. **3**
8. A) Cantilever retaining wall having vertical back face retains moist sandy soil as backfill. Height of backfill is 6 m. Water table is present at 3 m below G.L. Backfill has following properties,
- Dry unit weight of soil  $16 \text{ kN/m}^3$ ,  $\phi = 30^\circ$ , water content = 15%. Submerged unit weight is  $10 \text{ kN/m}^3$ . Draw active earth pressure diagram and determine total active force on retaining wall. **6**
- B) What do you mean by earth pressure at rest ? What will be the co-efficient of earth pressure at rest if Poisson's ratio ( $\mu$ ) of the soil is 0.4 ? **3**
9. A) Differentiate between Standard and Modified Proctor Test. **5**
- B) Explain the various types of rollers used for compaction in the field and their suitability. **4**



SLR-TJ – 36

Seat  
No.

Set **S**

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – I**

Day and Date : Saturday, 2-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Solve **any three** question from **each** Section.
  - 2) Assume additional data, if required and state it **clearly**.
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.
  - 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) For a degree of consolidation of 50%, the time factor  $T_v$  is
  - a) 0.3927
  - b) 0.1963
  - c) 0.5000
  - d) None
- 2) If a retaining wall carries a surcharge of  $20 \text{ kN/m}^2$ , the active earth pressure due to surcharge only at the bottom of the wall of 6 m high, with the backfill soil of angle of internal friction of  $30^\circ$  is
  - a)  $6.67 \text{ kN/m}^2$
  - b)  $60 \text{ kN/m}^2$
  - c)  $20 \text{ kN/m}^2$
  - d) None of these
- 3) Rehmann's method is a graphical method to find
  - a) Passive earth pressure
  - b) Active earth pressure
  - c) Both active and passive earth pressure
  - d) None of these
- 4) Factor(s) affecting compaction is (are)
  - a) Water content
  - b) Type of soil and amount of compaction
  - c) Admixtures and method of compaction
  - d) All of these

P.T.O.



- 5) The process of consolidation will be
- Quicker in fine grained soil
  - Quicker in a coarse grained soil
  - The same in both coarse-grained and fine-grained soil
  - None of these
- 6) A soil sample (sp. gr. 2.7) has a degree of saturation of 40% at a water content of 20%. The void ratio of the sample is
- 1.35
  - 0.03
  - 5.4
  - None of these
- 7) In order to prevent piping the exit gradient should be
- Equal to the critical gradient
  - Much less than the critical gradient
  - Greater than the critical gradient
  - Not a function of the critical gradient
- 8) The flow index of a soil indicates
- Variation of the plastic limit
  - The ratio of liquid limit to plastic limit
  - Variation of shear strength with water content
  - None of these
- 9) An unconfined compression test is good for
- Granular soils
  - Saturated cohesive soils
  - Both granular and cohesive soils
  - None of these
- 10) Soil has its degree of saturation of 80% and void ratio of 0.6, its water content considering  $G = 2.7$  is
- 20%
  - 48%
  - 17.77%
  - None
- 11) A flow net is drawn for a weir. The total head loss is 8 m. Number of potential drops are 8 and the length of flow path of last flow field is 1 m. The exit gradient is
- 1
  - 1.6
  - 2.3
  - 2.4
- 12) A soil has a liquid limit of 45% and lies above the A line when plotted on the plasticity chart. The group symbol of soil as per soil classification is
- CH
  - CI
  - CL
  - MI
- 13) Compaction is a process is which
- Removal of water from the voids of the soil mass
  - Removal of air from the voids of the soil mass
  - Removal of both air and water from the voids of the soil mass
  - None of the above
- 14) Consolidation process of soils is
- Slow process
  - Dependent of permeability of soils
  - Observed in fine grained soils
  - All of these



Seat No.	
----------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – I**

Day and Date : Saturday, 2-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) Solve **any three** question from **each** Section.  
2) Assume additional data, if required and state it **clearly**.  
3) Figures to the **right** indicate **full** marks.

SECTION – I

2. A) Describe pycnometer and density bottle method for determination of specific gravity of soil. 4
- B) A soil sample has a liquid limit of 38% and plastic limit of 22%. The following data is available from sieve analysis test.

Sieve size	% passing
4.75	65
75 micron	18

Classify the soil according to IS classification system. 5

3. A) Write a detail note on Unconfined Compression Test. 5
- B) An undrained triaxial test on a sample of compacted soil gave the following results :

Cell pressure (kN/m <sup>2</sup> )	100	200	300
Deviatric stress (kN/m <sup>2</sup> )	140	180	230
Pore pressure (kN/m <sup>2</sup> )	50	80	130

Determine the effective strength parameters. 5

4. A) Write a note on characteristics of flow net. 4
- B) Flow net is developed for a homogeneous earth dam. Related data is as below.
- a) Flow head causing seepage : 12 m
  - b) Length of dam : 150 m
  - c) No. of potential drops : 12
  - d) No. of flow channels : 10
  - e) Co-efficient of permeability :  $6.4 \times 10^{-5}$  cm/sec. 5

Set S



5. A) Write short notes on **any two** : **4**
- a) Stress under the point load (Boussinesqs equation)
  - b) Core cutter method
  - c) Effective stress.
- B) Write a detail note on various drainage conditions of shear tests. **5**

### SECTION – II

6. Write short notes on/find : **(2½×4=10)**
- a) Field compaction control.
  - b) Primary consolidation.
  - c) Active earth pressure when the back of the wall is inclined.
  - d) Passive pressure for a vertical wall of 4 m high with a backfill of unit weight  $18 \text{ kN/m}^3$ ,  $\phi = 30^\circ$ .
7. A) Under consolidation pressure of  $2 \text{ kg/cm}^2$  the thickness of saturated clay sample is 21.8 mm with a water content of 14%. After increasing consolidation pressure to  $4.5 \text{ kg/cm}^2$ , the thickness decreases to 19.8 mm. Determine compression index ( $C_c$ ). Take  $G = 2.70$ . **6**
- B) Explain the spring analogy of consolidation. **3**
8. A) Cantilever retaining wall having vertical back face retains moist sandy soil as backfill. Height of backfill is 6 m. Water table is present at 3 m below G.L. Backfill has following properties,
- Dry unit weight of soil  $16 \text{ kN/m}^3$ ,  $\phi = 30^\circ$ , water content = 15%. Submerged unit weight is  $10 \text{ kN/m}^3$ . Draw active earth pressure diagram and determine total active force on retaining wall. **6**
- B) What do you mean by earth pressure at rest ? What will be the co-efficient of earth pressure at rest if Poisson's ratio ( $\mu$ ) of the soil is 0.4 ? **3**
9. A) Differentiate between Standard and Modified Proctor Test. **5**
- B) Explain the various types of rollers used for compaction in the field and their suitability. **4**





SLR-TJ – 37

Seat No.	
----------	--

Set	P
-----	---

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
BUILDING PLANNING AND DESIGN**

Day and Date : Tuesday, 5-12-2017  
Time : 10.00 a.m. to 2.00 p.m.

Total Marks : 70

**Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. State whether following statements is **correct** or **incorrect** (**one mark each**).
  - 1) In one point perspective, only one side of object is true dimension in perspective view.
  - 2) The slope for floor of Auditorium/cinema theatre may be with an inclination of  $18^\circ$  and  $20^\circ$  from front side.
  - 3) The desirable sound intensity inside a hotel room is less than 45 dB.
  - 4) The plan of a cinema theatre should be such that the walls converge towards the screen.
  - 5) The desirable maximum distance between last row and the screen when no sound reflectors are provided is 10 m.
  - 6) IS 1641-1960 gives three types of the fire loads.
  - 7) Low fire load is applied to domestic buildings, hotels and offices.
  - 8) Number of cycles or vibrations per second is known as one decibel.
  - 9) In Sabin's formula V is velocity of sound in m/sec.

P.T.O.



- 10) Dead spots in an auditorium are advantageous for acoustics of building.
  - 11) Area of ward per bed shall be in the range of 8 – 10 sq.m.
  - 12) Pathology dept. in hospital requires illumination intensity of 200 to 300 lux.
  - 13) Area of 5 sq. shall be considered per bus for bus station.
  - 14) Cavity wall construction is a part of green building.
-



Seat No.	
-------------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
BUILDING PLANNING AND DESIGN**

Day and Date : Tuesday, 5-12-2017

Marks : 56

Time : 10.00 a.m. to 2.00 p.m.

- Instructions :** 1) **All questions are compulsory.**  
2) Use both sides of **full imperial drawing sheet for Section I.**  
3) Figure on **right** indicate **full marks.**  
4) Assume suitable data wherever needed and mention it.  
5) Use answer book for Section II.  
6) Retain all projection/construction lines on drawing sheet.

**SECTION – I**

2. It is proposed to construct a two storeyed shopping complex with the following data :

- 1) Entrance : 20 to 30 sq.m.
- 2) Big shops : 6 nos. 30 to 40 sq.m. each
- 3) Small shops : 8 nos. 20 sq.m. each
- 4) Facility center : 4 nos.
- 5) Separate sanitary blocks for ladies and gents
- 6) Staircase for future expansion
- 7) Passages 2 to 2.5 wide.

The building is R.C.C. framed structure. Assume additional data if required and mention it clearly.

Draw

- a) A detailed plan (scale 1 : 100) **16**
- b) A sectional elevation passing through sanitary blocks and staircase (scale 1 : 100). **12**

**SECTION – II**

3. Attempt **any four** of the following : **(4×7=28)**

- 1) Explain any three common acoustical defects and their remedial measures.
- 2) Explain the importance of AUTOCAD and describe any four commands of CAD.
- 3) Write a note on noise and its effect on human beings.
- 4) Write a short note aesthetics for public building planning.
- 5) Explain the Sabine's formula and reverberation.
- 6) Write various criteria of "Green Building" development.





SLR-TJ – 37

Seat  
No.

--

Set

Q

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
BUILDING PLANNING AND DESIGN**

Day and Date : Tuesday, 5-12-2017

Total Marks : 70

Time : 10.00 a.m. to 2.00 p.m.

- Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*  
2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. State whether following statements is **correct** or **incorrect** (**one mark each**).
  - 1) The desirable sound intensity inside a hotel room is less than 45 dB.
  - 2) The plan of a cinema theatre should be such that the walls converge towards the screen.
  - 3) The desirable maximum distance between last row and the screen when no sound reflectors are provided is 10 m.
  - 4) IS 1641-1960 gives three types of the fire loads.
  - 5) Low fire load is applied to domestic buildings, hotels and offices.
  - 6) Number of cycles or vibrations per second is known as one decibel.
  - 7) In Sabin's formula  $V$  is velocity of sound in m/sec.
  - 8) Dead spots in an auditorium are advantageous for acoustics of building.
  - 9) Area of ward per bed shall be in the range of 8 – 10 sq.m.
  - 10) Pathology dept. in hospital requires illumination intensity of 200 to 300 lux.

P.T.O.



- 11) Area of 5 sq. shall be considered per bus for bus station.
  - 12) Cavity wall construction is a part of green building.
  - 13) In one point perspective, only one side of object is true dimension in perspective view.
  - 14) The slope for floor of Auditorium/cinema theatre may be with an inclination of  $18^\circ$  and  $20^\circ$  from front side.
-



Seat No.	
-------------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
BUILDING PLANNING AND DESIGN**

Day and Date : Tuesday, 5-12-2017

Marks : 56

Time : 10.00 a.m. to 2.00 p.m.

- Instructions :** 1) **All questions are compulsory.**  
2) Use both sides of **full imperial drawing sheet for Section I.**  
3) Figure on **right** indicate **full marks.**  
4) Assume suitable data wherever needed and mention it.  
5) Use answer book for Section II.  
6) Retain all projection/construction lines on drawing sheet.

**SECTION – I**

2. It is proposed to construct a two storeyed shopping complex with the following data :

- 1) Entrance : 20 to 30 sq.m.
- 2) Big shops : 6 nos. 30 to 40 sq.m. each
- 3) Small shops : 8 nos. 20 sq.m. each
- 4) Facility center : 4 nos.
- 5) Separate sanitary blocks for ladies and gents
- 6) Staircase for future expansion
- 7) Passages 2 to 2.5 wide.

The building is R.C.C. framed structure. Assume additional data if required and mention it clearly.

Draw

- a) A detailed plan (scale 1 : 100) **16**
- b) A sectional elevation passing through sanitary blocks and staircase (scale 1 : 100). **12**

**SECTION – II**

3. Attempt **any four** of the following : **(4×7=28)**

- 1) Explain any three common acoustical defects and their remedial measures.
- 2) Explain the importance of AUTOCAD and describe any four commands of CAD.
- 3) Write a note on noise and its effect on human beings.
- 4) Write a short note aesthetics for public building planning.
- 5) Explain the Sabine's formula and reverberation.
- 6) Write various criteria of "Green Building" development.







SLR-TJ – 37

Seat No.	
-------------	--

Set 

R
---

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
BUILDING PLANNING AND DESIGN**

Day and Date : Tuesday, 5-12-2017  
Time : 10.00 a.m. to 2.00 p.m.

Total Marks : 70

**Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. State whether following statements is **correct** or **incorrect** (**one mark each**).
  - 1) IS 1641-1960 gives three types of the fire loads.
  - 2) Low fire load is applied to domestic buildings, hotels and offices.
  - 3) Number of cycles or vibrations per second is known as one decibel.
  - 4) In Sabin's formula V is velocity of sound in m/sec.
  - 5) Dead spots in an auditorium are advantageous for acoustics of building.
  - 6) Area of ward per bed shall be in the range of 8 – 10 sq.m.
  - 7) Pathology dept. in hospital requires illumination intensity of 200 to 300 lux.
  - 8) Area of 5 sq. shall be considered per bus for bus station.
  - 9) Cavity wall construction is a part of green building.
  - 10) In one point perspective, only one side of object is true dimension in perspective view.
  - 11) The slope for floor of Auditorium/cinema theatre may be with an inclination of 18° and 20° from front side.

P.T.O.



- 12) The desirable sound intensity inside a hotel room is less than 45 dB.
  - 13) The plan of a cinema theatre should be such that the walls converge towards the screen.
  - 14) The desirable maximum distance between last row and the screen when no sound reflectors are provided is 10 m.
-



Seat No.	
-------------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
BUILDING PLANNING AND DESIGN**

Day and Date : Tuesday, 5-12-2017

Marks : 56

Time : 10.00 a.m. to 2.00 p.m.

- Instructions :** 1) **All questions are compulsory.**  
2) Use both sides of **full imperial drawing sheet for Section I.**  
3) Figure on **right** indicate **full marks.**  
4) Assume suitable data wherever needed and mention it.  
5) Use answer book for Section II.  
6) Retain all projection/construction lines on drawing sheet.

**SECTION – I**

2. It is proposed to construct a two storeyed shopping complex with the following data :

- 1) Entrance : 20 to 30 sq.m.
- 2) Big shops : 6 nos. 30 to 40 sq.m. each
- 3) Small shops : 8 nos. 20 sq.m. each
- 4) Facility center : 4 nos.
- 5) Separate sanitary blocks for ladies and gents
- 6) Staircase for future expansion
- 7) Passages 2 to 2.5 wide.

The building is R.C.C. framed structure. Assume additional data if required and mention it clearly.

Draw

- a) A detailed plan (scale 1 : 100) **16**
- b) A sectional elevation passing through sanitary blocks and staircase (scale 1 : 100). **12**

**SECTION – II**

3. Attempt **any four** of the following : **(4×7=28)**

- 1) Explain any three common acoustical defects and their remedial measures.
- 2) Explain the importance of AUTOCAD and describe any four commands of CAD.
- 3) Write a note on noise and its effect on human beings.
- 4) Write a short note aesthetics for public building planning.
- 5) Explain the Sabine's formula and reverberation.
- 6) Write various criteria of "Green Building" development.





SLR-TJ – 37

Seat  
No.

--

Set

S

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
BUILDING PLANNING AND DESIGN**

Day and Date : Tuesday, 5-12-2017

Total Marks : 70

Time : 10.00 a.m. to 2.00 p.m.

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. State whether following statements is **correct** or **incorrect (one mark each)**.
  - 1) In Sabin's formula V is velocity of sound in m/sec.
  - 2) Dead spots in an auditorium are advantageous for acoustics of building.
  - 3) Area of ward per bed shall be in the range of 8 – 10 sq.m.
  - 4) Pathology dept. in hospital requires illumination intensity of 200 to 300 lux.
  - 5) Area of 5 sq. shall be considered per bus for bus station.
  - 6) Cavity wall construction is a part of green building.
  - 7) In one point perspective, only one side of object is true dimension in perspective view.
  - 8) The slope for floor of Auditorium/cinema theatre may be with an inclination of 18° and 20° from front side.
  - 9) The desirable sound intensity inside a hotel room is less than 45 dB.
  - 10) The plan of a cinema theatre should be such that the walls converge towards the screen.

P.T.O.



- 11) The desirable maximum distance between last row and the screen when no sound reflectors are provided is 10 m.
  - 12) IS 1641-1960 gives three types of the fire loads.
  - 13) Low fire load is applied to domestic buildings, hotels and offices.
  - 14) Number of cycles or vibrations per second is known as one decibel.
-



Seat No.	
-------------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
BUILDING PLANNING AND DESIGN**

Day and Date : Tuesday, 5-12-2017

Marks : 56

Time : 10.00 a.m. to 2.00 p.m.

- Instructions :** 1) *All questions are compulsory.*  
2) *Use both sides of full imperial drawing sheet for Section I.*  
3) *Figure on right indicate full marks.*  
4) *Assume suitable data wherever needed and mention it.*  
5) *Use answer book for Section II.*  
6) *Retain all projection/construction lines on drawing sheet.*

**SECTION – I**

2. It is proposed to construct a two storeyed shopping complex with the following data :

- 1) Entrance : 20 to 30 sq.m.
- 2) Big shops : 6 nos. 30 to 40 sq.m. each
- 3) Small shops : 8 nos. 20 sq.m. each
- 4) Facility center : 4 nos.
- 5) Separate sanitary blocks for ladies and gents
- 6) Staircase for future expansion
- 7) Passages 2 to 2.5 wide.

The building is R.C.C. framed structure. Assume additional data if required and mention it clearly.

Draw

- a) A detailed plan (scale 1 : 100) **16**
- b) A sectional elevation passing through sanitary blocks and staircase (scale 1 : 100). **12**

**SECTION – II**

3. Attempt **any four** of the following : **(4×7=28)**

- 1) Explain any three common acoustical defects and their remedial measures.
- 2) Explain the importance of AUTOCAD and describe any four commands of CAD.
- 3) Write a note on noise and its effect on human beings.
- 4) Write a short note aesthetics for public building planning.
- 5) Explain the Sabine's formula and reverberation.
- 6) Write various criteria of "Green Building" development.







SLR-TJ – 38

Seat No.	
----------	--

Set 

P
---

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – I**

Day and Date : Thursday, 7-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Assume suitable data **wherever** necessary and mention it clearly.
  - 5) Use of non- programmable calculator is **allowed**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) The purpose of aeration used in water treatment is
  - a) To reduce corrosion to water pipes
  - b) To remove iron and manganese
  - c) Remove hydrogen sulphide
  - d) All the above
- 2) In rapid sand filters the permissible head loss is
  - a) Between 2.5 and 3.5 m
  - b) Exactly 2.5 m
  - c) Less than 5 m
  - d) All of above
- 3) Cleaning of slow sand filter is done by
  - a) Scrapping and removal of sand
  - b) Back washing
  - c) Both a) and b)
  - d) None of above
- 4) \_\_\_\_\_ treatment reduces salinity of water.
  - a) Flocculation
  - b) Reverse osmosis
  - c) Electro-dialysis
  - d) Both b) and c)
- 5) The factor affecting per capita demand, is
  - a) size of the city
  - b) climatic conditions
  - c) pressure in water mains
  - d) All the above

P.T.O.



- 6) For ideal settling basin  $V_s$  is settling velocity. If particle is having settling velocity ( $V_s'$ ) more than that of  $V_s$ , then particle will removed with \_\_\_\_\_ efficiency.
- a) 100%                                      b) Less than 100%  
c) 0% (no removal)                      d) None of these
- 7) Zeolites can be regenerated by passing a solution of
- a) Sugar                                      b) Salt  
c) Wine                                      d) All of above
- 8) Thrust block is designed for a minimum factor of safety of
- a) 0.5                                      b) 1  
c) 2                                      d) 4
- 9) The valve used for controlling the flow is
- a) Sluice valve                              b) Check valve  
c) Scour valve                              d) Pressure relief valve
- 10) The valve which allows flow in one direction is
- a) Gate valve                              b) Sluice  
c) Reflux                                      d) None of these
- 11) The corrosion in pipe is due to
- a) DO in water  
b) pH of water  
c) Impurities in the material particularly those having a lower potential  
d) All of above
- 12) Stagnation of water occurs in \_\_\_\_\_ system.
- a) Radial                                      b) Grid iron  
c) Circular                                      d) Dead end
- 13) Pressure relief valves installed along water mains are provided for relieving
- a) Ice pressure                              b) Water hammer pressure  
c) Air pressure                              d) All of above
- 14) To absorb the hourly variation in demand \_\_\_\_\_ type of reservoirs are provided.
- a) Sedimentation                              b) Distribution  
c) Penetration                                      d) Filtration
-



Seat No.	
----------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – I**

Day and Date : Thursday, 7-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions:** 1) Solve **any three** questions from Section – I and **any three** questions from Section – II.  
2) Figures to the **right** indicate **full** marks.  
3) Assume suitable data **wherever** necessary and mention it clearly.  
4) Use of non- programmable calculator is **allowed**.

SECTION – I

2. a) Following figures represents population data of a town : 5

Year	1940	1950	1960	1970	1980	1990
Population	1,50,000	1,80,000	2,34,000	3,27,600	4,58,640	8,87,960

Forecast the future population of a town by year 2020 by Geometrical increase method.

- b) Which equation to be used to find settling velocity for laminar flow ? Derive the formula equation for the same. 5
3. a) Design a rapid sand filter for a flow of 20 MLd. 5  
b) What are objectives of aeration ? Explain 'Cascade aerator'. 4
4. a) Design a flocculator for a flow of 5 MLd. 5  
b) How will you determine optimum dose of alum in laboratory ? Explain the procedure. 4
5. Write short notes on **any three** of the following : 9
- i) Zeolite for hardness removal
  - ii) Electrodialysis
  - iii) Design of flocculator
  - iv) General flowsheet for water treatment.

Set P



## SECTION – II

6. a) Explain household piping system with 'overhead tank'. **5**  
 b) Explain dead end system of water distribution with neat sketch. **5**
7. a) Explain analytical method for finding capacity of elevated service reservoir. **5**  
 b) A compound pipe system consists of 1800 m of 0.5 m diameter, 1200 m of 0.4 m diameter and 600 m of 0.3 m diameter connected in series. Find :  
 a) Equivalent length of 0.4 m diameter pipe **4**  
 b) Diameter of equivalent pipe if its length is 3600 m.
8. a) What is water hammer pressure ? How to find maximum pressure developed due to water hammer ? **5**  
 b) Calculate flow through pipe using Hardy cross method ( $n = 1.85$ ) **4**

Pipe	Diameter (mm)	Length (meter)	K
AB	350	375	940
BC	250	750	968
CD	350	500	125
DA	250	625	806

Inflow at A is 150 units and outflow at B, C and D are 40, 70 and 40 units respectively. Take two trials. Assume flow in pipe AB as 80 units.

9. Write short notes on following (**any three**) : **9**
- 1) Hardy cross method
  - 2) Equivalent pipe method
  - 3) Corrosion control in pipes
  - 4) Thrust block design.



SLR-TJ – 38

Seat No.	
----------	--

Set 

Q
---

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – I**

Day and Date : Thursday, 7-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Assume suitable data **wherever** necessary and mention it clearly.
  - 5) Use of non-programmable calculator is **allowed**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) Thrust block is designed for a minimum factor of safety of
  - a) 0.5
  - b) 1
  - c) 2
  - d) 4
- 2) The valve used for controlling the flow is
  - a) Sluice valve
  - b) Check valve
  - c) Scour valve
  - d) Pressure relief valve
- 3) The valve which allows flow in one direction is
  - a) Gate valve
  - b) Sluice
  - c) Reflux
  - d) None of these
- 4) The corrosion in pipe is due to
  - a) DO in water
  - b) pH of water
  - c) Impurities in the material particularly those having a lower potential
  - d) All of above
- 5) Stagnation of water occurs in \_\_\_\_\_ system.
  - a) Radial
  - b) Grid iron
  - c) Circular
  - d) Dead end
- 6) Pressure relief valves installed along water mains are provided for relieving
  - a) Ice pressure
  - b) Water hammer pressure
  - c) Air pressure
  - d) All of above

P.T.O.



- 7) To absorb the hourly variation in demand \_\_\_\_\_ type of reservoirs are provided.
- a) Sedimentation
  - b) Distribution
  - c) Penetration
  - d) Filtration
- 8) The purpose of aeration used in water treatment is
- a) To reduce corrosion to water pipes
  - b) To remove iron and manganese
  - c) Remove hydrogen sulphide
  - d) All the above
- 9) In rapid sand filters the permissible head loss is
- a) Between 2.5 and 3.5 m
  - b) Exactly 2.5 m
  - c) Less than 5 m
  - d) All of above
- 10) Cleaning of slow sand filter is done by
- a) Scrapping and removal of sand
  - b) Back washing
  - c) Both a) and b)
  - d) None of above
- 11) \_\_\_\_\_ treatment reduces salinity of water.
- a) Flocculation
  - b) Reverse osmosis
  - c) Electro-dialysis
  - d) Both b) and c)
- 12) The factor affecting per capita demand, is
- a) size of the city
  - b) climatic conditions
  - c) pressure in water mains
  - d) all the above
- 13) For ideal settling basin  $V_s$  is settling velocity. If particle is having settling velocity ( $V_s'$ ) more than that of  $V_s$ , then particle will removed with \_\_\_\_\_ efficiency.
- a) 100%
  - b) Less than 100%
  - c) 0% (no removal)
  - d) None of these
- 14) Zeolites can be regenerated by passing a solution of
- a) Sugar
  - b) Salt
  - c) Wine
  - d) All of above
-



Seat No.	
----------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – I**

Day and Date : Thursday, 7-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) Solve **any three** questions from Section – I and **any three** questions from Section – II.  
2) Figures to the **right** indicate **full** marks.  
3) Assume suitable data **wherever** necessary and mention it clearly.  
4) Use of non- programmable calculator is **allowed**.

SECTION – I

2. a) Following figures represents population data of a town : 5

Year	1940	1950	1960	1970	1980	1990
Population	1,50,000	1,80,000	2,34,000	3,27,600	4,58,640	8,87,960

Forecast the future population of a town by year 2020 by Geometrical increase method.

- b) Which equation to be used to find settling velocity for laminar flow ? Derive the formula equation for the same. 5
3. a) Design a rapid sand filter for a flow of 20 MLd. 5  
b) What are objectives of aeration ? Explain ‘Cascade aerator’. 4
4. a) Design a flocculator for a flow of 5 MLd. 5  
b) How will you determine optimum dose of alum in laboratory ? Explain the procedure. 4
5. Write short notes on **any three** of the following : 9
- i) Zeolite for hardness removal
  - ii) Electrodialysis
  - iii) Design of flocculator
  - iv) General flowsheet for water treatment.

Set Q



## SECTION – II

6. a) Explain household piping system with 'overhead tank'. **5**  
 b) Explain dead end system of water distribution with neat sketch. **5**
7. a) Explain analytical method for finding capacity of elevated service reservoir. **5**  
 b) A compound pipe system consists of 1800 m of 0.5 m diameter, 1200 m of 0.4 m diameter and 600 m of 0.3 m diameter connected in series. Find :  
 a) Equivalent length of 0.4 m diameter pipe **4**  
 b) Diameter of equivalent pipe if its length is 3600 m.
8. a) What is water hammer pressure ? How to find maximum pressure developed due to water hammer ? **5**  
 b) Calculate flow through pipe using Hardy cross method ( $n = 1.85$ ) **4**

Pipe	Diameter (mm)	Length (meter)	K
AB	350	375	940
BC	250	750	968
CD	350	500	125
DA	250	625	806

Inflow at A is 150 units and outflow at B, C and D are 40, 70 and 40 units respectively. Take two trials. Assume flow in pipe AB as 80 units.

9. Write short notes on following (**any three**) : **9**
- 1) Hardy cross method
  - 2) Equivalent pipe method
  - 3) Corrosion control in pipes
  - 4) Thrust block design.





SLR-TJ – 38

Seat No.	
----------	--

Set 

R
---

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – I**

Day and Date : Thursday, 7-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Assume suitable data **wherever** necessary and mention it clearly.
  - 5) Use of non- programmable calculator is **allowed**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **14**
- 1) The factor affecting per capita demand, is
    - a) size of the city
    - b) climatic conditions
    - c) pressure in water mains
    - d) All the above
  - 2) For ideal settling basin  $V_s$  is settling velocity. If particle is having settling velocity ( $V_s'$ ) more than that of  $V_s$ , then particle will removed with \_\_\_\_\_ efficiency.
    - a) 100%
    - b) Less than 100%
    - c) 0% (no removal)
    - d) None of these
  - 3) Zeolites can be regenerated by passing a solution of
    - a) Sugar
    - b) Salt
    - c) Wine
    - d) All of above
  - 4) Thrust block is designed for a minimum factor of safety of
    - a) 0.5
    - b) 1
    - c) 2
    - d) 4
  - 5) The valve used for controlling the flow is
    - a) Sluice valve
    - b) Check valve
    - c) Scour valve
    - d) Pressure relief valve
  - 6) The valve which allows flow in one direction is
    - a) Gate valve
    - b) Sluice
    - c) Reflux
    - d) None of these

P.T.O.



- 7) The corrosion in pipe is due to
- DO in water
  - pH of water
  - Impurities in the material particularly those having a lower potential
  - All of above
- 8) Stagnation of water occurs in \_\_\_\_\_ system.
- Radial
  - Grid iron
  - Circular
  - Dead end
- 9) Pressure relief valves installed along water mains are provided for relieving
- Ice pressure
  - Water hammer pressure
  - Air pressure
  - All of above
- 10) To absorb the hourly variation in demand \_\_\_\_\_ type of reservoirs are provided.
- Sedimentation
  - Distribution
  - Penetration
  - Filtration
- 11) The purpose of aeration used in water treatment is
- To reduce corrosion to water pipes
  - To remove iron and manganese
  - Remove hydrogen sulphide
  - All the above
- 12) In rapid sand filters the permissible head loss is
- Between 2.5 and 3.5 m
  - Exactly 2.5 m
  - Less than 5 m
  - All of above
- 13) Cleaning of slow sand filter is done by
- Scrapping and removal of sand
  - Back washing
  - Both a) and b)
  - None of above
- 14) \_\_\_\_\_ treatment reduces salinity of water.
- Flocculation
  - Reverse osmosis
  - Electro-dialysis
  - Both b) and c)
-



Seat No.	
----------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – I**

Day and Date : Thursday, 7-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) Solve **any three** questions from Section – I and **any three** questions from Section – II.  
2) Figures to the **right** indicate **full** marks.  
3) Assume suitable data **wherever** necessary and mention it clearly.  
4) Use of non- programmable calculator is **allowed**.

SECTION – I

2. a) Following figures represents population data of a town : 5

Year	1940	1950	1960	1970	1980	1990
Population	1,50,000	1,80,000	2,34,000	3,27,600	4,58,640	8,87,960

Forecast the future population of a town by year 2020 by Geometrical increase method.

- b) Which equation to be used to find settling velocity for laminar flow ? Derive the formula equation for the same. 5
3. a) Design a rapid sand filter for a flow of 20 MLd. 5  
b) What are objectives of aeration ? Explain 'Cascade aerator'. 4
4. a) Design a flocculator for a flow of 5 MLd. 5  
b) How will you determine optimum dose of alum in laboratory ? Explain the procedure. 4
5. Write short notes on **any three** of the following : 9
- i) Zeolite for hardness removal
  - ii) Electrodialysis
  - iii) Design of flocculator
  - iv) General flowsheet for water treatment.

Set R



## SECTION – II

6. a) Explain household piping system with 'overhead tank'. **5**  
 b) Explain dead end system of water distribution with neat sketch. **5**
7. a) Explain analytical method for finding capacity of elevated service reservoir. **5**  
 b) A compound pipe system consists of 1800 m of 0.5 m diameter, 1200 m of 0.4 m diameter and 600 m of 0.3 m diameter connected in series. Find :  
 a) Equivalent length of 0.4 m diameter pipe **4**  
 b) Diameter of equivalent pipe if its length is 3600 m.
8. a) What is water hammer pressure ? How to find maximum pressure developed due to water hammer ? **5**  
 b) Calculate flow through pipe using Hardy cross method ( $n = 1.85$ ) **4**

Pipe	Diameter (mm)	Length (meter)	K
AB	350	375	940
BC	250	750	968
CD	350	500	125
DA	250	625	806

Inflow at A is 150 units and outflow at B, C and D are 40, 70 and 40 units respectively. Take two trials. Assume flow in pipe AB as 80 units.

9. Write short notes on following (**any three**) : **9**
- 1) Hardy cross method
  - 2) Equivalent pipe method
  - 3) Corrosion control in pipes
  - 4) Thrust block design.



SLR-TJ – 38

Seat No.	
----------	--

Set	S
-----	---

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – I**

Day and Date : Thursday, 7-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Assume suitable data **wherever** necessary and mention it clearly.
  - 5) Use of non- programmable calculator is **allowed**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) The valve which allows flow in one direction is
  - a) Gate valve
  - b) Sluice
  - c) Reflux
  - d) None of these
- 2) The corrosion in pipe is due to
  - a) DO in water
  - b) pH of water
  - c) Impurities in the material particularly those having a lower potential
  - d) All of above
- 3) Stagnation of water occurs in \_\_\_\_\_ system.
  - a) Radial
  - b) Grid iron
  - c) Circular
  - d) Dead end
- 4) Pressure relief valves installed along water mains are provided for relieving
  - a) Ice pressure
  - b) Water hammer pressure
  - c) Air pressure
  - d) All of above
- 5) To absorb the hourly variation in demand \_\_\_\_\_ type of reservoirs are provided.
  - a) Sedimentation
  - b) Distribution
  - c) Penetration
  - d) Filtration

P.T.O.



- 6) The purpose of aeration used in water treatment is
- To reduce corrosion to water pipes
  - To remove iron and manganese
  - Remove hydrogen sulphide
  - All the above
- 7) In rapid sand filters the permissible head loss is
- Between 2.5 and 3.5 m
  - Exactly 2.5 m
  - Less than 5 m
  - All of above
- 8) Cleaning of slow sand filter is done by
- Scrapping and removal of sand
  - Back washing
  - Both a) and b)
  - None of above
- 9) \_\_\_\_\_ treatment reduces salinity of water.
- Flocculation
  - Reverse osmosis
  - Electro-dialysis
  - Both b) and c)
- 10) The factor affecting per capita demand, is
- size of the city
  - climatic conditions
  - pressure in water mains
  - all the above
- 11) For ideal settling basin  $V_s$  is settling velocity. If particle is having settling velocity ( $V_s'$ ) more than that of  $V_s$ , then particle will removed with \_\_\_\_\_ efficiency.
- 100%
  - Less than 100%
  - 0% (no removal)
  - None of these
- 12) Zeolites can be regenerated by passing a solution of
- Sugar
  - Salt
  - Wine
  - All of above
- 13) Thrust block is designed for a minimum factor of safety of
- 0.5
  - 1
  - 2
  - 4
- 14) The valve used for controlling the flow is
- Sluice valve
  - Check valve
  - Scour valve
  - Pressure relief valve



Seat No.	
----------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – I**

Day and Date : Thursday, 7-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) Solve **any three** questions from Section – I and **any three** questions from Section – II.  
2) Figures to the **right** indicate **full** marks.  
3) Assume suitable data **wherever** necessary and mention it clearly.  
4) Use of non- programmable calculator is **allowed**.

SECTION – I

2. a) Following figures represents population data of a town : 5

Year	1940	1950	1960	1970	1980	1990
Population	1,50,000	1,80,000	2,34,000	3,27,600	4,58,640	8,87,960

Forecast the future population of a town by year 2020 by Geometrical increase method.

- b) Which equation to be used to find settling velocity for laminar flow ? Derive the formula equation for the same. 5
3. a) Design a rapid sand filter for a flow of 20 MLd. 5  
b) What are objectives of aeration ? Explain ‘Cascade aerator’. 4
4. a) Design a flocculator for a flow of 5 MLd. 5  
b) How will you determine optimum dose of alum in laboratory ? Explain the procedure. 4
5. Write short notes on **any three** of the following : 9
- i) Zeolite for hardness removal
  - ii) Electrodialysis
  - iii) Design of flocculator
  - iv) General flowsheet for water treatment.

Set S



## SECTION – II

6. a) Explain household piping system with 'overhead tank'. **5**  
 b) Explain dead end system of water distribution with neat sketch. **5**
7. a) Explain analytical method for finding capacity of elevated service reservoir. **5**  
 b) A compound pipe system consists of 1800 m of 0.5 m diameter, 1200 m of 0.4 m diameter and 600 m of 0.3 m diameter connected in series. Find :  
 a) Equivalent length of 0.4 m diameter pipe **4**  
 b) Diameter of equivalent pipe if its length is 3600 m.
8. a) What is water hammer pressure ? How to find maximum pressure developed due to water hammer ? **5**  
 b) Calculate flow through pipe using Hardy cross method ( $n = 1.85$ ) **4**

Pipe	Diameter (mm)	Length (meter)	K
AB	350	375	940
BC	250	750	968
CD	350	500	125
DA	250	625	806

Inflow at A is 150 units and outflow at B, C and D are 40, 70 and 40 units respectively. Take two trials. Assume flow in pipe AB as 80 units.

9. Write short notes on following (**any three**) : **9**
- 1) Hardy cross method
  - 2) Equivalent pipe method
  - 3) Corrosion control in pipes
  - 4) Thrust block design.





SLR-TJ – 39

Seat No.	
----------	--

Set	P
-----	---

**T.E. Civil (Part – I) (CGPA Pattern) Examination, 2017  
ENGINEERING MANAGEMENT – I**

Day and Date : Saturday, 9-12-2017

Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions:**
- 1) **All questions are compulsory.**
  - 2) **Assume suitable data wherever necessary.**
  - 3) **Use graph paper if needed.**
  - 4) **Use of nonprogrammable computers is permitted.**
  - 5) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book Page No. 3. Each question carries one mark.**
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14
- 1) The cost of keeping items in inventory is called \_\_\_\_\_
    - a) Setup cost
    - b) Holding cost
    - c) Finished goods
    - d) None of these
  - 2) If primal is maximize  $35X_1 + 40X_2$ , subjected to  $2X_1 + 3X_2 \leq 60$  and  $4X_1 + 3X_2 \leq 96$ ,  $X_1, X_2 \geq 0$  the dual will have objective function as \_\_\_\_\_
    - a)  $3y_1 + 3y_2$  (minimize)
    - b)  $60y_1 + 96y_2$  (minimize)
    - c)  $3y_1 - 3y_2$  (maximize)
    - d)  $60y_1 + 96y_2$  (minimize)
  - 3) Hungarian Trial and error method is suitable for solving
    - a) Transportation problem
    - b) Games theory
    - c) Assignment problem
    - d) Simplex method
  - 4) EOQ decreases when the cost of item
    - a) Increases
    - b) Zero
    - c) Decreases
    - d) None of these

P.T.O.



- 5) If primal is minimize  $30x_1 + 40x_2$  subjected to  $6x_1 + 12x_2 \leq 120$  and  $8x_1 + 5x_2 \leq 60$ ,  $x_1, x_2 \geq 0$  the dual will have objective function as
- a)  $6y_1 + 8y_2$  (minimize)                      b)  $6y_1 - 8y_2$  (Maximize)  
c)  $120y_1 + 60y_2$  (Maximize)                  d)  $120y_1 - 60y_2$  (Maximize)
- 6) Transportation problem can be solved if
- a) no. of rows = no. of columns                  b) no. of rows  $\geq$  no. of column  
c) no. of rows  $\leq$  no. of column                  d) All of these
- 7) In decision tree problem the event mode is shown by
- a) Square                      b) Circle                      c) Triangle                      d) Rectangle
- 8) Queuing theory is used to balance
- a) Cost of offering service  
b) Cost due to delay in offering service  
c) Both a) and b)  
d) None of these
- 9) Management by objectives includes
- a) Line managers                                      b) Line and staff managers  
c) Line, staff and labour                              d) None
- 10) The Monte-Carlo simulation used
- a) Sampling technique                              b) Decision technique  
c) Mathematical technique                              d) Both a) and b)
- 11) The Vogel's approximation method is also caled as
- a) Row minima method                              b) Penalty method  
c) Least cost method                                      d) None
- 12) The biological process, of mutation has inspired
- a) Artificial Neural Network                              b) Genetic Algorithm  
c) Fuzzy logic    d) Dynamics programming
- 13) The solution of decision tree is obtained by
- a) Folding back method                              b) Games theory  
c) Laplace criteria    d) Dynamic programming
- 14) If possible outcomes of alternate course of action and probability of possible outcome is not known, then the problem is of decision under
- a) Certainty                      b) Risk                      c) Uncertainty                      d) None
-



<b>Seat No.</b>	
-----------------	--

**T.E. Civil (Part – I) (CGPA Pattern) Examination, 2017  
ENGINEERING MANAGEMENT – I**

Day and Date : Saturday, 9-12-2017

Max. Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Assume suitable data wherever necessary.**
  - 3) **Use graph paper if needed.**
  - 4) **Use of nonprogrammable computers is permitted.**

SECTION – I

2. Solve any three (8 marks each) :

24

a) Find IBFS of the following transportation problem using VAM availability.

1	2	1	4	30
3	3	2	1	50
4	2	5	9	20

**Supply** 20 40 30 10

b) Solve the following problem using

- 1) Laplace and
- 2) Maximax criterion

<b>Customer category</b>	<b>Supplier level</b>			
	<b>A<sub>1</sub></b>	<b>A<sub>2</sub></b>	<b>A<sub>3</sub></b>	<b>A<sub>4</sub></b>
<b>E<sub>1</sub></b>	7	12	20	27
<b>E<sub>2</sub></b>	10	9	10	25
<b>E<sub>3</sub></b>	23	20	14	23
<b>E<sub>4</sub></b>	32	24	21	17

c) Explain with example “Decision Tree Analysis”.



d) What is planning ? Write down steps in planning. State importance of planning.

e) Write notes on :

1) Simulation

2) Fuzzy logic.

3. Discuss in short (**any one**) :

4

a) Dualing in LPP

b) Genetic algorithm.

#### SECTION – II

4. Solve **any three (8 marks each)** :

24

a) What is EOQ ? What is its importance ? Derive the formula for same.

b) Explain with example on graph ABC analysis.

c) Discuss post disaster management stage.

d) Explain with example and graph P chart and C chart.

e) Write notes on :

1) TQM

2) Quality Circle.

5. Discuss importance of **any one** in short :

4

a) BEA

b) Material management



SLR-TJ – 39

Seat No.	
----------	--

Set	Q
-----	---

**T.E. Civil (Part – I) (CGPA Pattern) Examination, 2017  
ENGINEERING MANAGEMENT – I**

Day and Date : Saturday, 9-12-2017

Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions:**
- 1) **All questions are compulsory.**
  - 2) **Assume suitable data wherever necessary.**
  - 3) **Use graph paper if needed.**
  - 4) **Use of nonprogrammable computers is permitted.**
  - 5) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book Page No. 3. Each question carries one mark.**
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14
- 1) Queuing theory is used to balance
    - a) Cost of offering service
    - b) Cost due to delay in offering service
    - c) Both a) and b)
    - d) None of these
  - 2) Management by objectives includes
    - a) Line managers
    - b) Line and staff managers
    - c) Line, staff and labour
    - d) None
  - 3) The Monte-Carlo simulation used
    - a) Sampling technique
    - b) Decision technique
    - c) Mathematical technique
    - d) Both a) and b)
  - 4) The Vogel's approximation method is also called as
    - a) Row minima method
    - b) Penalty method
    - c) Least cost method
    - d) None

P.T.O.



- 5) The biological process, of mutation has inspired
- a) Artificial Neural Network
  - b) Genetic Algorithm
  - c) Fuzzy logic
  - d) Dynamics programming
- 6) The solution of decision tree is obtained by
- a) Folding back method
  - b) Games theory
  - c) Laplace criteria
  - d) Dynamic programming
- 7) If possible outcomes of alternate course of action and probability of possible outcome is not known, then the problem is of decision under
- a) Certainty
  - b) Risk
  - c) Uncertainty
  - d) None
- 8) The cost of keeping items in inventory is called \_\_\_\_\_
- a) Setup cost
  - b) Holding cost
  - c) Finished goods
  - d) None of these
- 9) If primal is maximize  $35X_1 + 40X_2$ , subjected to  $2X_1 + 3X_2 \leq 60$  and  $4X_1 + 3X_2 \leq 96$ ,  $X_1, X_2 \geq 0$  the dual will have objective function as \_\_\_\_\_
- a)  $3y_1 + 3y_2$  (minimize)
  - b)  $60y_1 + 96y_2$  (minimize)
  - c)  $3y_1 - 3y_2$  (maximize)
  - d)  $60y_1 + 96y_2$  (minimize)
- 10) Hungarian Trial and error method is suitable for solving
- a) Transportation problem
  - b) Games theory
  - c) Assignment problem
  - d) Simplex method
- 11) EOQ decreases when the cost of item
- a) Increases
  - b) Zero
  - c) Decreases
  - d) None of these
- 12) If primal is minimize  $30x_1 + 40x_2$  subjected to  $6x_1 + 12x_2 \leq 120$  and  $8x_1 + 5x_2 \leq 60$ ,  $x_1, x_2 \geq 0$  the dual will have objective function as
- a)  $6y_1 + 8y_2$  (minimize)
  - b)  $6y_1 - 8y_2$  (Maximize)
  - c)  $120y_1 + 60y_2$  (Maximize)
  - d)  $120y_1 - 60y_2$  (Maximize)
- 13) Transportation problem can be solved if
- a) no. of rows = no. of columns
  - b) no. of rows  $\geq$  no. of column
  - c) no. of rows  $\leq$  no. of column
  - d) All of these
- 14) In decision tree problem the event mode is shown by
- a) Square
  - b) Circle
  - c) Triangle
  - d) Rectangle



<b>Seat No.</b>	
-----------------	--

**T.E. Civil (Part – I) (CGPA Pattern) Examination, 2017  
ENGINEERING MANAGEMENT – I**

Day and Date : Saturday, 9-12-2017

Max. Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Assume suitable data wherever necessary.**
  - 3) **Use graph paper if needed.**
  - 4) **Use of nonprogrammable computers is permitted.**

SECTION – I

2. Solve any three (8 marks each) : 24

a) Find IBFS of the following transportation problem using VAM availability.

1	2	1	4	30
3	3	2	1	50
4	2	5	9	20

**Supply** 20 40 30 10

b) Solve the following problem using

- 1) Laplace and
- 2) Maximax criterion

Customer category	Supplier level			
	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>
E <sub>1</sub>	7	12	20	27
E <sub>2</sub>	10	9	10	25
E <sub>3</sub>	23	20	14	23
E <sub>4</sub>	32	24	21	17

c) Explain with example “Decision Tree Analysis”.



d) What is planning ? Write down steps in planning. State importance of planning.

e) Write notes on :

1) Simulation

2) Fuzzy logic.

3. Discuss in short (**any one**) :

4

a) Dualing in LPP

b) Genetic algorithm.

#### SECTION – II

4. Solve **any three (8 marks each)** :

24

a) What is EOQ ? What is its importance ? Derive the formula for same.

b) Explain with example on graph ABC analysis.

c) Discuss post disaster management stage.

d) Explain with example and graph P chart and C chart.

e) Write notes on :

1) TQM

2) Quality Circle.

5. Discuss importance of **any one** in short :

4

a) BEA

b) Material management





SLR-TJ – 39

Seat No.	
----------	--

Set	R
-----	---

**T.E. Civil (Part – I) (CGPA Pattern) Examination, 2017  
ENGINEERING MANAGEMENT – I**

Day and Date : Saturday, 9-12-2017

Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions:**
- 1) **All questions are compulsory.**
  - 2) **Assume suitable data wherever necessary.**
  - 3) **Use graph paper if needed.**
  - 4) **Use of nonprogrammable computers is permitted.**
  - 5) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book Page No. 3. Each question carries one mark.**
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14
- 1) If primal is minimize  $30x_1 + 40x_2$  subjected to  $6x_1 + 12x_2 \leq 120$  and  $8x_1 + 5x_2 \leq 60$ ,  $x_1, x_2 \geq 0$  the dual will have objective function as
    - a)  $6y_1 + 8y_2$  (minimize)
    - b)  $6y_1 - 8y_2$  (Maximize)
    - c)  $120y_1 + 60y_2$  (Maximize)
    - d)  $120y_1 - 60y_2$  (Maximize)
  - 2) Transportation problem can be solved if
    - a) no. of rows = no. of columns
    - b) no. of rows  $\geq$  no. of column
    - c) no. of rows  $\leq$  no. of column
    - d) All of these
  - 3) In decision tree problem the event mode is shown by
    - a) Square
    - b) Circle
    - c) Triangle
    - d) Rectangle
  - 4) Queuing theory is used to balance
    - a) Cost of offering service
    - b) Cost due to delay in offering service
    - c) Both a) and b)
    - d) None of these

P.T.O.



- 5) Management by objectives includes
- a) Line managers
  - b) Line and staff managers
  - c) Line, staff and labour
  - d) None
- 6) The Monte-Carlo simulation used
- a) Sampling technique
  - b) Decision technique
  - c) Mathematical technique
  - d) Both a) and b)
- 7) The Vogel's approximation method is also called as
- a) Row minima method
  - b) Penalty method
  - c) Least cost method
  - d) None
- 8) The biological process, of mutation has inspired
- a) Artificial Neural Network
  - b) Genetic Algorithm
  - c) Fuzzy logic
  - d) Dynamics programming
- 9) The solution of decision tree is obtained by
- a) Folding back method
  - b) Games theory
  - c) Laplace criteria
  - d) Dynamic programming
- 10) If possible outcomes of alternate course of action and probability of possible outcome is not known, then the problem is of decision under
- a) Certainty
  - b) Risk
  - c) Uncertainty
  - d) None
- 11) The cost of keeping items in inventory is called \_\_\_\_\_
- a) Setup cost
  - b) Holding cost
  - c) Finished goods
  - d) None of these
- 12) If primal is maximize  $35X_1 + 40X_2$ , subjected to  $2X_1 + 3X_2 \leq 60$  and  $4X_1 + 3X_2 \leq 96$ ,  $X_1, X_2 \geq 0$  the dual will have objective function as \_\_\_\_\_
- a)  $3y_1 + 3y_2$  (minimize)
  - b)  $60y_1 + 96y_2$  (minimize)
  - c)  $3y_1 - 3y_2$  (maximize)
  - d)  $60y_1 + 96y_2$  (minimize)
- 13) Hungarian Trial and error method is suitable for solving
- a) Transportation problem
  - b) Games theory
  - c) Assignment problem
  - d) Simplex method
- 14) EOQ decreases when the cost of item
- a) Increases
  - b) Zero
  - c) Decreases
  - d) None of these
-



<b>Seat No.</b>	
-----------------	--

**T.E. Civil (Part – I) (CGPA Pattern) Examination, 2017  
ENGINEERING MANAGEMENT – I**

Day and Date : Saturday, 9-12-2017

Max. Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :** 1) **All questions are compulsory.**  
 2) **Assume suitable data wherever necessary.**  
 3) **Use graph paper if needed.**  
 4) **Use of nonprogrammable computers is permitted.**

SECTION – I

2. Solve any three (8 marks each) : 24

a) Find IBFS of the following transportation problem using VAM availability.

1	2	1	4	30
3	3	2	1	50
4	2	5	9	20

**Supply** 20 40 30 10

b) Solve the following problem using

- 1) Laplace and
- 2) Maximax criterion

Customer category	Supplier level			
	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>
E <sub>1</sub>	7	12	20	27
E <sub>2</sub>	10	9	10	25
E <sub>3</sub>	23	20	14	23
E <sub>4</sub>	32	24	21	17

c) Explain with example “Decision Tree Analysis”.



d) What is planning ? Write down steps in planning. State importance of planning.

e) Write notes on :

1) Simulation

2) Fuzzy logic.

3. Discuss in short (**any one**) :

4

a) Dualing in LPP

b) Genetic algorithm.

### SECTION – II

4. Solve **any three (8 marks each)** :

24

a) What is EOQ ? What is its importance ? Derive the formula for same.

b) Explain with example on graph ABC analysis.

c) Discuss post disaster management stage.

d) Explain with example and graph P chart and C chart.

e) Write notes on :

1) TQM

2) Quality Circle.

5. Discuss importance of **any one** in short :

4

a) BEA

b) Material management



SLR-TJ – 39

Seat No.	
----------	--

Set	<b>S</b>
-----	----------

**T.E. Civil (Part – I) (CGPA Pattern) Examination, 2017  
ENGINEERING MANAGEMENT – I**

Day and Date : Saturday, 9-12-2017

Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

- Instructions:**
- 1) **All questions are compulsory.**
  - 2) **Assume suitable data wherever necessary.**
  - 3) **Use graph paper if needed.**
  - 4) **Use of nonprogrammable computers is permitted.**
  - 5) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book Page No. 3. Each question carries one mark.**
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **14**
- 1) The Monte-Carlo simulation used
    - a) Sampling technique
    - b) Decision technique
    - c) Mathematical technique
    - d) Both a) and b)
  - 2) The Vogel's approximation method is also called as
    - a) Row minima method
    - b) Penalty method
    - c) Least cost method
    - d) None
  - 3) The biological process, of mutation has inspired
    - a) Artificial Neural Network
    - b) Genetic Algorithm
    - c) Fuzzy logic
    - d) Dynamics programming
  - 4) The solution of decision tree is obtained by
    - a) Folding back method
    - b) Games theory
    - c) Laplace criteria
    - d) Dynamic programming

P.T.O.



- 5) If possible outcomes of alternate course of action and probability of possible outcome is not known, then the problem is of decision under
    - a) Certainty
    - b) Risk
    - c) Uncertainty
    - d) None
  - 6) The cost of keeping items in inventory is called \_\_\_\_\_
    - a) Setup cost
    - b) Holding cost
    - c) Finished goods
    - d) None of these
  - 7) If primal is maximize  $35X_1 + 40X_2$ , subjected to  $2X_1 + 3X_2 \leq 60$  and  $4X_1 + 3X_2 \leq 96, X_1, X_2 \geq 0$  the dual will have objective function as \_\_\_\_\_
    - a)  $3y_1 + 3y_2$  (minimize)
    - b)  $60y_1 + 96y_2$  (minimize)
    - c)  $3y_1 - 3y_2$  (maximize)
    - d)  $60y_1 + 96y_2$  (minimize)
  - 8) Hungarian Trial and error method is suitable for solving
    - a) Transportation problem
    - b) Games theory
    - c) Assignment problem
    - d) Simplex method
  - 9) EOQ decreases when the cost of item
    - a) Increases
    - b) Zero
    - c) Decreases
    - d) None of these
  - 10) If primal is minimize  $30x_1 + 40x_2$  subjected to  $6x_1 + 12x_2 \leq 120$  and  $8x_1 + 5x_2 \leq 60, x_1, x_2 \geq 0$  the dual will have objective function as
    - a)  $6y_1 + 8y_2$  (minimize)
    - b)  $6y_1 - 8y_2$  (Maximize)
    - c)  $120y_1 + 60y_2$  (Maximize)
    - d)  $120y_1 - 60y_2$  (Maximize)
  - 11) Transportation problem can be solved if
    - a) no. of rows = no. of columns
    - b) no. of rows  $\geq$  no. of column
    - c) no. of rows  $\leq$  no. of column
    - d) All of these
  - 12) In decision tree problem the event mode is shown by
    - a) Square
    - b) Circle
    - c) Triangle
    - d) Rectangle
  - 13) Queuing theory is used to balance
    - a) Cost of offering service
    - b) Cost due to delay in offering service
    - c) Both a) and b)
    - d) None of these
  - 14) Management by objectives includes
    - a) Line managers
    - b) Line and staff managers
    - c) Line, staff and labour
    - d) None
-



<b>Seat No.</b>	
-----------------	--

**T.E. Civil (Part – I) (CGPA Pattern) Examination, 2017  
ENGINEERING MANAGEMENT – I**

Day and Date : Saturday, 9-12-2017

Max. Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) **Assume suitable data wherever necessary.**
  - 3) **Use graph paper if needed.**
  - 4) **Use of nonprogrammable computers is permitted.**

SECTION – I

2. Solve any three (8 marks each) : 24

a) Find IBFS of the following transportation problem using VAM availability.

1	2	1	4	30
3	3	2	1	50
4	2	5	9	20

**Supply** 20 40 30 10

b) Solve the following problem using

- 1) Laplace and
- 2) Maximax criterion

Customer category	Supplier level			
	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>
E <sub>1</sub>	7	12	20	27
E <sub>2</sub>	10	9	10	25
E <sub>3</sub>	23	20	14	23
E <sub>4</sub>	32	24	21	17

c) Explain with example “Decision Tree Analysis”.



d) What is planning ? Write down steps in planning. State importance of planning.

e) Write notes on :

1) Simulation

2) Fuzzy logic.

3. Discuss in short (**any one**) :

4

a) Dualing in LPP

b) Genetic algorithm.

#### SECTION – II

4. Solve **any three (8 marks each)** :

24

a) What is EOQ ? What is its importance ? Derive the formula for same.

b) Explain with example on graph ABC analysis.

c) Discuss post disaster management stage.

d) Explain with example and graph P chart and C chart.

e) Write notes on :

1) TQM

2) Quality Circle.

5. Discuss importance of **any one** in short :

4

a) BEA

b) Material management





SLR-TJ – 40

Seat No.	
----------	--

Set	P
-----	---

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – I**

Day and Date : Monday, 11-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to the **right** indicate **full** marks.  
4) Assume suitable data **wherever** needed and mention it **clearly**.


**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(14×1=14)

- 1) Nagpur plan is \_\_\_\_\_ road development.  
a) First                      b) Second                      c) Third                      d) None
- 2) In hilly area, ruling gradient will be \_\_\_\_\_ than in plain terrain.  
a) Flatter                      b) Steeper                      c) Cannot say                      d) None
- 3) Cross slope provided to carriage way is called as  
a) Gradient                      b) Kerb                      c) Camber                      d) None
- 4) Which of the following is said to be foundation of the road ?  
a) Sub grade                      b) Sub base  
c) Both a) and b)                      d) Base course
- 5)  This road sign is  
a) Mandatory                      b) Information  
c) Both a) and b)                      d) None
- 6) For determining thickness of road which of the following test is carried out ?  
a) Impact                      b) Abrasion  
c) Softening point                      d) CBR

P.T.O.



- 7) Bitumen grade 80 – 100 indicates that its penetration is in between 8 to 10  
a) micron                      b) mm                      c) cm                      d) none
- 8) The main object of prime coat is  
a) To plug the capillary voids of the porous surface  
b) To bond the loose material particles on the existing surface  
c) Both a) and b)  
d) To increase the strength of the pavement
- 9) When loose soil extends to greater depth, the suitable type of the foundation for bridge is  
a) Raft foundation                      b) Pile foundation  
c) Open foundation                      d) None of the above
- 10) Spread foundation as per IRC-class AA loading, the maximum loading for tracked vehicle is considered as  
a) 100 tonne                      b) 70 tonne  
c) 120 tonne                      d) 140 tonne
- 11) In case of pilot tunnel method, pilot tunnel is constructed \_\_\_\_\_ to main tunnel.  
a) Inclined                      b) Parallel                      c) Vertical                      d) All the above
- 12) The vertical cutting of river bed is known as  
a) Afflux                      b) Waterway  
c) Scour                      d) None of the above
- 13) What is the correct sequence of the following events of construction of a shaft in a rock ?  
1. Drilling and blasting  
2. Timbering  
3. Pumping  
4. Mucking
- Select the correct answer using the codes given below :
- a) 1, 2, 3, 4  
b) 1, 4, 2, 3  
c) 2, 1, 4, 3  
d) 2, 4, 1, 3
- 14) As per recommendations the formula for determining economic span for RCC slab bridges is  
a)  $L = 1.5 H$                       b)  $L = 2 H$   
c)  $L = 0.75 H$                       d)  $L = 3 H$



Seat No.	
-------------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – I**

Day and Date : Monday, 11-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

**Instructions :** 1) Figures to the **right** indicate **full** marks.  
2) Assume suitable data **wherever** needed and mention it **clearly**.

SECTION – I

2. Solve **any four** (7 marks **each**) : **(7×4=28)**

- a) While aligning a hill road with ruling gradient of 6%, a horizontal curve of radius 60 m is encountered. Find gradient compensation and compensated gradient at the curve.
- b) The design speed of highway is 50 kmph. There is a horizontal curve of radius 80 m on a certain locality with mix traffic condition. Calculate super elevation needed to be maintained. Also calculate maximum allowable speed on this horizontal curve.
- c) What is alignment ? Discuss the factors affecting alignment.
- d) Discuss the application of Geosynthesis in road construction.
- e) What is SSD ? Explain PIEV theory in SSD.
- f) Explain “Intelligent transportation system”.
- g) Why highway development is needed ? Write first and second development plan in short.

SECTION – II

3. Answer **any four** questions (7 marks **each**) : **(7×4=28)**

- a) C.C. Pavement is constructed using the following data :
  - a) Modulus of elasticity =  $3 \times 10^5$  kg/cm<sup>2</sup>
  - b) Poissons ratio = 0.15
  - c) Thickness of CC pavement = 18 cm

**Set P**



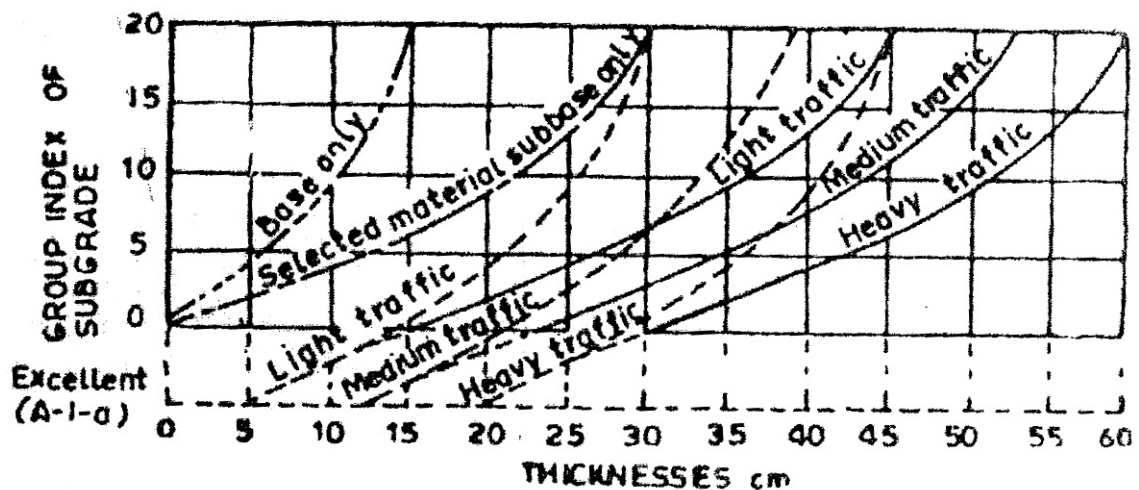
- d) Modulus of subgrade reaction =  $6.0 \text{ kg/cm}^3$
- e) Wheel load = 5100 kg
- f) Radius of loaded area = 15 cm

Calculate stresses at interior, Edge and corner by Westergaard's method. Determine the probable location where the crack is likely to be develop due to corner loading.

- b) The properties of subgrade soil are given below :
  - a) Soil portion passing through 0.074 sieve = 50%
  - b) Liquid limit = 40%
  - c) Plastic limit = 20%

Find G.I. number and design the pavement thickness (sub-base, base and surface course) for the anticipated traffic volume of over 300 commercial vehicles per day.

Use Figure – 1 (GI thickness chart)



– Combined thickness of surface, base and sub-base

--- Thickness of surface and base.

**Figure – 1 – Design chart by Group Index Value.**

- c) Enumerate the construction steps of Wet Mix Macadam (WMM) base course.
- d) Write a note on surface and subsurface drainage system.
- e) Explain well foundation in detail with neat sketch.
- f) Describe heading and bench method of tunneling in hard rock.
- g) With neat sketches explain different shapes of tunnel and discuss its advantages and disadvantages.



SLR-TJ – 40

Seat No.	
-------------	--

Set	<b>Q</b>
-----	----------

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – I**

Day and Date : Monday, 11-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*  
2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*  
3) *Figures to the right indicate full marks.*  
4) *Assume suitable data wherever needed and mention it clearly.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(14×1=14)**


- 1) The main object of prime coat is
  - a) To plug the capillary voids of the porous surface
  - b) To bond the loose material particles on the existing surface
  - c) Both a) and b)
  - d) To increase the strength of the pavement
- 2) When loose soil extends to greater depth, the suitable type of the foundation for bridge is
  - a) Raft foundation
  - b) Pile foundation
  - c) Open foundation
  - d) None of the above
- 3) Spread foundation as per IRC-class AA loading, the maximum loading for tracked vehicle is considered as
  - a) 100 tonne
  - b) 70 tonne
  - c) 120 tonne
  - d) 140 tonne
- 4) In case of pilot tunnel method, pilot tunnel is constructed \_\_\_\_\_ to main tunnel.
  - a) Inclined
  - b) Parallel
  - c) Vertical
  - d) All the above
- 5) The vertical cutting of river bed is known as
  - a) Afflux
  - b) Waterway
  - c) Scour
  - d) None of the above

P.T.O.



- 6) What is the correct sequence of the following events of construction of a shaft in a rock ?
1. Drilling and blasting
  2. Timbering
  3. Pumping
  4. Mucking

Select the correct answer using the codes given below :

- a) 1, 2, 3, 4
  - b) 1, 4, 2, 3
  - c) 2, 1, 4, 3
  - d) 2, 4, 1, 3
- 7) As per recommendations the formula for determining economic span for RCC slab bridges is
- a)  $L = 1.5 H$
  - b)  $L = 2 H$
  - c)  $L = 0.75 H$
  - d)  $L = 3 H$
- 8) Nagpur plan is \_\_\_\_\_ road development.
- a) First
  - b) Second
  - c) Third
  - d) None
- 9) In hilly area, ruling gradient will be \_\_\_\_\_ than in plain terrain.
- a) Flatter
  - b) Steeper
  - c) Cannot say
  - d) None
- 10) Cross slope provided to carriage way is called as
- a) Gradient
  - b) Kerb
  - c) Camber
  - d) None
- 11) Which of the following is said to be foundation of the road ?
- a) Sub grade
  - b) Sub base
  - c) Both a) and b)
  - d) Base course
- 12)  This road sign is
- a) Mandatory
  - b) Information
  - c) Both a) and b)
  - d) None
- 13) For determining thickness of road which of the following test is carried out ?
- a) Impact
  - b) Abrasion
  - c) Softening point
  - d) CBR
- 14) Bitumen grade 80 – 100 indicates that its penetration is in between 8 to 10
- a) micron
  - b) mm
  - c) cm
  - d) none



Seat No.	
-------------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – I**

Day and Date : Monday, 11-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

**Instructions :** 1) Figures to the **right** indicate **full** marks.  
2) Assume suitable data **wherever** needed and mention it **clearly**.

SECTION – I

2. Solve **any four** (7 marks **each**) : **(7×4=28)**

- a) While aligning a hill road with ruling gradient of 6%, a horizontal curve of radius 60 m is encountered. Find gradient compensation and compensated gradient at the curve.
- b) The design speed of highway is 50 kmph. There is a horizontal curve of radius 80 m on a certain locality with mix traffic condition. Calculate super elevation needed to be maintained. Also calculate maximum allowable speed on this horizontal curve.
- c) What is alignment ? Discuss the factors affecting alignment.
- d) Discuss the application of Geosynthesis in road construction.
- e) What is SSD ? Explain PIEV theory in SSD.
- f) Explain “Intelligent transportation system”.
- g) Why highway development is needed ? Write first and second development plan in short.

SECTION – II

3. Answer **any four** questions (7 marks **each**) : **(7×4=28)**

- a) C.C. Pavement is constructed using the following data :
  - a) Modulus of elasticity =  $3 \times 10^5$  kg/cm<sup>2</sup>
  - b) Poissons ratio = 0.15
  - c) Thickness of CC pavement = 18 cm

**Set Q**



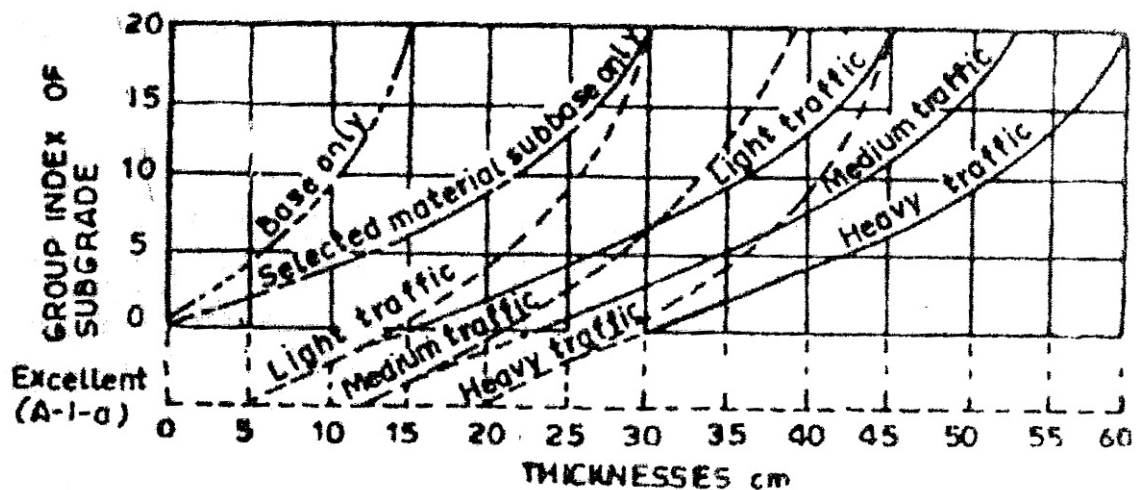
- d) Modulus of subgrade reaction =  $6.0 \text{ kg/cm}^3$
- e) Wheel load = 5100 kg
- f) Radius of loaded area = 15 cm

Calculate stresses at interior, Edge and corner by Westergaard's method. Determine the probable location where the crack is likely to be develop due to corner loading.

- b) The properties of subgrade soil are given below :
  - a) Soil portion passing through 0.074 sieve = 50%
  - b) Liquid limit = 40%
  - c) Plastic limit = 20%

Find G.I. number and design the pavement thickness (sub-base, base and surface course) for the anticipated traffic volume of over 300 commercial vehicles per day.

Use Figure – 1 (GI thickness chart)



– Combined thickness of surface, base and sub-base

--- Thickness of surface and base.

**Figure – 1 – Design chart by Group Index Value.**

- c) Enumerate the construction steps of Wet Mix Macadam (WMM) base course.
- d) Write a note on surface and subsurface drainage system.
- e) Explain well foundation in detail with neat sketch.
- f) Describe heading and bench method of tunneling in hard rock.
- g) With neat sketches explain different shapes of tunnel and discuss its advantages and disadvantages.





SLR-TJ – 40

Seat No.	
----------	--

Set	R
-----	---

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – I**

Day and Date : Monday, 11-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.*  
2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*  
3) *Figures to the right indicate full marks.*  
4) *Assume suitable data wherever needed and mention it clearly.*


**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(14×1=14)

1)  This road sign is

- a) Mandatory  
b) Information  
c) Both a) and b)  
d) None
- 2) For determining thickness of road which of the following test is carried out ?  
a) Impact  
b) Abrasion  
c) Softening point  
d) CBR
- 3) Bitumen grade 80 – 100 indicates that its penetration is in between 8 to 10  
a) micron  
b) mm  
c) cm  
d) none
- 4) The main object of prime coat is  
a) To plug the capillary voids of the porous surface  
b) To bond the loose material particles on the existing surface  
c) Both a) and b)  
d) To increase the strength of the pavement
- 5) When loose soil extends to greater depth, the suitable type of the foundation for bridge is  
a) Raft foundation  
b) Pile foundation  
c) Open foundation  
d) None of the above

P.T.O.



- 6) Spread foundation as per IRC-class AA loading, the maximum loading for tracked vehicle is considered as
- a) 100 tonne
  - b) 70 tonne
  - c) 120 tonne
  - d) 140 tonne
- 7) In case of pilot tunnel method, pilot tunnel is constructed \_\_\_\_\_ to main tunnel.
- a) Inclined
  - b) Parallel
  - c) Vertical
  - d) All the above
- 8) The vertical cutting of river bed is known as
- a) Afflux
  - b) Waterway
  - c) Scour
  - d) None of the above
- 9) What is the correct sequence of the following events of construction of a shaft in a rock ?
- 1. Drilling and blasting
  - 2. Timbering
  - 3. Pumping
  - 4. Mucking

Select the correct answer using the codes given below :

- a) 1, 2, 3, 4
  - b) 1, 4, 2, 3
  - c) 2, 1, 4, 3
  - d) 2, 4, 1, 3
- 10) As per recommendations the formula for determining economic span for RCC slab bridges is
- a)  $L = 1.5 H$
  - b)  $L = 2 H$
  - c)  $L = 0.75 H$
  - d)  $L = 3 H$
- 11) Nagpur plan is \_\_\_\_\_ road development.
- a) First
  - b) Second
  - c) Third
  - d) None
- 12) In hilly area, ruling gradient will be \_\_\_\_\_ than in plain terrain.
- a) Flatter
  - b) Steeper
  - c) Cannot say
  - d) None
- 13) Cross slope provided to carriage way is called as
- a) Gradient
  - b) Kerb
  - c) Camber
  - d) None
- 14) Which of the following is said to be foundation of the road ?
- a) Sub grade
  - b) Sub base
  - c) Both a) and b)
  - d) Base course



Seat No.	
-------------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – I**

Day and Date : Monday, 11-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

**Instructions :** 1) Figures to the **right** indicate **full** marks.  
2) Assume suitable data **wherever** needed and mention it **clearly**.

SECTION – I

2. Solve **any four** (7 marks **each**) : **(7×4=28)**

- a) While aligning a hill road with ruling gradient of 6%, a horizontal curve of radius 60 m is encountered. Find gradient compensation and compensated gradient at the curve.
- b) The design speed of highway is 50 kmph. There is a horizontal curve of radius 80 m on a certain locality with mix traffic condition. Calculate super elevation needed to be maintained. Also calculate maximum allowable speed on this horizontal curve.
- c) What is alignment ? Discuss the factors affecting alignment.
- d) Discuss the application of Geosynthesis in road construction.
- e) What is SSD ? Explain PIEV theory in SSD.
- f) Explain “Intelligent transportation system”.
- g) Why highway development is needed ? Write first and second development plan in short.

SECTION – II

3. Answer **any four** questions (7 marks **each**) : **(7×4=28)**

- a) C.C. Pavement is constructed using the following data :
  - a) Modulus of elasticity =  $3 \times 10^5$  kg/cm<sup>2</sup>
  - b) Poissons ratio = 0.15
  - c) Thickness of CC pavement = 18 cm

**Set R**



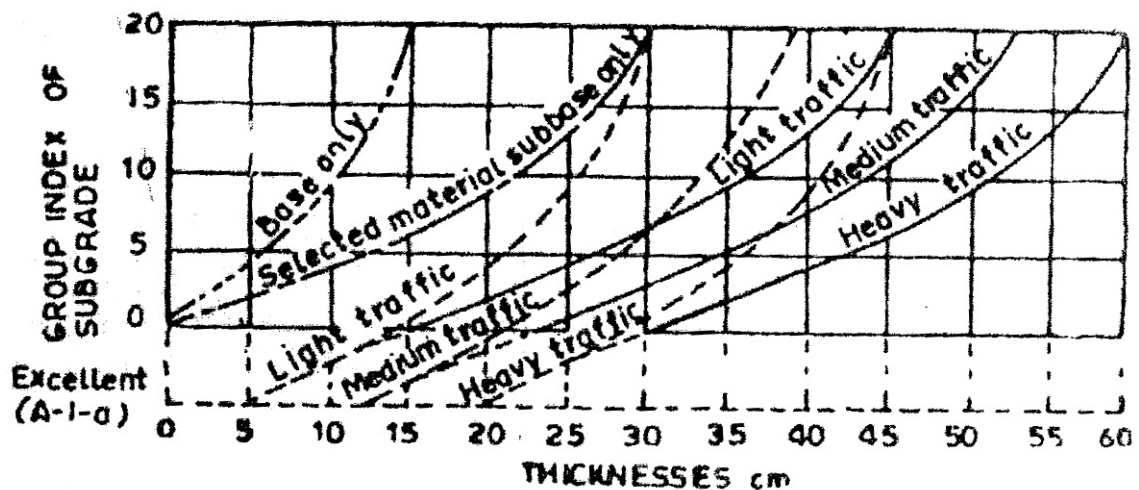
- d) Modulus of subgrade reaction =  $6.0 \text{ kg/cm}^3$
- e) Wheel load = 5100 kg
- f) Radius of loaded area = 15 cm

Calculate stresses at interior, Edge and corner by Westergaard's method. Determine the probable location where the crack is likely to be develop due to corner loading.

- b) The properties of subgrade soil are given below :
  - a) Soil portion passing through 0.074 sieve = 50%
  - b) Liquid limit = 40%
  - c) Plastic limit = 20%

Find G.I. number and design the pavement thickness (sub-base, base and surface course) for the anticipated traffic volume of over 300 commercial vehicles per day.

Use Figure – 1 (GI thickness chart)



– Combined thickness of surface, base and sub-base

--- Thickness of surface and base.

**Figure – 1 – Design chart by Group Index Value.**

- c) Enumerate the construction steps of Wet Mix Macadam (WMM) base course.
- d) Write a note on surface and subsurface drainage system.
- e) Explain well foundation in detail with neat sketch.
- f) Describe heading and bench method of tunneling in hard rock.
- g) With neat sketches explain different shapes of tunnel and discuss its advantages and disadvantages.



SLR-TJ – 40

Seat No.	
-------------	--

Set	<b>S</b>
-----	----------

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – I**

Day and Date : Monday, 11-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to the **right** indicate **full** marks.  
4) Assume suitable data **wherever** needed and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(14×1=14)**


- 1) Spread foundation as per IRC-class AA loading, the maximum loading for tracked vehicle is considered as
  - a) 100 tonne
  - b) 70 tonne
  - c) 120 tonne
  - d) 140 tonne
- 2) In case of pilot tunnel method, pilot tunnel is constructed \_\_\_\_\_ to main tunnel.
  - a) Inclined
  - b) Parallel
  - c) Vertical
  - d) All the above
- 3) The vertical cutting of river bed is known as
  - a) Afflux
  - b) Waterway
  - c) Scour
  - d) None of the above
- 4) What is the correct sequence of the following events of construction of a shaft in a rock ?
  1. Drilling and blasting
  2. Timbering
  3. Pumping
  4. Mucking

Select the correct answer using the codes given below :

- a) 1, 2, 3, 4
- b) 1, 4, 2, 3
- c) 2, 1, 4, 3
- d) 2, 4, 1, 3

P.T.O.



- 5) As per recommendations the formula for determining economic span for RCC slab bridges is
    - a)  $L = 1.5 H$
    - b)  $L = 2 H$
    - c)  $L = 0.75 H$
    - d)  $L = 3 H$
  
  - 6) Nagpur plan is \_\_\_\_\_ road development.
    - a) First
    - b) Second
    - c) Third
    - d) None
  
  - 7) In hilly area, ruling gradient will be \_\_\_\_\_ than in plain terrain.
    - a) Flatter
    - b) Steeper
    - c) Cannot say
    - d) None
  
  - 8) Cross slope provided to carriage way is called as
    - a) Gradient
    - b) Kerb
    - c) Camber
    - d) None
  
  - 9) Which of the following is said to be foundation of the road ?
    - a) Sub grade
    - b) Sub base
    - c) Both a) and b)
    - d) Base course
  
  - 10)  This road sign is
    - a) Mandatory
    - b) Information
    - c) Both a) and b)
    - d) None
  
  - 11) For determining thickness of road which of the following test is carried out ?
    - a) Impact
    - b) Abrasion
    - c) Softening point
    - d) CBR
  
  - 12) Bitumen grade 80 – 100 indicates that its penetration is in between 8 to 10
    - a) micron
    - b) mm
    - c) cm
    - d) none
  
  - 13) The main object of prime coat is
    - a) To plug the capillary voids of the porous surface
    - b) To bond the loose material particles on the existing surface
    - c) Both a) and b)
    - d) To increase the strength of the pavement
  
  - 14) When loose soil extends to greater depth, the suitable type of the foundation for bridge is
    - a) Raft foundation
    - b) Pile foundation
    - c) Open foundation
    - d) None of the above
-



Seat No.	
-------------	--

**T.E. (Civil) (Part – I) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – I**

Day and Date : Monday, 11-12-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

**Instructions :** 1) Figures to the **right** indicate **full** marks.  
2) Assume suitable data **wherever** needed and mention it **clearly**.

SECTION – I

2. Solve **any four (7 marks each)** : **(7×4=28)**

- While aligning a hill road with ruling gradient of 6%, a horizontal curve of radius 60 m is encountered. Find gradient compensation and compensated gradient at the curve.
- The design speed of highway is 50 kmph. There is a horizontal curve of radius 80 m on a certain locality with mix traffic condition. Calculate super elevation needed to be maintained. Also calculate maximum allowable speed on this horizontal curve.
- What is alignment ? Discuss the factors affecting alignment.
- Discuss the application of Geosynthesis in road construction.
- What is SSD ? Explain PIEV theory in SSD.
- Explain “Intelligent transportation system”.
- Why highway development is needed ? Write first and second development plan in short.

SECTION – II

3. Answer **any four** questions (7 marks each) : **(7×4=28)**

- C.C. Pavement is constructed using the following data :
  - Modulus of elasticity =  $3 \times 10^5$  kg/cm<sup>2</sup>
  - Poissons ratio = 0.15
  - Thickness of CC pavement = 18 cm

Set S



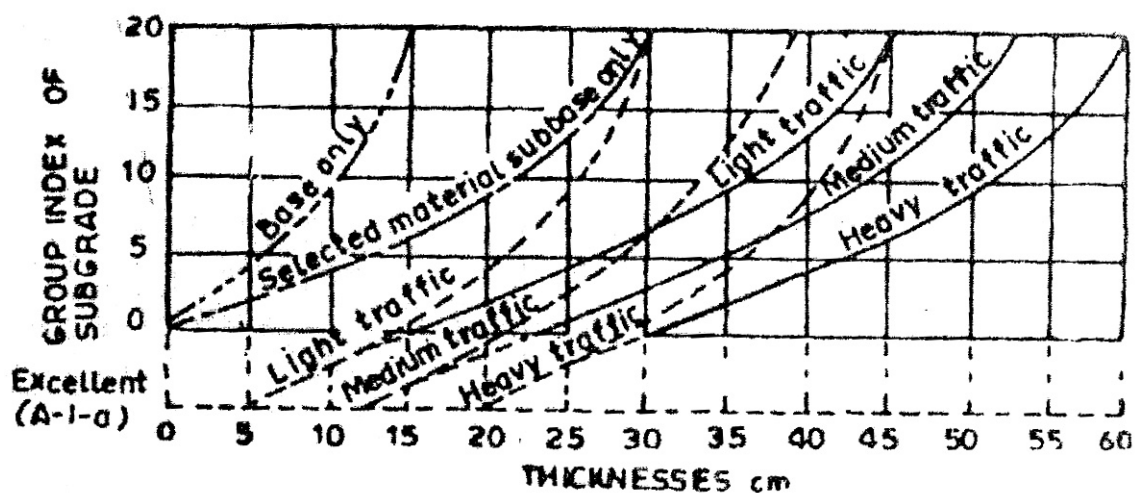
- d) Modulus of subgrade reaction =  $6.0 \text{ kg/cm}^3$
- e) Wheel load = 5100 kg
- f) Radius of loaded area = 15 cm

Calculate stresses at interior, Edge and corner by Westergaard's method. Determine the probable location where the crack is likely to be develop due to corner loading.

- b) The properties of subgrade soil are given below :
  - a) Soil portion passing through 0.074 sieve = 50%
  - b) Liquid limit = 40%
  - c) Plastic limit = 20%

Find G.I. number and design the pavement thickness (sub-base, base and surface course) for the anticipated traffic volume of over 300 commercial vehicles per day.

Use Figure – 1 (GI thickness chart)



– Combined thickness of surface, base and sub-base

--- Thickness of surface and base.

**Figure – 1 – Design chart by Group Index Value.**

- c) Enumerate the construction steps of Wet Mix Macadam (WMM) base course.
- d) Write a note on surface and subsurface drainage system.
- e) Explain well foundation in detail with neat sketch.
- f) Describe heading and bench method of tunneling in hard rock.
- g) With neat sketches explain different shapes of tunnel and discuss its advantages and disadvantages.





Seat No.	
----------	--

Set	P
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017**  
**STRUCTURAL MECHANICS – III**

Day and Date : Tuesday, 21-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full marks**.
  - 4) Assume additional data if required and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

1) Flexibility coefficient of beam shown in Fig. 1 is

1

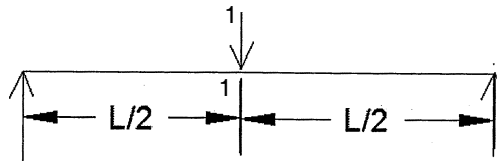


Fig. 1

- a)  $\frac{L^3}{2EI}$       b)  $\frac{L^3}{48EI}$       c)  $\frac{L^3}{4EI}$       d)  $\frac{L^3}{3EI}$

2) The fixed end moments of for beam shown in Fig. 2 is

1

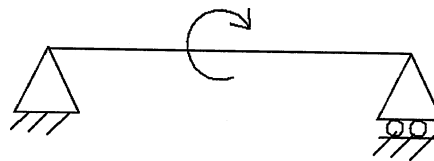


Fig. 2

- a) M      b) M/8      c) M/2      d) M/4
- 3) According to Castigliano's second theorem work done due to the redundant is always
- a) Maximum      b) Zero      c) Minimum      d) Infinity
- 4) Shear caused by sinking of one support by  $\delta$  of simply supported beam is
- a)  $\frac{3E\delta}{L}$       b) 0      c)  $\frac{6E\delta}{L^2}$       d)  $\frac{12E\delta}{L^3}$
- 5) Fixed end moment of beam subjected to UDL 'w' throughout span 'L' is
- a) w/2      b)  $wL^2/2$       c)  $wL^2/12$       d) wL

P.T.O.



6) Degree of static indeterminacy of beam (neglecting axial forces) shown in Fig. 6.

1

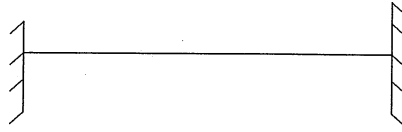


Fig. 6

- a) 1    b) 3    c) 2    d) 4
- 7) Castigliano's second theorem is used to calculate 1
  - a) Deflection    b) Unknown rotation    c) Redundant force    d) None
- 8) Number of unknowns to be determined in the stiffness method is equal to 1
  - a) Static indeterminacy
  - b) Kinematic indeterminacy
  - c) Sum of static indeterminacy and Kinematic indeterminacy
  - d) None of the above
- 9) Moment distribution method is best suited for 1
  - a) Pin-jointed frame    b) Rigid-jointed frame    c) Space frame    d) Plane frame
- 10) Shape of ILD for indeterminate structure is 1
  - a) Linear    b) Nonlinear    c) Triangular    d) All of the above
- 11) Size of stiffness matrix for fixed beam is 1
  - a)  $2 \times 2$     b)  $3 \times 3$     c)  $4 \times 4$     d) None of these
- 12) Mullar Breslau principle for influence line is applicable for 1
  - a) Simple beam    b) Continuous beam    c) Redundant truss    d) All of these
- 13) Distribution factor for member OA, OB, OC and OD are as shown in frame 13. 2

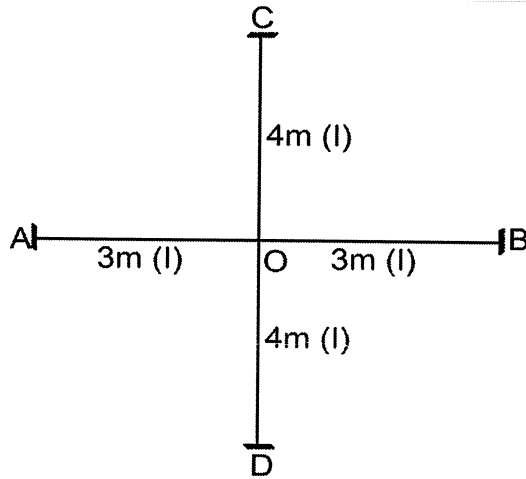


Fig. No. 13

- a) 0.25, 0.5, 0.25, 0    b) 0.20, 0.25, 0.25, 0.3
- c) 0.25, 0.25, 0.25, 0.25    d) 0.25, 0.5, 0.15, 0.1



Seat No.	
----------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
STRUCTURAL MECHANICS – III**

Day and Date : Tuesday, 21-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) In Section I, Q. No. 2 is **compulsory**. Solve **any two** questions from remaining.  
2) In Section II, solve **any three** questions.  
3) Figures to the **right** indicate **full** marks.  
4) Assume additional data if required and mention it **clearly**.

SECTION – I

2. Solve **any four** : (2.5×4=10)
- a) Enlist various methods of force method of analysis.
  - b) Explain Castigliano's theorem with its applications.
  - c) Differentiate between force method and displacement method.
  - d) Explain unit load method.
  - e) Determine Static and Kinematic indeterminacy of structures refer figure 2.1 (a) (b).

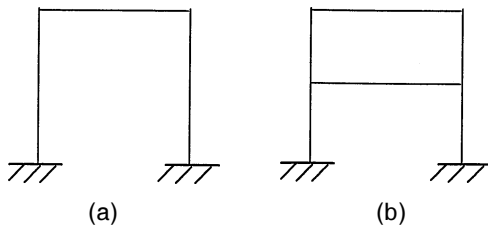


Fig. (2.1)

3. Analyze the beam shown in Fig. 3.1 using Consistent Deformation method. 9

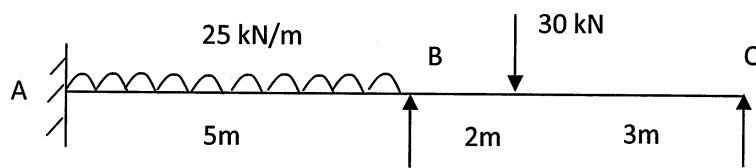


Fig. (3.1)

4. Draw BMD using Strain Energy Method. 9

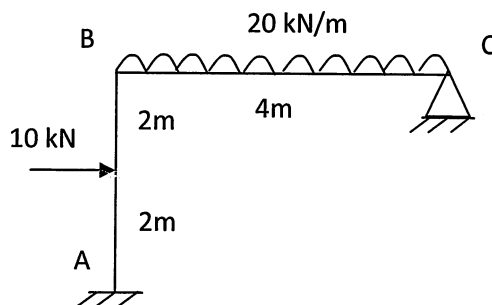


Fig. (4.1)

Set P



5. Draw SFD and BMD using Flexibility method.

9

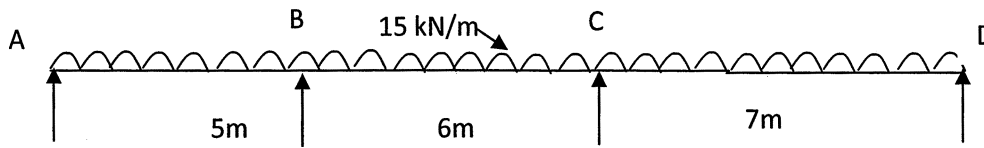


Fig. (5.1)

SECTION – II

6. Draw shear force and bending moment diagram for a continuous beam as shown in Fig. No. 6.1 using moment distribution method.

9

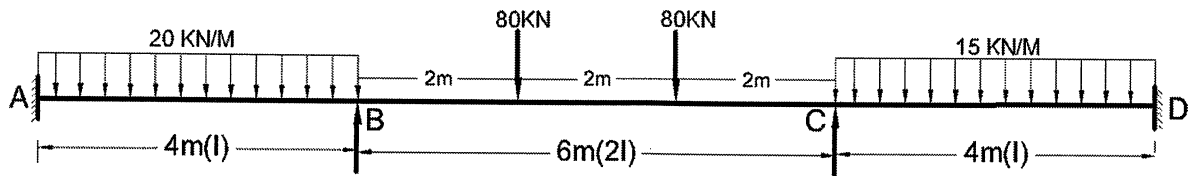


Fig. 6.1

7. Develop stiffness matrix for a frame as shown in Fig. No. 7.1 in the direction of given ordinates.

10

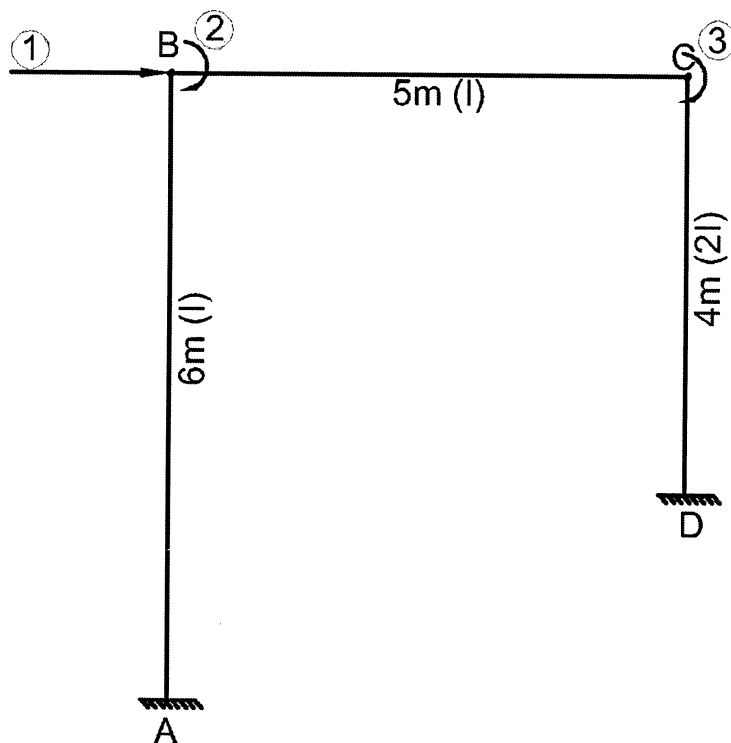


Fig. 7.1



8. Draw ILD for  $V_c$  and  $M_c$  for beam as shown in Fig. No. 8.1. Plot ordinate at every 1 m interval.

9

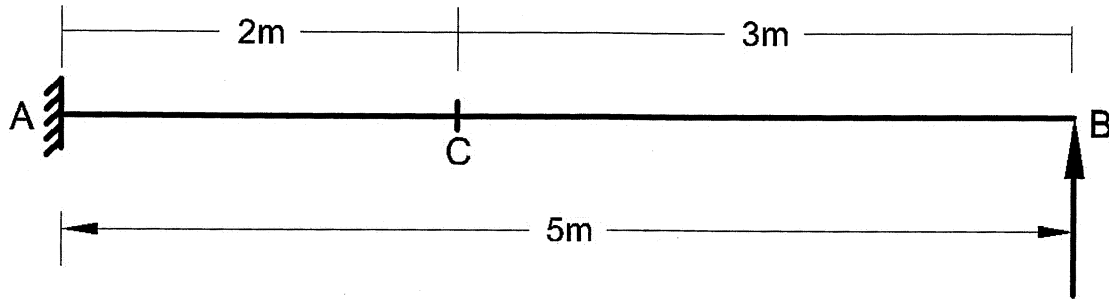


Fig. 8.1

9. A three span continuous beam ABCD is fixed at the ends A and D and is one rollers at B and C. Span AB = 3 m; BC = 4 m; and CD = 3 m. A concentrated load of 10 kN is acting at a distance of 2 m from A in span AB. A central load of 20 kN is acting in span BC and concentrated load of 15 kN is acting at 2 m from D in span CD. Moment of inertia for all span is same. Analyse the beam using stiffness matrix method and draw bending moment and shear force diagrams.

9





SLR-TJ – 42

Seat No.	
----------	--

Set	Q
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
STRUCTURAL MECHANICS – III**

Day and Date : Tuesday, 21-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to the **right** indicate **full** marks.  
4) Assume additional data if required and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14
- 1) Number of unknowns to be determined in the stiffness method is equal to 1  
a) Static indeterminacy  
b) Kinematic indeterminacy  
c) Sum of static indeterminacy and Kinematic indeterminacy  
d) None of the above
- 2) Moment distribution method is best suited for 1  
a) Pin-jointed frame      b) Rigid-jointed frame      c) Space frame      d) Plane frame
- 3) Shape of ILD for indeterminate structure is 1  
a) Linear      b) Nonlinear      c) Triangular      d) All of the above
- 4) Size of stiffness matrix for fixed beam is 1  
a)  $2 \times 2$       b)  $3 \times 3$       c)  $4 \times 4$       d) None of these
- 5) Mullar Breslau principle for influence line is applicable for 1  
a) Simple beam      b) Continuous beam      c) Redundant truss      d) All of these
- 6) Distribution factor for member OA, OB, OC and OD are as shown in frame 6. 2

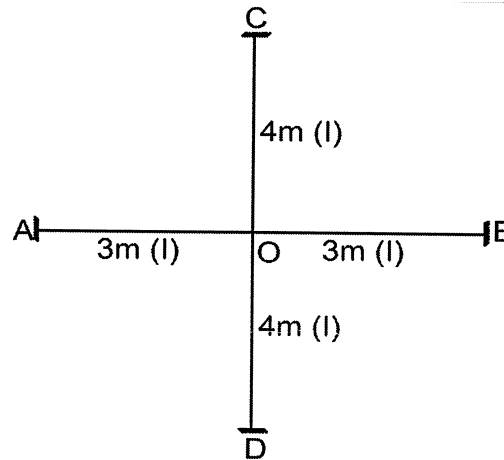


Fig. No. 6

- a) 0.25, 0.5, 0.25, 0      b) 0.20, 0.25, 0.25, 0.3  
c) 0.25, 0.25, 0.25, 0.25      d) 0.25, 0.5, 0.15, 0.1

P.T.O.



7) Flexibility coefficient of beam shown in Fig. 7 is

1

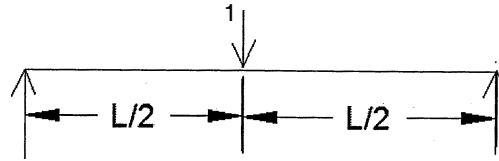


Fig. 7

- a)  $\frac{L^3}{2EI}$       b)  $\frac{L^3}{48EI}$       c)  $\frac{L^3}{4EI}$       d)  $\frac{L^3}{3EI}$

8) The fixed end moments of for beam shown in Fig. 8 is

1

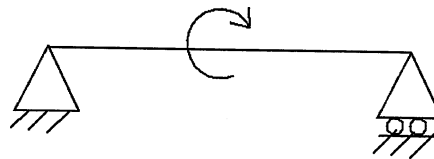


Fig. 8

- a) M      b) M/8      c) M/2      d) M/4

9) According to Castigliano's second theorem work done due to the redundant is always

1

- a) Maximum      b) Zero      c) Minimum      d) Infinity

10) Shear caused by sinking of one support by  $\delta$  of simply supported beam is

1

- a)  $\frac{3EI\delta}{L}$       b) 0      c)  $\frac{6EI\delta}{L^2}$       d)  $\frac{12EI\delta}{L^3}$

11) Fixed end moment of beam subjected to UDL 'w' throughout span 'L' is

1

- a) w/2      b)  $wL^2/2$       c)  $wL^2/12$       d) wL

12) Degree of static indeterminacy of beam (neglecting axial forces) shown in Fig. 12.

1

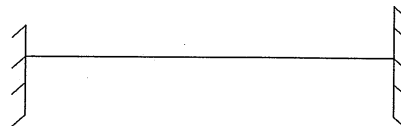


Fig. 12

- a) 1      b) 3      c) 2      d) 4

13) Castigliano's second theorem is used to calculate

1

- a) Deflection      b) Unknown rotation      c) Redundant force      d) None





Seat No.	
-------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
STRUCTURAL MECHANICS – III**

Day and Date : Tuesday, 21-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :**
- 1) In Section I, Q. No. 2 is **compulsory**. Solve **any two** questions from remaining.
  - 2) In Section II, solve **any three** questions.
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Assume additional data if required and mention it **clearly**.

SECTION – I

2. Solve **any four** : **(2.5×4=10)**
- a) Enlist various methods of force method of analysis.
  - b) Explain Castigliano's theorem with its applications.
  - c) Differentiate between force method and displacement method.
  - d) Explain unit load method.
  - e) Determine Static and Kinematic indeterminacy of structures refer figure 2.1 (a) (b).

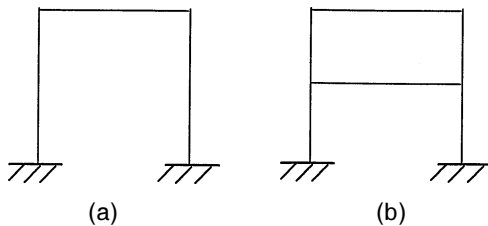


Fig. (2.1)

3. Analyze the beam shown in Fig. 3.1 using Consistent Deformation method. **9**

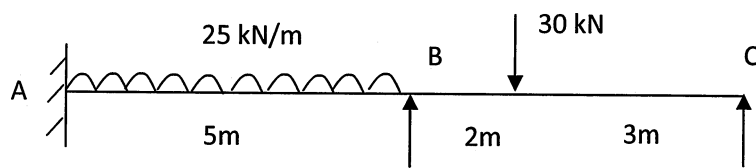


Fig. (3.1)

4. Draw BMD using Strain Energy Method. **9**

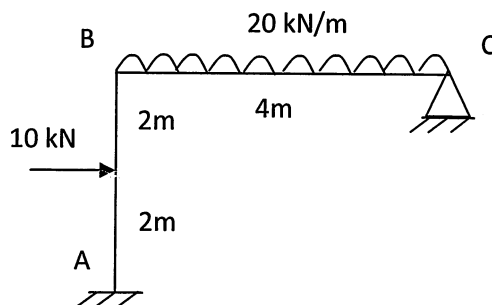


Fig. (4.1)

**Set Q**



5. Draw SFD and BMD using Flexibility method.

9

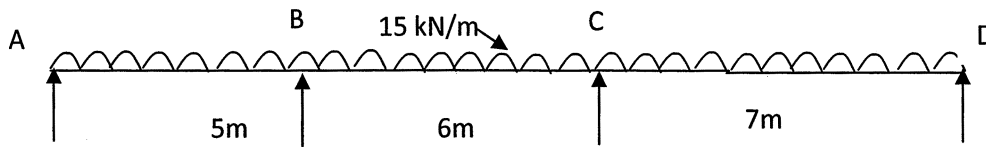


Fig. (5.1)

SECTION – II

6. Draw shear force and bending moment diagram for a continuous beam as shown in Fig. No. 6.1 using moment distribution method.

9

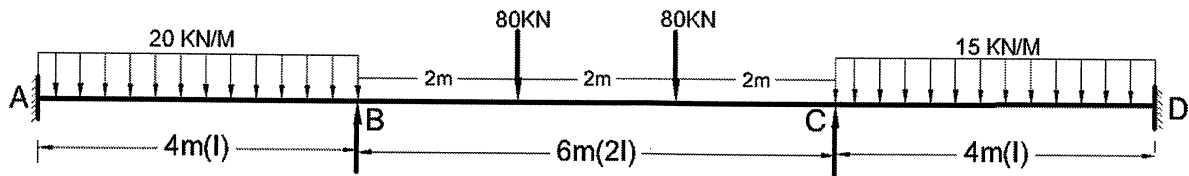


Fig. 6.1

7. Develop stiffness matrix for a frame as shown in Fig. No. 7.1 in the direction of given ordinates.

10

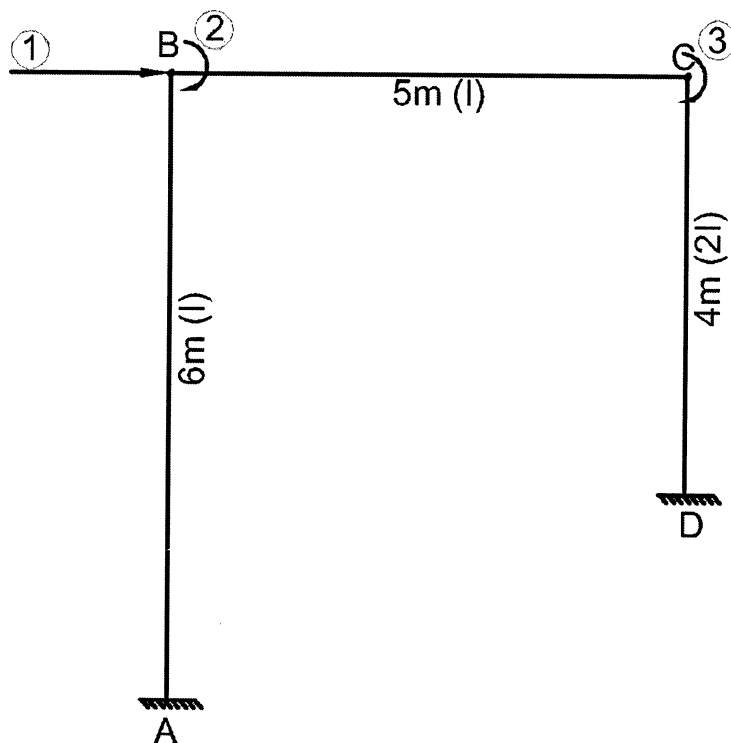


Fig. 7.1



8. Draw ILD for  $V_c$  and  $M_c$  for beam as shown in Fig. No. 8.1. Plot ordinate at every 1 m interval.

9

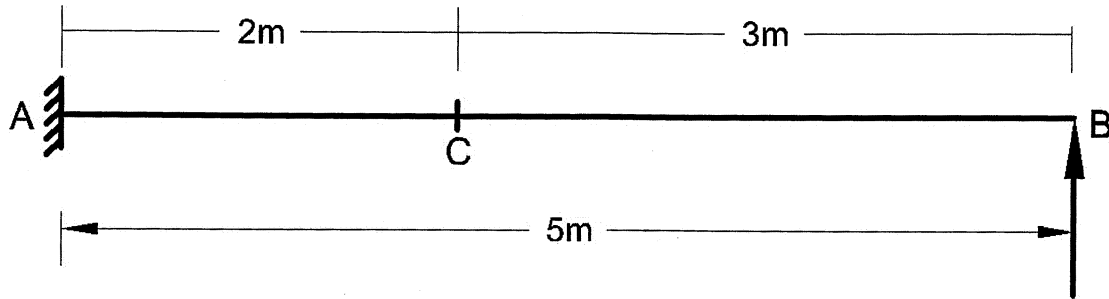


Fig. 8.1

9. A three span continuous beam ABCD is fixed at the ends A and D and is one rollers at B and C. Span AB = 3 m; BC = 4 m; and CD = 3 m. A concentrated load of 10 kN is acting at a distance of 2 m from A in span AB. A central load of 20 kN is acting in span BC and concentrated load of 15 kN is acting at 2 m from D in span CD. Moment of inertia for all span is same. Analyse the beam using stiffness matrix method and draw bending moment and shear force diagrams.

9

\_\_\_\_\_





SLR-TJ – 42

Seat No.	
----------	--

Set **R**

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
STRUCTURAL MECHANICS – III**

Day and Date : Tuesday, 21-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Assume additional data if required and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14
  - 1) Shape of ILD for indeterminate structure is 1
    - a) Linear
    - b) Nonlinear
    - c) Triangular
    - d) All of the above
  - 2) Size of stiffness matrix for fixed beam is 1
    - a)  $2 \times 2$
    - b)  $3 \times 3$
    - c)  $4 \times 4$
    - d) None of these
  - 3) Mullar Breslau principle for influence line is applicable for 1
    - a) Simple beam
    - b) Continuous beam
    - c) Redundant truss
    - d) All of these
  - 4) Distribution factor for member OA, OB, OC and OD are as shown in frame 4. 2

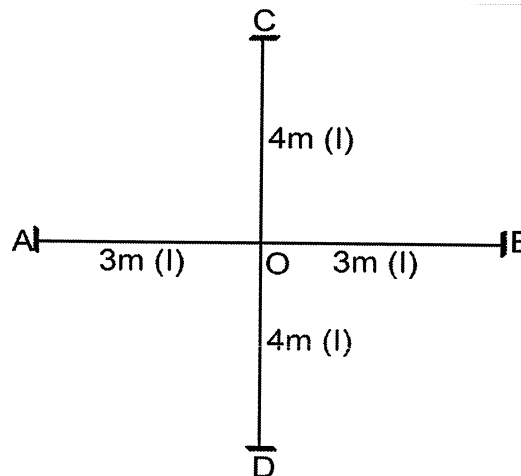


Fig. No. 4

- a) 0.25, 0.5, 0.25, 0
- b) 0.20, 0.25, 0.25, 0.3
- c) 0.25, 0.25, 0.25, 0.25
- d) 0.25, 0.5, 0.15, 0.1

P.T.O.



5) Flexibility coefficient of beam shown in Fig. 5 is

1

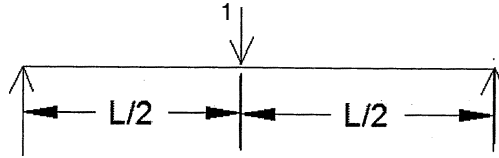


Fig. 5

- a)  $\frac{L^3}{2EI}$                       b)  $\frac{L^3}{48EI}$                       c)  $\frac{L^3}{4EI}$                       d)  $\frac{L^3}{3EI}$

6) The fixed end moments of for beam shown in Fig. 6 is

1

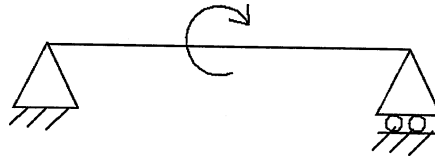


Fig. 6

- a) M                                      b) M/8                                      c) M/2                                      d) M/4

7) According to Castigliano's second theorem work done due to the redundant is always

1

- a) Maximum                      b) Zero                      c) Minimum                      d) Infinity

8) Shear caused by sinking of one support by  $\delta$  of simply supported beam is

1

- a)  $\frac{3E\delta}{L}$                                       b) 0                                      c)  $\frac{6E\delta}{L^2}$                                       d)  $\frac{12E\delta}{L^3}$

9) Fixed end moment of beam subjected to UDL 'w' throughout span 'L' is

1

- a) w/2                                      b)  $wL^2/2$                                       c)  $wL^2/12$                                       d) wL

10) Degree of static indeterminacy of beam (neglecting axial forces) shown in Fig. 10.

1

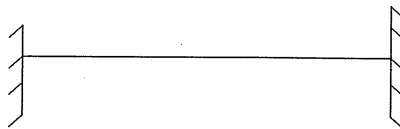


Fig. 10

- a) 1                                      b) 3                                      c) 2                                      d) 4

11) Castigliano's second theorem is used to calculate

1

- a) Deflection                      b) Unknown rotation                      c) Redundant force                      d) None

12) Number of unknowns to be determined in the stiffness method is equal to

1

- a) Static indeterminacy  
 b) Kinematic indeterminacy  
 c) Sum of static indeterminacy and Kinematic indeterminacy  
 d) None of the above

13) Moment distribution method is best suited for

1

- a) Pin-jointed frame                      b) Rigid-jointed frame                      c) Space frame                      d) Plane frame



Seat No.	
----------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
STRUCTURAL MECHANICS – III**

Day and Date : Tuesday, 21-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) In Section I, Q. No. 2 is **compulsory**. Solve **any two** questions from remaining.  
2) In Section II, solve **any three** questions.  
3) Figures to the **right** indicate **full** marks.  
4) Assume additional data if required and mention it **clearly**.

SECTION – I

2. Solve **any four** : (2.5×4=10)
- a) Enlist various methods of force method of analysis.
  - b) Explain Castigliano's theorem with its applications.
  - c) Differentiate between force method and displacement method.
  - d) Explain unit load method.
  - e) Determine Static and Kinematic indeterminacy of structures refer figure 2.1 (a) (b).

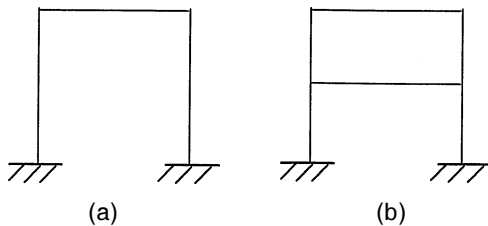


Fig. (2.1)

3. Analyze the beam shown in Fig. 3.1 using Consistent Deformation method. 9

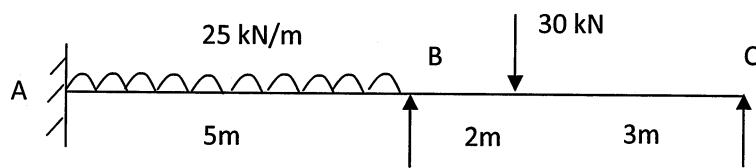


Fig. (3.1)

4. Draw BMD using Strain Energy Method. 9

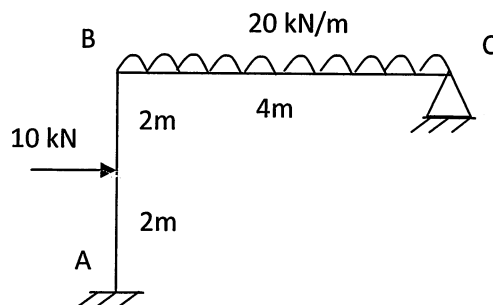


Fig. (4.1)

Set R



5. Draw SFD and BMD using Flexibility method.

9

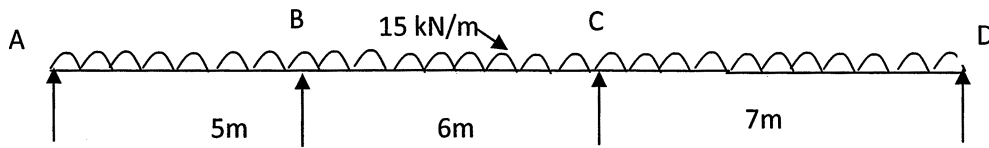


Fig. (5.1)

SECTION – II

6. Draw shear force and bending moment diagram for a continuous beam as shown in Fig. No. 6.1 using moment distribution method.

9

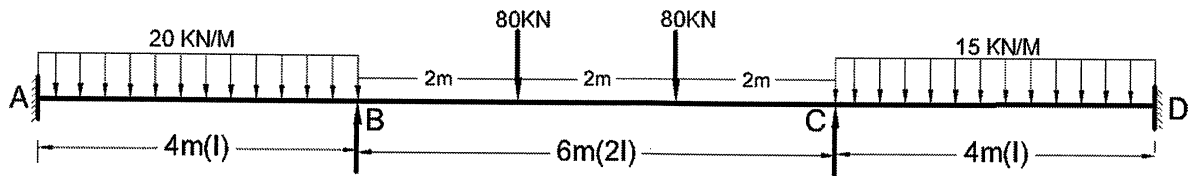


Fig. 6.1

7. Develop stiffness matrix for a frame as shown in Fig. No. 7.1 in the direction of given ordinates.

10

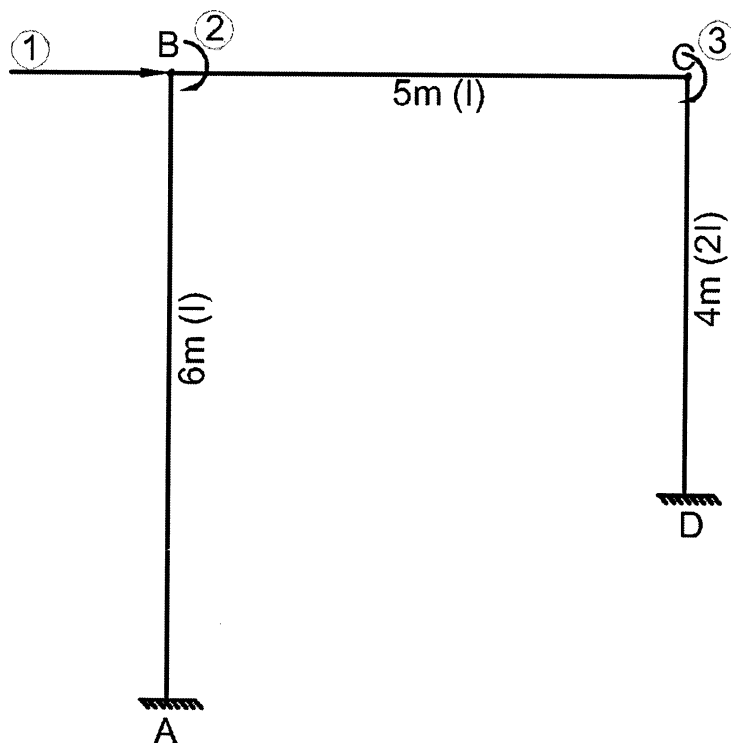


Fig. 7.1





8. Draw ILD for  $V_c$  and  $M_c$  for beam as shown in Fig. No. 8.1. Plot ordinate at every 1 m interval.

9

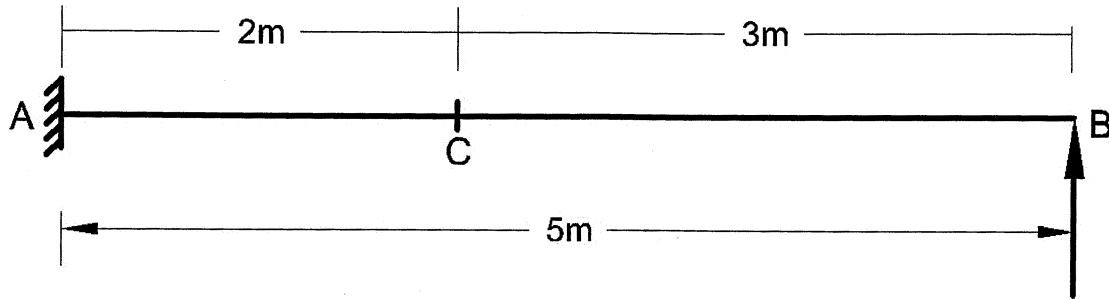


Fig. 8.1

9. A three span continuous beam ABCD is fixed at the ends A and D and is one rollers at B and C. Span AB = 3 m; BC = 4 m; and CD = 3 m. A concentrated load of 10 kN is acting at a distance of 2 m from A in span AB. A central load of 20 kN is acting in span BC and concentrated load of 15 kN is acting at 2 m from D in span CD. Moment of inertia for all span is same. Analyse the beam using stiffness matrix method and draw bending moment and shear force diagrams.

9

\_\_\_\_\_





Seat No.	
----------	--

Set	<b>S</b>
-----	----------

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017**  
**STRUCTURAL MECHANICS – III**

Day and Date : Tuesday, 21-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Assume additional data if required and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : 14

1) Shear caused by sinking of one support by  $\delta$  of simply supported beam is 1

- a)  $\frac{3EI\delta}{L}$                       b) 0                      c)  $\frac{6EI\delta}{L^2}$                       d)  $\frac{12EI\delta}{L^3}$

2) Fixed end moment of beam subjected to UDL 'w' throughout span 'L' is 1

- a)  $w/2$                       b)  $wL^2/2$                       c)  $wL^2/12$                       d)  $wL$

3) Degree of static indeterminacy of beam (neglecting axial forces) shown in Fig. 3. 1

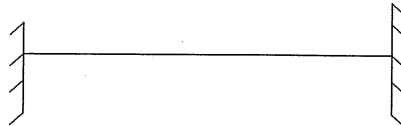


Fig. 3

- a) 1                      b) 3                      c) 2                      d) 4

4) Castigliano's second theorem is used to calculate 1

- a) Deflection                      b) Unknown rotation  
c) Redundant force                      d) None

5) Number of unknowns to be determined in the stiffness method is equal to 1

- a) Static indeterminacy  
b) Kinematic indeterminacy  
c) Sum of static indeterminacy and Kinematic indeterminacy  
d) None of the above

6) Moment distribution method is best suited for 1

- a) Pin-jointed frame                      b) Rigid-jointed frame  
c) Space frame                      d) Plane frame

7) Shape of ILD for indeterminate structure is 1

- a) Linear                      b) Nonlinear                      c) Triangular                      d) All of the above

8) Size of stiffness matrix for fixed beam is 1

- a)  $2 \times 2$                       b)  $3 \times 3$                       c)  $4 \times 4$                       d) None of these

9) Mullar Breslau principle for influence line is applicable for 1

- a) Simple beam                      b) Continuous beam                      c) Redundant truss                      d) All of these

**P.T.O.**



10) Distribution factor for member OA, OB, OC and OD are as shown in frame 10.

2

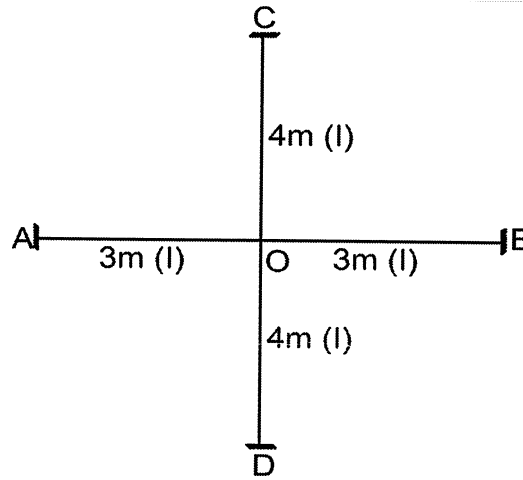


Fig. No. 10

- a) 0.25, 0.5, 0.25, 0
- b) 0.20, 0.25, 0.25, 0.3
- c) 0.25, 0.25, 0.25, 0.25
- d) 0.25, 0.5, 0.15, 0.1

11) Flexibility coefficient of beam shown in Fig. 11 is

1

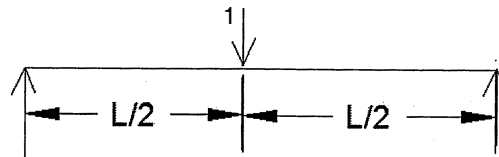


Fig. 11

- a)  $\frac{L^3}{2EI}$
- b)  $\frac{L^3}{48EI}$
- c)  $\frac{L^3}{4EI}$
- d)  $\frac{L^3}{3EI}$

12) The fixed end moments of for beam shown in Fig. 12 is

1

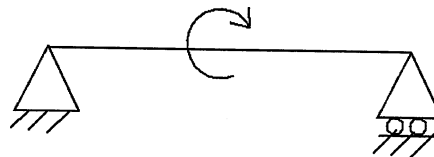


Fig. 12

- a) M
- b) M/8
- c) M/2
- d) M/4

13) According to Castigliano's second theorem work done due to the redundant is always

1

- a) Maximum
- b) Zero
- c) Minimum
- d) Infinity



Seat No.	
-------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
STRUCTURAL MECHANICS – III**

Day and Date : Tuesday, 21-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :**
- 1) In Section I, Q. No. 2 is **compulsory**. Solve **any two** questions from remaining.
  - 2) In Section II, solve **any three** questions.
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Assume additional data if required and mention it **clearly**.

SECTION – I

2. Solve **any four** : **(2.5×4=10)**
- a) Enlist various methods of force method of analysis.
  - b) Explain Castigliano's theorem with its applications.
  - c) Differentiate between force method and displacement method.
  - d) Explain unit load method.
  - e) Determine Static and Kinematic indeterminacy of structures refer figure 2.1 (a) (b).

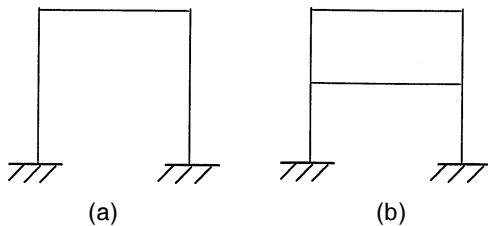


Fig. (2.1)

3. Analyze the beam shown in Fig. 3.1 using Consistent Deformation method. **9**

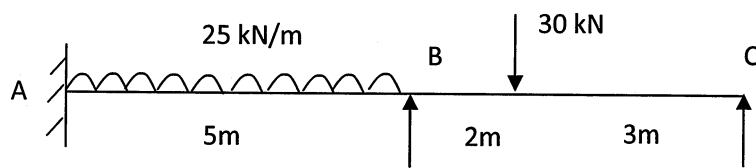


Fig. (3.1)

4. Draw BMD using Strain Energy Method. **9**

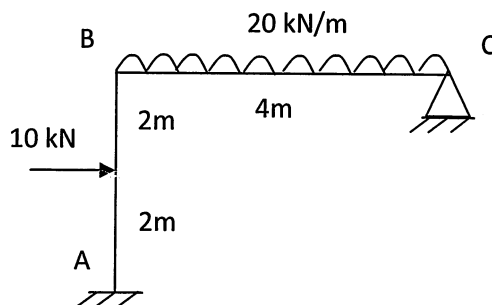


Fig. (4.1)

**Set S**



5. Draw SFD and BMD using Flexibility method.

9

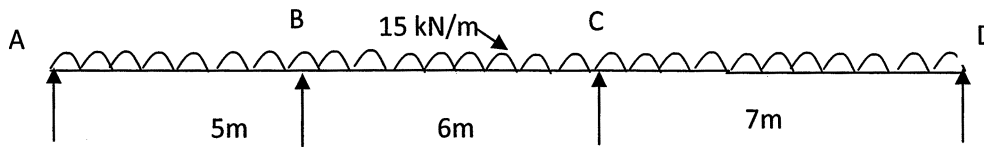


Fig. (5.1)

SECTION – II

6. Draw shear force and bending moment diagram for a continuous beam as shown in Fig. No. 6.1 using moment distribution method.

9

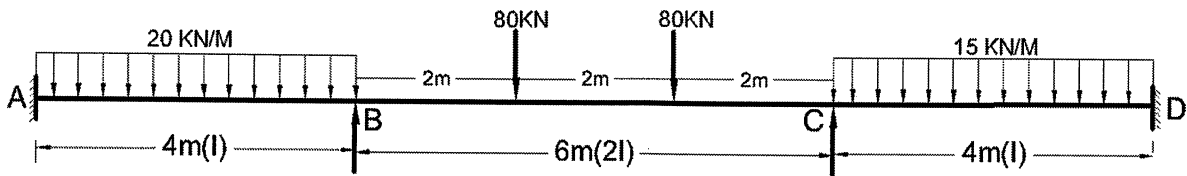


Fig. 6.1

7. Develop stiffness matrix for a frame as shown in Fig. No. 7.1 in the direction of given ordinates.

10

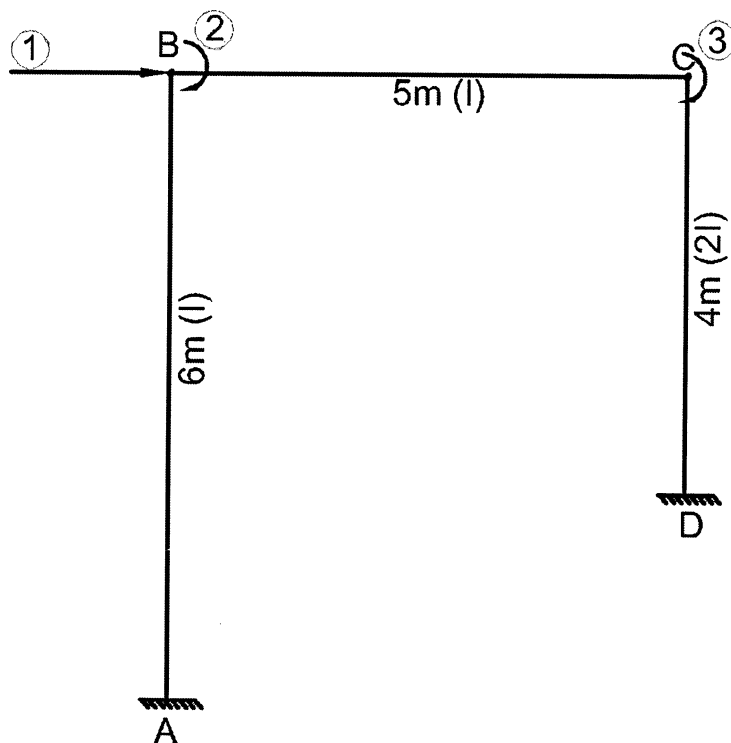


Fig. 7.1



8. Draw ILD for  $V_c$  and  $M_c$  for beam as shown in Fig. No. 8.1. Plot ordinate at every 1 m interval.

9

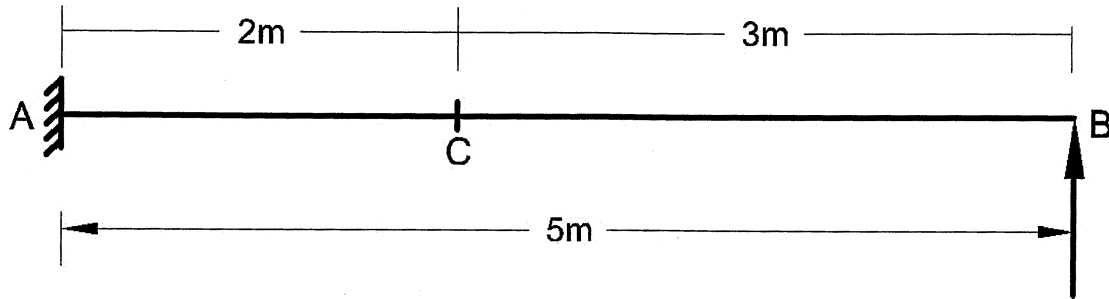


Fig. 8.1

9. A three span continuous beam ABCD is fixed at the ends A and D and is one rollers at B and C. Span AB = 3 m; BC = 4 m; and CD = 3 m. A concentrated load of 10 kN is acting at a distance of 2 m from A in span AB. A central load of 20 kN is acting in span BC and concentrated load of 15 kN is acting at 2 m from D in span CD. Moment of inertia for all span is same. Analyse the beam using stiffness matrix method and draw bending moment and shear force diagrams.

9

---







SLR-TJ – 43

Seat No.	
----------	--

Set	P
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) **Assume** additional data if required and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternatives :

14

- 1) RQD is the ratio of
  - a) Sum of lengths of rock core pieces greater than 15 cm to the total length of core run
  - b) Sum of lengths of rock core pieces greater than 10 cm to the total length of core run
  - c) Sum of lengths of rock core pieces to the total length of core run
  - d) Sum of lengths of unbroken rock core pieces to the total length of core run
- 2) One of the purposes of Soil exploration is
  - a) To understand the behaviour of the structure
  - b) To estimate the load coming on the soil
  - c) To find the quantity and quality of water
  - d) To determine basic properties of soil
- 3) Which one of the following is not the assumption made in Terzaghi's bearing capacity analysis ?
  - a) The strip footing has rough base
  - b) Failure zone do not extend above the horizontal plane through the base of the footing
  - c) Plastic zone is not fully developed
  - d) The elastic zone has straight boundaries
- 4) How much is the drive weight used in Standard Penetration test as per IS 2131 : 1981 ?
  - a) 53.5 kg
  - b) 63.5 kg
  - c) 73.5 kg
  - d) 83.5 kg

P.T.O.



- 5) In case of sandy soil, which settlement is predominant ?
- Immediate settlement
  - Consolidation settlement
  - Secondary consolidation settlement
  - None
- 6) In case of plate load test seating load to be applied is
- 5 kPa
  - 10 kPa
  - 7 kPa
  - None
- 7) These types of soil deposits are often found near the mouths of rivers, along the perimeters of bays and beneath swamps or lagoons.
- Weak/compressible soil
  - Collapsible soil
  - Expansive soil
  - Corrosive soil
- 8) Curb is a component in case of
- Box caisson
  - Pneumatic caisson
  - Open caisson
  - All
- 9) Swedish circle method of slope stability analysis is used in case of
- Silty soil
  - Sandy soil
  - Clayey soil
  - None
- 10) Location of critical slip circle for a given slope can be found by using method suggested by
- Taylor
  - Cassagrande
  - Fellenius
  - Bishop
- 11) Pile used to safeguard waterfront structures is called
- Uplift pile
  - Dolphin pile
  - Anchor pile
  - None
- 12) For cantilever sheet pile supporting clayey soil having  $c = 25$  kPa, pressure intensity at the top of wall is
- 0
  - 25 kPa
  - 50 kPa
  - None
- 13) In pile groups, if we interchange number of rows and number of columns then efficiency of pile group
- Will increase
  - Will decrease
  - Remain same
  - Depend on soil type
- 14) Friction pile of square and circular shape having same size and length is used whose capacity is more ?
- Square
  - Circular
  - Square in clayey soil
  - Circular in sandy soil



Seat No.	
-------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Answer **any three** questions out of Q. 2, Q. 3, Q. 4, Q. 5 in Section – I.
  - 3) Q. 6 is **compulsory**, answer **any two** questions out of Q. 7, Q. 8 and Q. 9 in Section – II.
  - 4) **Assume** additional data if required and mention it **clearly**.

SECTION – I

2. a) Explain any two types of borings with neat sketches. 5
- b) A sampler has inner diameter of 68 mm with its thickness 4 mm and cutting edge of sampler has outer diameter of 81 mm with its thickness 8 mm. Determine area ratio for the sampler, inside clearance and outside clearance. Draw sketch of the sampler. 4
3. a) A circular footing is resting on stiff saturated clay with unconfined compressive strength of 250 kN/m<sup>2</sup>. The depth of foundation is 1.8. Determine the diameter of the footing by Terzaghi's analysis if column load is 800 kN. Assume factor of safety 3. Bulk unit weight of soil is 20 kN/m<sup>3</sup>. For  $\phi = 0$  Terzaghi's bearing capacity factors,  $N_c = 5.7$ ,  $N_q = 1$ ,  $N_\gamma = 0$ . 5
- b) Following observations were recorded by conducting plate load test on two different size plates at a site : 5

Load (kN)	Size of plate	Shape of plate	Settlement (mm)
50	Circular	0.3 m diameter	25
90	Square	0.45 m side	25

Find the size of square footing to carry a load of 900 kN at the same specified settlement of 25 mm.

4. a) Calculate the consolidation settlement with the following data. Foundation size 1.5 m × 1.5 m. Load on foundation 400 kN. Depth of foundation 1.4 m. Density of soil 17.5 kN/m<sup>3</sup>. Thickness of compressible layer below foundation is 1.5 m. Compression index is 0.27. Initial void ratio of the soil is 0.6. Divide the compressible stratum in 3 equal layers for the calculation of consolidation settlement. Assume 2V : 1H contact pressure distribution. 5
- b) Explain the test procedure for standard penetration test. Also mention the corrections to be done for the observed N. 4



5. a) Explain various difficult soils and precautions to be taken before construction on these soils. 5
- b) Explain the below ground improvement techniques : 4
- i) Vibrofloatation
  - ii) Sand drains.

## SECTION – II

6. Write short notes on **any four** : (3×4=12)
- a) Construction of under reamed pile
  - b) Different types of combined footing
  - c) Earth fill cofferdam
  - d) Converse labbare formula
  - e) Slope failure.
7. a) Calculate capacity of rectangular pile 0.3 m × 0.4 m of length 12 m embedded in clayey soil having  $C = 45$  kPa,  $\phi = 0$ ,  $\alpha = 0.64$  (Assume suitable data if required). 4
- b) With a neat sketch, explain function of each component of well foundation. 4
8. a) Design a combined footing for two columns carrying a load of 800 kN and 600 kN. Size of each column is 400 mm × 400 mm, c/c distance between column is 3.6 m, length of footing is 4 m SBC of soil is 160 kN/m<sup>2</sup>. Draw SFD and BMD. 5
- b) What are the ideal requirements of cofferdam (any six) ? 3
9. a) Explain Fellenius method of locating center of critical slip circle. 3
- b) A 40° cutting slope is excavated to a depth of 8 m in a deep layer of saturated clay of unit weight 19 kN/m<sup>3</sup>, the relevant shear strength parameters are  $c_u = 65$  kPa. Determine the factor of safety for the trial failure surface specified in Fig.1. 5

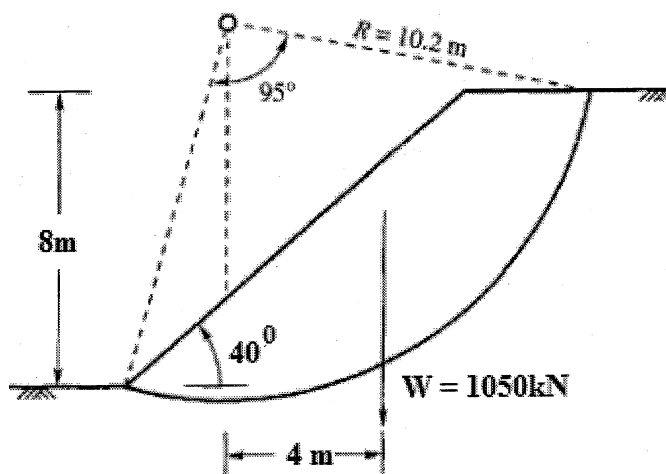


Fig. 1



SLR-TJ – 43

Seat No.	
----------	--

Set	Q
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) **Assume** additional data if required and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternatives :

14

- 1) Curb is a component in case of
  - a) Box caisson
  - b) Pneumatic caisson
  - c) Open caisson
  - d) All
- 2) Swedish circle method of slope stability analysis is used in case of
  - a) Silty soil
  - b) Sandy soil
  - c) Clayey soil
  - d) None
- 3) Location of critical slip circle for a given slope can be found by using method suggested by
  - a) Taylor
  - b) Cassagrande
  - c) Fellenius
  - d) Bishop
- 4) Pile used to safeguard waterfront structures is called
  - a) Uplift pile
  - b) Dolphin pile
  - c) Anchor pile
  - d) None
- 5) For cantilever sheet pile supporting clayey soil having  $c = 25$  kPa, pressure intensity at the top of wall is
  - a) 0
  - b)  $-25$  kPa
  - c)  $-50$  kPa
  - d) None
- 6) In pile groups, if we interchange number of rows and number of columns then efficiency of pile group
  - a) Will increase
  - b) Will decrease
  - c) Remain same
  - d) Depend on soil type

P.T.O.





Seat No.	
-------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Answer **any three** questions out of Q. 2, Q. 3, Q. 4, Q. 5 in Section – I.
  - 3) Q. 6 is **compulsory**, answer **any two** questions out of Q. 7, Q. 8 and Q. 9 in Section – II.
  - 4) **Assume** additional data if required and mention it **clearly**.

SECTION – I

2. a) Explain any two types of borings with neat sketches. 5  
 b) A sampler has inner diameter of 68 mm with its thickness 4 mm and cutting edge of sampler has outer diameter of 81 mm with its thickness 8 mm. Determine area ratio for the sampler, inside clearance and outside clearance. Draw sketch of the sampler. 4
3. a) A circular footing is resting on stiff saturated clay with unconfined compressive strength of 250 kN/m<sup>2</sup>. The depth of foundation is 1.8. Determine the diameter of the footing by Terzaghi's analysis if column load is 800 kN. Assume factor of safety 3. Bulk unit weight of soil is 20 kN/m<sup>3</sup>. For  $\phi = 0$  Terzaghi's bearing capacity factors,  $N_c = 5.7$ ,  $N_q = 1$ ,  $N_\gamma = 0$ . 5  
 b) Following observations were recorded by conducting plate load test on two different size plates at a site : 5

Load (kN)	Size of plate	Shape of plate	Settlement (mm)
50	Circular	0.3 m diameter	25
90	Square	0.45 m side	25

Find the size of square footing to carry a load of 900 kN at the same specified settlement of 25 mm.

4. a) Calculate the consolidation settlement with the following data. Foundation size 1.5 m × 1.5 m. Load on foundation 400 kN. Depth of foundation 1.4 m. Density of soil 17.5 kN/m<sup>3</sup>. Thickness of compressible layer below foundation is 1.5 m. Compression index is 0.27. Initial void ratio of the soil is 0.6. Divide the compressible stratum in 3 equal layers for the calculation of consolidation settlement. Assume 2V : 1H contact pressure distribution. 5  
 b) Explain the test procedure for standard penetration test. Also mention the corrections to be done for the observed N. 4



5. a) Explain various difficult soils and precautions to be taken before construction on these soils. 5
- b) Explain the below ground improvement techniques : 4
- i) Vibrofloatation
  - ii) Sand drains.

## SECTION – II

6. Write short notes on **any four** : (3×4=12)
- a) Construction of under reamed pile
  - b) Different types of combined footing
  - c) Earth fill cofferdam
  - d) Converse labbare formula
  - e) Slope failure.
7. a) Calculate capacity of rectangular pile 0.3 m × 0.4 m of length 12 m embedded in clayey soil having  $C = 45$  kPa,  $\phi = 0$ ,  $\alpha = 0.64$  (Assume suitable data if required). 4
- b) With a neat sketch, explain function of each component of well foundation. 4
8. a) Design a combined footing for two columns carrying a load of 800 kN and 600 kN. Size of each column is 400 mm × 400 mm, c/c distance between column is 3.6 m, length of footing is 4 m SBC of soil is 160 kN/m<sup>2</sup>. Draw SFD and BMD. 5
- b) What are the ideal requirements of cofferdam (any six) ? 3
9. a) Explain Fellenius method of locating center of critical slip circle. 3
- b) A 40° cutting slope is excavated to a depth of 8 m in a deep layer of saturated clay of unit weight 19 kN/m<sup>3</sup>, the relevant shear strength parameters are  $c_u = 65$  kPa. Determine the factor of safety for the trial failure surface specified in Fig.1. 5

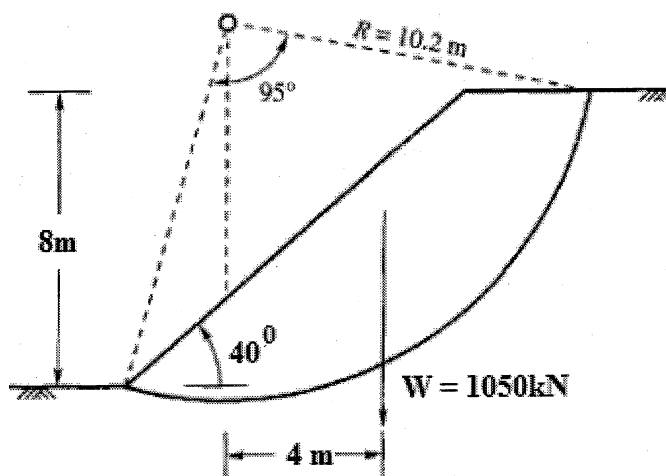


Fig. 1





SLR-TJ – 43

Seat No.	
----------	--

Set	R
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) **Assume** additional data if required and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternatives :

14

- 1) In case of sandy soil, which settlement is predominant ?
  - a) Immediate settlement
  - b) Consolidation settlement
  - c) Secondary consolidation settlement
  - d) None
- 2) In case of plate load test seating load to be applied is
  - a) 5 kPa
  - b) 10 kPa
  - c) 7 kPa
  - d) None
- 3) These types of soil deposits are often found near the mouths of rivers, along the perimeters of bays and beneath swamps or lagoons.
  - a) Weak/compressible soil
  - b) Collapsible soil
  - c) Expansive soil
  - d) Corrosive soil
- 4) Curb is a component in case of
  - a) Box caisson
  - b) Pneumatic caisson
  - c) Open caisson
  - d) All
- 5) Swedish circle method of slope stability analysis is used in case of
  - a) Silty soil
  - b) Sandy soil
  - c) Clayey soil
  - d) None
- 6) Location of critical slip circle for a given slope can be found by using method suggested by
  - a) Taylor
  - b) Cassagrande
  - c) Fellenius
  - d) Bishop

P.T.O.



- 7) Pile used to safeguard waterfront structures is called  
a) Uplift pile      b) Dolphin pile      c) Anchor pile      d) None
- 8) For cantilever sheet pile supporting clayey soil having  $c = 25$  kPa, pressure intensity at the top of wall is  
a) 0      b)  $-25$  kPa      c)  $-50$  kPa      d) None
- 9) In pile groups, if we interchange number of rows and number of columns then efficiency of pile group  
a) Will increase      b) Will decrease  
c) Remain same      d) Depend on soil type
- 10) Friction pile of square and circular shape having same size and length is used whose capacity is more ?  
a) Square      b) Circular  
c) Square in clayey soil      d) Circular in sandy soil
- 11) RQD is the ratio of  
a) Sum of lengths of rock core pieces greater than 15 cm to the total length of core run  
b) Sum of lengths of rock core pieces greater than 10 cm to the total length of core run  
c) Sum of lengths of rock core pieces to the total length of core run  
d) Sum of lengths of unbroken rock core pieces to the total length of core run
- 12) One of the purposes of Soil exploration is  
a) To understand the behaviour of the structure  
b) To estimate the load coming on the soil  
c) To find the quantity and quality of water  
d) To determine basic properties of soil
- 13) Which one of the following is not the assumption made in Terzaghi's bearing capacity analysis ?  
a) The strip footing has rough base  
b) Failure zone do not extend above the horizontal plane through the base of the footing  
c) Plastic zone is not fully developed  
d) The elastic zone has straight boundaries
- 14) How much is the drive weight used in Standard Penetration test as per IS 2131 : 1981 ?  
a) 53.5 kg      b) 63.5 kg      c) 73.5 kg      d) 83.5 kg



Seat No.	
-------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Answer **any three** questions out of Q. 2, Q. 3, Q. 4, Q. 5 in Section – I.
  - 3) Q. 6 is **compulsory**, answer **any two** questions out of Q. 7, Q. 8 and Q. 9 in Section – II.
  - 4) **Assume** additional data if required and mention it **clearly**.

SECTION – I

2. a) Explain any two types of borings with neat sketches. 5
- b) A sampler has inner diameter of 68 mm with its thickness 4 mm and cutting edge of sampler has outer diameter of 81 mm with its thickness 8 mm. Determine area ratio for the sampler, inside clearance and outside clearance. Draw sketch of the sampler. 4
3. a) A circular footing is resting on stiff saturated clay with unconfined compressive strength of 250 kN/m<sup>2</sup>. The depth of foundation is 1.8. Determine the diameter of the footing by Terzaghi's analysis if column load is 800 kN. Assume factor of safety 3. Bulk unit weight of soil is 20 kN/m<sup>3</sup>. For  $\phi = 0$  Terzaghi's bearing capacity factors,  $N_c = 5.7$ ,  $N_q = 1$ ,  $N_\gamma = 0$ . 5
- b) Following observations were recorded by conducting plate load test on two different size plates at a site : 5

Load (kN)	Size of plate	Shape of plate	Settlement (mm)
50	Circular	0.3 m diameter	25
90	Square	0.45 m side	25

Find the size of square footing to carry a load of 900 kN at the same specified settlement of 25 mm.

4. a) Calculate the consolidation settlement with the following data. Foundation size 1.5 m × 1.5 m. Load on foundation 400 kN. Depth of foundation 1.4 m. Density of soil 17.5 kN/m<sup>3</sup>. Thickness of compressible layer below foundation is 1.5 m. Compression index is 0.27. Initial void ratio of the soil is 0.6. Divide the compressible stratum in 3 equal layers for the calculation of consolidation settlement. Assume 2V : 1H contact pressure distribution. 5
- b) Explain the test procedure for standard penetration test. Also mention the corrections to be done for the observed N. 4



5. a) Explain various difficult soils and precautions to be taken before construction on these soils. 5
- b) Explain the below ground improvement techniques : 4
- i) Vibrofloatation
  - ii) Sand drains.

## SECTION – II

6. Write short notes on **any four** : (3×4=12)
- a) Construction of under reamed pile
  - b) Different types of combined footing
  - c) Earth fill cofferdam
  - d) Converse labbare formula
  - e) Slope failure.
7. a) Calculate capacity of rectangular pile 0.3 m × 0.4 m of length 12 m embedded in clayey soil having  $C = 45$  kPa,  $\phi = 0$ ,  $\alpha = 0.64$  (Assume suitable data if required). 4
- b) With a neat sketch, explain function of each component of well foundation. 4
8. a) Design a combined footing for two columns carrying a load of 800 kN and 600 kN. Size of each column is 400 mm × 400 mm, c/c distance between column is 3.6 m, length of footing is 4 m SBC of soil is 160 kN/m<sup>2</sup>. Draw SFD and BMD. 5
- b) What are the ideal requirements of cofferdam (any six) ? 3
9. a) Explain Fellenius method of locating center of critical slip circle. 3
- b) A 40° cutting slope is excavated to a depth of 8 m in a deep layer of saturated clay of unit weight 19 kN/m<sup>3</sup>, the relevant shear strength parameters are  $c_u = 65$  kPa. Determine the factor of safety for the trial failure surface specified in Fig.1. 5

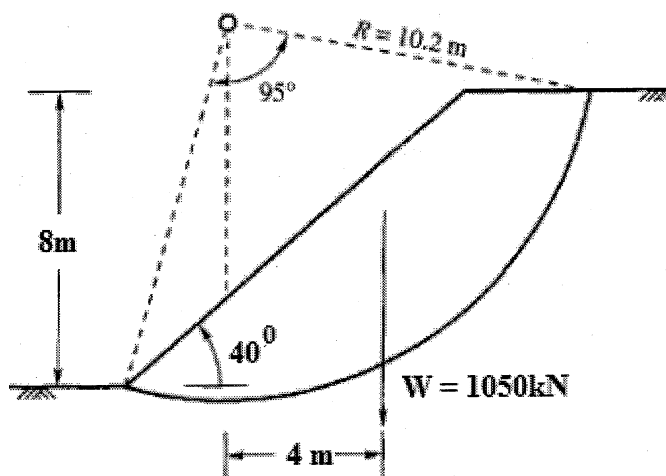


Fig. 1



SLR-TJ – 43

Seat No.	
----------	--

Set	S
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) **Assume** additional data if required and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternatives : 14
- 1) Location of critical slip circle for a given slope can be found by using method suggested by  
a) Taylor                      b) Cassagrande      c) Fellenius                      d) Bishop
  - 2) Pile used to safeguard waterfront structures is called  
a) Uplift pile                      b) Dolphin pile      c) Anchor pile                      d) None
  - 3) For cantilever sheet pile supporting clayey soil having  $c = 25$  kPa, pressure intensity at the top of wall is  
a) 0                                      b)  $-25$  kPa                      c)  $-50$  kPa                      d) None
  - 4) In pile groups, if we interchange number of rows and number of columns then efficiency of pile group  
a) Will increase                                      b) Will decrease  
c) Remain same                                      d) Depend on soil type
  - 5) Friction pile of square and circular shape having same size and length is used whose capacity is more ?  
a) Square                                      b) Circular  
c) Square in clayey soil                                      d) Circular in sandy soil

P.T.O.



- 6) RQD is the ratio of
- Sum of lengths of rock core pieces greater than 15 cm to the total length of core run
  - Sum of lengths of rock core pieces greater than 10 cm to the total length of core run
  - Sum of lengths of rock core pieces to the total length of core run
  - Sum of lengths of unbroken rock core pieces to the total length of core run
- 7) One of the purposes of Soil exploration is
- To understand the behaviour of the structure
  - To estimate the load coming on the soil
  - To find the quantity and quality of water
  - To determine basic properties of soil
- 8) Which one of the following is not the assumption made in Terzaghi's bearing capacity analysis ?
- The strip footing has rough base
  - Failure zone do not extend above the horizontal plane through the base of the footing
  - Plastic zone is not fully developed
  - The elastic zone has straight boundaries
- 9) How much is the drive weight used in Standard Penetration test as per IS 2131 : 1981 ?
- 53.5 kg
  - 63.5 kg
  - 73.5 kg
  - 83.5 kg
- 10) In case of sandy soil, which settlement is predominant ?
- Immediate settlement
  - Consolidation settlement
  - Secondary consolidation settlement
  - None
- 11) In case of plate load test seating load to be applied is
- 5 kPa
  - 10 kPa
  - 7 kPa
  - None
- 12) These types of soil deposits are often found near the mouths of rivers, along the perimeters of bays and beneath swamps or lagoons.
- Weak/compressible soil
  - Collapsible soil
  - Expansive soil
  - Corrosive soil
- 13) Curb is a component in case of
- Box caisson
  - Pneumatic caisson
  - Open caisson
  - All
- 14) Swedish circle method of slope stability analysis is used in case of
- Silty soil
  - Sandy soil
  - Clayey soil
  - None



Seat No.	
-------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOTECHNICAL ENGINEERING – II**

Day and Date : Wednesday, 22-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Answer **any three** questions out of Q. 2, Q. 3, Q. 4, Q. 5 in Section – I.
  - 3) Q. 6 is **compulsory**, answer **any two** questions out of Q. 7, Q. 8 and Q. 9 in Section – II.
  - 4) **Assume** additional data if required and mention it **clearly**.

SECTION – I

2. a) Explain any two types of borings with neat sketches. 5
- b) A sampler has inner diameter of 68 mm with its thickness 4 mm and cutting edge of sampler has outer diameter of 81 mm with its thickness 8 mm. Determine area ratio for the sampler, inside clearance and outside clearance. Draw sketch of the sampler. 4
3. a) A circular footing is resting on stiff saturated clay with unconfined compressive strength of 250 kN/m<sup>2</sup>. The depth of foundation is 1.8. Determine the diameter of the footing by Terzaghi's analysis if column load is 800 kN. Assume factor of safety 3. Bulk unit weight of soil is 20 kN/m<sup>3</sup>. For  $\phi = 0$  Terzaghi's bearing capacity factors,  $N_c = 5.7$ ,  $N_q = 1$ ,  $N_\gamma = 0$ . 5
- b) Following observations were recorded by conducting plate load test on two different size plates at a site : 5

Load (kN)	Size of plate	Shape of plate	Settlement (mm)
50	Circular	0.3 m diameter	25
90	Square	0.45 m side	25

Find the size of square footing to carry a load of 900 kN at the same specified settlement of 25 mm.

4. a) Calculate the consolidation settlement with the following data. Foundation size 1.5 m × 1.5 m. Load on foundation 400 kN. Depth of foundation 1.4 m. Density of soil 17.5 kN/m<sup>3</sup>. Thickness of compressible layer below foundation is 1.5 m. Compression index is 0.27. Initial void ratio of the soil is 0.6. Divide the compressible stratum in 3 equal layers for the calculation of consolidation settlement. Assume 2V : 1H contact pressure distribution. 5
- b) Explain the test procedure for standard penetration test. Also mention the corrections to be done for the observed N. 4



5. a) Explain various difficult soils and precautions to be taken before construction on these soils. 5
- b) Explain the below ground improvement techniques : 4
- i) Vibrofloatation
  - ii) Sand drains.

## SECTION – II

6. Write short notes on **any four** : (3×4=12)
- a) Construction of under reamed pile
  - b) Different types of combined footing
  - c) Earth fill cofferdam
  - d) Converse labbare formula
  - e) Slope failure.
7. a) Calculate capacity of rectangular pile 0.3 m × 0.4 m of length 12 m embedded in clayey soil having  $C = 45$  kPa,  $\phi = 0$ ,  $\alpha = 0.64$  (Assume suitable data if required). 4
- b) With a neat sketch, explain function of each component of well foundation. 4
8. a) Design a combined footing for two columns carrying a load of 800 kN and 600 kN. Size of each column is 400 mm × 400 mm, c/c distance between column is 3.6 m, length of footing is 4 m SBC of soil is 160 kN/m<sup>2</sup>. Draw SFD and BMD. 5
- b) What are the ideal requirements of cofferdam (any six) ? 3
9. a) Explain Fellenius method of locating center of critical slip circle. 3
- b) A 40° cutting slope is excavated to a depth of 8 m in a deep layer of saturated clay of unit weight 19 kN/m<sup>3</sup>, the relevant shear strength parameters are  $c_u = 65$  kPa. Determine the factor of safety for the trial failure surface specified in Fig.1. 5

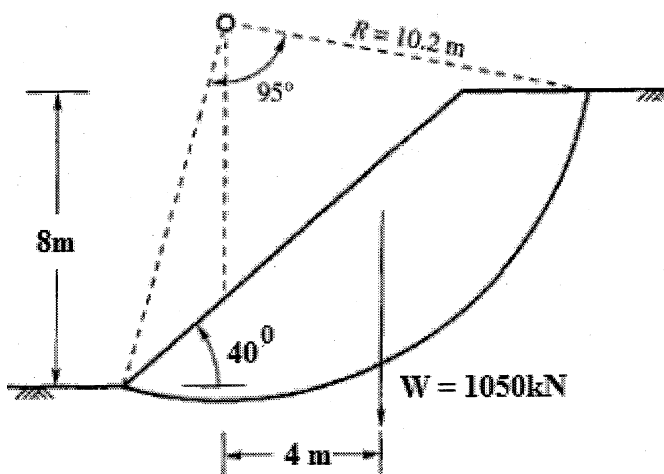


Fig. 1





SLR-TJ – 44

Seat No.	
----------	--

Set 

P
---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – II**

Day and Date : Thursday, 23-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Solve **any three** questions from Section – I i.e. Questions No. 2 to Question No. 5 and in Section – II and solve **any three** questions from Question No. 6 to Question No. 9.
  - 2) Figure to the **right** indicate **full** marks.
  - 3) **Assume** suitable data **wherever** necessary and mention it **clearly**.
  - 4) Use of non programmable calculator is **allowed**.
  - 5) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) The design period for main sewers is considered as \_\_\_\_\_ years.  
a) 10                      b) 20                      c) 30                      d) 40
- 2) HMD of sewer running full is  
a) D/4                      b) D/2                      c) D                      d) 2D
- 3) Imhoff cone is used to measure \_\_\_\_\_ solids in the sewage.  
a) Volatile                      b) Suspended                      c) Settleable                      d) None of these
- 4) For a any wastewater sample COD is always \_\_\_\_\_ than BOD.  
a) Lesser                      b) Greater                      c) Equal                      d) No such relation
- 5) The term sludge age is associated with  
a) Aeration tank in ASP                      b) Sedimentation  
c) Trickling filter                      d) None of these
- 6) Under drainage system in low rate trickling filter should run  
a) Full                      b) Partially full (less than 50%)  
c) Empty                      d) None of these
- 7) Septic tank is  
a) Settling tank                      b) Digestion tank  
c) Combination of a) and b)                      d) None of these

P.T.O.



- 8) \_\_\_\_\_ is the ultimate disposal option considered in municipal solid waste management system.  
a) Open burning    b) Incineration    c) Landfill    d) Composting
- 9) The standard rate of DALR is \_\_\_\_\_ °C/100m.  
a) – 1    b) +1    c) – 0.1    d) + 0.1
- 10) DO level in the stream may be zero in the zone of  
a) Clear water    b) Degradation  
c) Active degradation    d) Recovery
- 11) \_\_\_\_\_ which of the following is not a combustible waste.  
a) Wood    b) Cardboard    c) Bagasse    d) Glass
- 12) CO combines with Hemoglobin to form  
a) Carboxy-Hemoglobin    b) Epoxy-Hemoglobin  
c) Mucus    d) Pneumonia
- 13) The primary pollutant caused by incomplete combustion of organic matter is  
a) Sulphur dioxide    b) Carbon monoxide  
c) Ozone    d) Oxides of nitrogen
- 14) The quantity of refuse is expressed in  
a) kg/capita/sec    b) kg/capita/year  
c) kg/capita/hr    d) kg/capita/day
-



Seat No.	
----------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – II**

Day and Date : Thursday, 23-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :**
- 1) Solve **any three** questions from Section – I i.e. Questions No. 2 to Question No. 5 and in Section – II and solve **any three** questions from Question No. 6 to Question No. 9.
  - 2) Figure to the **right** indicate **full** marks.
  - 3) **Assume** suitable data **wherever** necessary and mention it **clearly**.
  - 4) Use of non programmable calculator is **allowed**.

SECTION – I

2. a) Under what circumstances sewage pumping stations are provided ? Discuss in detail. What are problems associated with sewage pumping ? **5**
- b) 6 ml of wastewater is diluted to 300 ml distilled water in standard BOD bottle. Initial Do in the bottle is determined to be 8.5 mg/l. Do after 5 days at 20° C is found to be 5 mg/l. Determine BOD<sub>5</sub> of wastewater and compute the ultimate BOD. **5**
3. a) Enlist modifications in ASP. Also explain any one modification in detail. **4**
- b) Find the minimum velocity and gradient required to transport coarse sand through a sewer of 60 cm dia. with sand particles of 1 mm dia. and specific gravity 2.66. Assume  $\beta = 0.06$  and  $f = 0.02$ . Assume the sewer to run half full. Take  $N = 0.012$ . **5**
4. a) Differentiate between standard rate and high rate trickling filter. **4**
- b) The MLSS concentration in an aeration tank is 2000 mg/Lit. and sludge volume after 30 minutes of settling in a 100 ml graduated cylinder is 176 ml.  
Calculate :
  - i) SVI
  - ii) SDI
  - iii) Required return sludge ratio
  - iv) SS concentration in the recirculate sludge. **5**



5. Write short note on :
- a) Design of septic tank by rational method. **3**
  - b) Steps in anaerobic digestion process. **3**
  - c) Bacteria algal symbiosis in oxidation ponds. **3**

SECTION – II

6. a) Explain with neat sketch Deoxygenating and reoxygenation curves. **5**  
b) Explain the principle and working of settling chamber with neat sketch. **5**
7. a) A stream, saturated with DO, has a flow of  $1.2 \text{ m}^3/\text{s}$ , BOD of  $4 \text{ mg/l}$  and rate constant of  $0.3$  per day. It receives an effluent discharge of  $0.25 \text{ m}^3/\text{s}$  having BOD  $20 \text{ mg/l}$ , DO  $5 \text{ mg/l}$  and rate constant  $0.13$  per day. The average velocity of flow of the stream is  $0.18 \text{ m/s}$ . Calculate the DO deficit at point  $20 \text{ km}$  and  $40 \text{ km}$  downstream. Assume that the temperature is  $20^\circ \text{C}$  throughout and BOD is measured at  $5$  days. Take saturation DO at  $20^\circ \text{C}$  as  $9.17 \text{ mg/l}$ . **5**  
b) Write advantages and disadvantages of decentralized wastewater treatment system. **4**
8. a) Define Air Pollution and give classification of air pollutants. **4**  
b) Explain with a neat sketch working of cyclone chamber. **5**
9. Write short note on :
- a) Composting by Trenching method. **3**
  - b) Effects of air pollutant on man. **3**
  - c) Zones of pollution in streams. **3**
-



SLR-TJ – 44

Seat No.	
----------	--

Set **Q**

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – II**

Day and Date : Thursday, 23-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Solve **any three** questions from Section – I i.e. Questions No. 2 to Question No. 5 and in Section – II and solve **any three** questions from Question No. 6 to Question No. 9.
  - 2) Figure to the **right** indicate **full** marks.
  - 3) **Assume** suitable data **wherever** necessary and mention it **clearly**.
  - 4) Use of non programmable calculator is **allowed**.
  - 5) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) \_\_\_\_\_ is the ultimate disposal option considered in municipal solid waste management system.  
a) Open burning    b) Incineration    c) Landfill    d) Composting
- 2) The standard rate of DALR is \_\_\_\_\_ °C/100m.  
a) – 1    b) +1    c) – 0.1    d) + 0.1
- 3) DO level in the stream may be zero in the zone of  
a) Clear water    b) Degradation  
c) Active degradation    d) Recovery
- 4) \_\_\_\_\_ which of the following is not a combustible waste.  
a) Wood    b) Cardboard    c) Bagasse    d) Glass
- 5) CO combines with Hemoglobin to form  
a) Carboxy-Hemoglobin    b) Epoxy-Hemoglobin  
c) Mucus    d) Pneumonia
- 6) The primary pollutant caused by incomplete combustion of organic matter is  
a) Sulphur dioxide    b) Carbon monoxide  
c) Ozone    d) Oxides of nitrogen
- 7) The quantity of refuse is expressed in  
a) kg/capita/sec    b) kg/capita/year  
c) kg/capita/hr    d) kg/capita/day

P.T.O.



- 8) The design period for main sewers is considered as \_\_\_\_\_ years.  
a) 10                      b) 20                      c) 30                      d) 40
- 9) HMD of sewer running full is  
a)  $D/4$                       b)  $D/2$                       c)  $D$                       d)  $2D$
- 10) Imhoff cone is used to measure \_\_\_\_\_ solids in the sewage.  
a) Volatile                      b) Suspended                      c) Settleable                      d) None of these
- 11) For a any wastewater sample COD is always \_\_\_\_\_ than BOD.  
a) Lesser                      b) Greater                      c) Equal                      d) No such relation
- 12) The term sludge age is associated with  
a) Aeration tank in ASP                      b) Sedimentation  
c) Trickling filter                      d) None of these
- 13) Under drainage system in low rate trickling filter should run  
a) Full                      b) Partially full (less than 50%)  
c) Empty                      d) None of these
- 14) Septic tank is  
a) Settling tank                      b) Digestion tank  
c) Combination of a) and b)                      d) None of these
-



Seat No.	
----------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – II**

Day and Date : Thursday, 23-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :**
- 1) Solve **any three** questions from Section – I i.e. Questions No. 2 to Question No. 5 and in Section – II and solve **any three** questions from Question No. 6 to Question No. 9.
  - 2) Figure to the **right** indicate **full** marks.
  - 3) **Assume** suitable data **wherever** necessary and mention it **clearly**.
  - 4) Use of non programmable calculator is **allowed**.

SECTION – I

2. a) Under what circumstances sewage pumping stations are provided ? Discuss in detail. What are problems associated with sewage pumping ? **5**
- b) 6 ml of wastewater is diluted to 300 ml distilled water in standard BOD bottle. Initial Do in the bottle is determined to be 8.5 mg/l. Do after 5 days at 20° C is found to be 5 mg/l. Determine BOD<sub>5</sub> of wastewater and compute the ultimate BOD. **5**
3. a) Enlist modifications in ASP. Also explain any one modification in detail. **4**
- b) Find the minimum velocity and gradient required to transport coarse sand through a sewer of 60 cm dia. with sand particles of 1 mm dia. and specific gravity 2.66. Assume  $\beta = 0.06$  and  $f = 0.02$ . Assume the sewer to run half full. Take  $N = 0.012$ . **5**
4. a) Differentiate between standard rate and high rate trickling filter. **4**
- b) The MLSS concentration in an aeration tank is 2000 mg/Lit. and sludge volume after 30 minutes of settling in a 100 ml graduated cylinder is 176 ml.  
Calculate :
  - i) SVI
  - ii) SDI
  - iii) Required return sludge ratio
  - iv) SS concentration in the recirculate sludge. **5**



5. Write short note on :
- a) Design of septic tank by rational method. **3**
  - b) Steps in anaerobic digestion process. **3**
  - c) Bacteria algal symbiosis in oxidation ponds. **3**

SECTION – II

6. a) Explain with neat sketch Deoxygenating and reoxygenation curves. **5**  
b) Explain the principle and working of settling chamber with neat sketch. **5**
7. a) A stream, saturated with DO, has a flow of  $1.2 \text{ m}^3/\text{s}$ , BOD of  $4 \text{ mg/l}$  and rate constant of 0.3 per day. It receives an effluent discharge of  $0.25 \text{ m}^3/\text{s}$  having BOD  $20 \text{ mg/l}$ , DO  $5 \text{ mg/l}$  and rate constant 0.13 per day. The average velocity of flow of the stream is  $0.18 \text{ m/s}$ . Calculate the DO deficit at point 20 km and 40 km downstream. Assume that the temperature is  $20^\circ \text{C}$  throughout and BOD is measured at 5 days. Take saturation DO at  $20^\circ \text{C}$  as  $9.17 \text{ mg/l}$ . **5**  
b) Write advantages and disadvantages of decentralized wastewater treatment system. **4**
8. a) Define Air Pollution and give classification of air pollutants. **4**  
b) Explain with a neat sketch working of cyclone chamber. **5**
9. Write short note on :
- a) Composting by Trenching method. **3**
  - b) Effects of air pollutant on man. **3**
  - c) Zones of pollution in streams. **3**
-





SLR-TJ – 44

Seat No.	
----------	--

Set 

R
---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – II**

Day and Date : Thursday, 23-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Solve **any three** questions from Section – I i.e. Questions No. 2 to Question No. 5 and in Section – II and solve **any three** questions from Question No. 6 to Question No. 9.
  - 2) Figure to the **right** indicate **full** marks.
  - 3) **Assume** suitable data **wherever** necessary and mention it **clearly**.
  - 4) Use of non programmable calculator is **allowed**.
  - 5) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) The term sludge age is associated with
  - a) Aeration tank in ASP
  - b) Sedimentation
  - c) Trickling filter
  - d) None of these
- 2) Under drainage system in low rate trickling filter should run
  - a) Full
  - b) Partially full (less than 50%)
  - c) Empty
  - d) None of these
- 3) Septic tank is
  - a) Settling tank
  - b) Digestion tank
  - c) Combination of a) and b)
  - d) None of these
- 4) \_\_\_\_\_ is the ultimate disposal option considered in municipal solid waste management system.
  - a) Open burning
  - b) Incineration
  - c) Landfill
  - d) Composting
- 5) The standard rate of DALR is \_\_\_\_\_ °C/100m.
  - a) – 1
  - b) +1
  - c) – 0.1
  - d) + 0.1
- 6) DO level in the stream may be zero in the zone of
  - a) Clear water
  - b) Degradation
  - c) Active degradation
  - d) Recovery

P.T.O.



- 7) \_\_\_\_\_ which of the following is not a combustible waste.  
a) Wood                      b) Cardboard              c) Bagasse              d) Glass
- 8) CO combines with Hemoglobin to form  
a) Carboxy-Hemoglobin              b) Epoxy-Hemoglobin  
c) Mucus                      d) Pneumonia
- 9) The primary pollutant caused by incomplete combustion of organic matter is  
a) Sulphur dioxide              b) Carbon monoxide  
c) Ozone                      d) Oxides of nitrogen
- 10) The quantity of refuse is expressed in  
a) kg/capita/sec              b) kg/capita/year  
c) kg/capita/hr              d) kg/capita/day
- 11) The design period for main sewers is considered as \_\_\_\_\_ years.  
a) 10                      b) 20                      c) 30                      d) 40
- 12) HMD of sewer running full is  
a) D/4                      b) D/2                      c) D                      d) 2D
- 13) Imhoff cone is used to measure \_\_\_\_\_ solids in the sewage.  
a) Volatile                      b) Suspended              c) Settleable              d) None of these
- 14) For a any wastewater sample COD is always \_\_\_\_\_ than BOD.  
a) Lesser                      b) Greater                      c) Equal                      d) No such relation
-



Seat No.	
----------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – II**

Day and Date : Thursday, 23-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :**
- 1) Solve **any three** questions from Section – I i.e. Questions No. 2 to Question No. 5 and in Section – II and solve **any three** questions from Question No. 6 to Question No. 9.
  - 2) Figure to the **right** indicate **full** marks.
  - 3) **Assume** suitable data **wherever** necessary and mention it **clearly**.
  - 4) Use of non programmable calculator is **allowed**.

SECTION – I

2. a) Under what circumstances sewage pumping stations are provided ? Discuss in detail. What are problems associated with sewage pumping ? **5**
- b) 6 ml of wastewater is diluted to 300 ml distilled water in standard BOD bottle. Initial Do in the bottle is determined to be 8.5 mg/l. Do after 5 days at 20° C is found to be 5 mg/l. Determine BOD<sub>5</sub> of wastewater and compute the ultimate BOD. **5**
3. a) Enlist modifications in ASP. Also explain any one modification in detail. **4**
- b) Find the minimum velocity and gradient required to transport coarse sand through a sewer of 60 cm dia. with sand particles of 1 mm dia. and specific gravity 2.66. Assume  $\beta = 0.06$  and  $f = 0.02$ . Assume the sewer to run half full. Take  $N = 0.012$ . **5**
4. a) Differentiate between standard rate and high rate trickling filter. **4**
- b) The MLSS concentration in an aeration tank is 2000 mg/Lit. and sludge volume after 30 minutes of settling in a 100 ml graduated cylinder is 176 ml.  
Calculate :
  - i) SVI
  - ii) SDI
  - iii) Required return sludge ratio
  - iv) SS concentration in the recirculate sludge. **5**



5. Write short note on :
- a) Design of septic tank by rational method. **3**
  - b) Steps in anaerobic digestion process. **3**
  - c) Bacteria algal symbiosis in oxidation ponds. **3**

SECTION – II

6. a) Explain with neat sketch Deoxygenating and reoxygenation curves. **5**  
b) Explain the principle and working of settling chamber with neat sketch. **5**
7. a) A stream, saturated with DO, has a flow of  $1.2 \text{ m}^3/\text{s}$ , BOD of  $4 \text{ mg/l}$  and rate constant of 0.3 per day. It receives an effluent discharge of  $0.25 \text{ m}^3/\text{s}$  having BOD  $20 \text{ mg/l}$ , DO  $5 \text{ mg/l}$  and rate constant 0.13 per day. The average velocity of flow of the stream is  $0.18 \text{ m/s}$ . Calculate the DO deficit at point 20 km and 40 km downstream. Assume that the temperature is  $20^\circ \text{C}$  throughout and BOD is measured at 5 days. Take saturation DO at  $20^\circ \text{C}$  as  $9.17 \text{ mg/l}$ . **5**  
b) Write advantages and disadvantages of decentralized wastewater treatment system. **4**
8. a) Define Air Pollution and give classification of air pollutants. **4**  
b) Explain with a neat sketch working of cyclone chamber. **5**
9. Write short note on :
- a) Composting by Trenching method. **3**
  - b) Effects of air pollutant on man. **3**
  - c) Zones of pollution in streams. **3**
-



SLR-TJ – 44

Seat No.	
----------	--

Set 

S
---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – II**

Day and Date : Thursday, 23-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Solve **any three** questions from Section – I i.e. Questions No. 2 to Question No. 5 and in Section – II and solve **any three** questions from Question No. 6 to Question No. 9.
  - 2) Figure to the **right** indicate **full** marks.
  - 3) **Assume** suitable data **wherever** necessary and mention it **clearly**.
  - 4) Use of non programmable calculator is **allowed**.
  - 5) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) DO level in the stream may be zero in the zone of
  - a) Clear water
  - b) Degradation
  - c) Active degradation
  - d) Recovery
- 2) \_\_\_\_\_ which of the following is not a combustible waste.
  - a) Wood
  - b) Cardboard
  - c) Bagasse
  - d) Glass
- 3) CO combines with Hemoglobin to form
  - a) Carboxy-Hemoglobin
  - b) Epoxy-Hemoglobin
  - c) Mucus
  - d) Pneumonia
- 4) The primary pollutant caused by incomplete combustion of organic matter is
  - a) Sulphur dioxide
  - b) Carbon monoxide
  - c) Ozone
  - d) Oxides of nitrogen
- 5) The quantity of refuse is expressed in
  - a) kg/capita/sec
  - b) kg/capita/year
  - c) kg/capita/hr
  - d) kg/capita/day
- 6) The design period for main sewers is considered as \_\_\_\_\_ years.
  - a) 10
  - b) 20
  - c) 30
  - d) 40

P.T.O.



- 7) HMD of sewer running full is  
a)  $D/4$                       b)  $D/2$                       c)  $D$                       d)  $2D$
- 8) Imhoff cone is used to measure \_\_\_\_\_ solids in the sewage.  
a) Volatile                      b) Suspended                      c) Settleable                      d) None of these
- 9) For a any wastewater sample COD is always \_\_\_\_\_ than BOD.  
a) Lesser                      b) Greater                      c) Equal                      d) No such relation
- 10) The term sludge age is associated with  
a) Aeration tank in ASP                      b) Sedimentation  
c) Trickling filter                      d) None of these
- 11) Under drainage system in low rate trickling filter should run  
a) Full                      b) Partially full (less than 50%)  
c) Empty                      d) None of these
- 12) Septic tank is  
a) Settling tank                      b) Digestion tank  
c) Combination of a) and b)                      d) None of these
- 13) \_\_\_\_\_ is the ultimate disposal option considered in municipal solid waste management system.  
a) Open burning                      b) Incineration                      c) Landfill                      d) Composting
- 14) The standard rate of DALR is \_\_\_\_\_ °C/100m.  
a)  $-1$                       b)  $+1$                       c)  $-0.1$                       d)  $+0.1$
-



Seat No.	
----------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENVIRONMENTAL ENGINEERING – II**

Day and Date : Thursday, 23-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :**
- 1) Solve **any three** questions from Section – I i.e. Questions No. 2 to Question No. 5 and in Section – II and solve **any three** questions from Question No. 6 to Question No. 9.
  - 2) Figure to the **right** indicate **full** marks.
  - 3) **Assume** suitable data **wherever** necessary and mention it **clearly**.
  - 4) Use of non programmable calculator is **allowed**.

SECTION – I

2. a) Under what circumstances sewage pumping stations are provided ? Discuss in detail. What are problems associated with sewage pumping ? **5**
- b) 6 ml of wastewater is diluted to 300 ml distilled water in standard BOD bottle. Initial Do in the bottle is determined to be 8.5 mg/l. Do after 5 days at 20° C is found to be 5 mg/l. Determine BOD<sub>5</sub> of wastewater and compute the ultimate BOD. **5**
3. a) Enlist modifications in ASP. Also explain any one modification in detail. **4**
- b) Find the minimum velocity and gradient required to transport coarse sand through a sewer of 60 cm dia. with sand particles of 1 mm dia. and specific gravity 2.66. Assume  $\beta = 0.06$  and  $f = 0.02$ . Assume the sewer to run half full. Take  $N = 0.012$ . **5**
4. a) Differentiate between standard rate and high rate trickling filter. **4**
- b) The MLSS concentration in an aeration tank is 2000 mg/Lit. and sludge volume after 30 minutes of settling in a 100 ml graduated cylinder is 176 ml.  
Calculate :
  - i) SVI
  - ii) SDI
  - iii) Required return sludge ratio
  - iv) SS concentration in the recirculate sludge. **5**



5. Write short note on :
- a) Design of septic tank by rational method. **3**
  - b) Steps in anaerobic digestion process. **3**
  - c) Bacteria algal symbiosis in oxidation ponds. **3**

SECTION – II

6. a) Explain with neat sketch Deoxygenating and reoxygenation curves. **5**  
b) Explain the principle and working of settling chamber with neat sketch. **5**
7. a) A stream, saturated with DO, has a flow of  $1.2 \text{ m}^3/\text{s}$ , BOD of  $4 \text{ mg/l}$  and rate constant of  $0.3$  per day. It receives an effluent discharge of  $0.25 \text{ m}^3/\text{s}$  having BOD  $20 \text{ mg/l}$ , DO  $5 \text{ mg/l}$  and rate constant  $0.13$  per day. The average velocity of flow of the stream is  $0.18 \text{ m/s}$ . Calculate the DO deficit at point  $20 \text{ km}$  and  $40 \text{ km}$  downstream. Assume that the temperature is  $20^\circ \text{C}$  throughout and BOD is measured at  $5$  days. Take saturation DO at  $20^\circ \text{C}$  as  $9.17 \text{ mg/l}$ . **5**  
b) Write advantages and disadvantages of decentralized wastewater treatment system. **4**
8. a) Define Air Pollution and give classification of air pollutants. **4**  
b) Explain with a neat sketch working of cyclone chamber. **5**
9. Write short note on :
- a) Composting by Trenching method. **3**
  - b) Effects of air pollutant on man. **3**
  - c) Zones of pollution in streams. **3**
-





SLR-TJ – 45

Seat No.	
----------	--

Set	P
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGINEERING MANAGEMENT – II**

Day and Date : Friday, 24-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book on Page No. 3. Each question carries 1 mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Assume suitable data if necessary but mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) Choose the correct statement from the following.
  - 1) A WBS need not be hierarchical in nature
  - 2) A WBS is a framework for converting project objectives to specific deliverables
  - 3) A WBS need not be comprehensive, there can be gaps in job logic
  - 4) A WBS should have a level of detail required to plan, communicate, monitor and control the project
  - a) All the above are true
  - b) 1 and 2 are true; 3 and 4 are false
  - c) 2 and 3 are true; 1 and 4 are false
  - d) 2 and 4 are true; 1 and 3 are false
- 2) Identify the correct statements about WBS.
  - 1) A WBS can have multiple dimensions
  - 2) The greater the number of positive answers for WBS level of detail guidelines, the weaker the justification for breaking down the work package
  - 3) Activities are the lowest elements of a WBS
  - 4) A lower level (child) WBS element represents 100% of work applicable to the next higher element (parent)
  - a) True – 1, 2 and 4; False – 3
  - b) True – 2, 3 and 4; False – 1
  - c) True – 1, 3 and 4; False – 2
  - d) All the above are True
- 3) Choose the best option that fits the following statement.  
The \_\_\_\_\_ of time management tools depends on the \_\_\_\_\_ of the project.
  - a) Identity, Quality
  - b) Utility, Complexity
  - c) Functionality, Creativity
  - d) Equity, Quantity
- 4) Identify the possible generic sequence to develop a Gantt chart for the 8 steps given below :
  - 1) Identify milestones
  - 2) Represent activity duration with rectangle bars
  - 3) Track the progress
  - 4) Identify duration and sequence of activity
  - 5) Identify activities

P.T.O.



- 6) Draw horizontal time axis  
 7) Shade the bars when activities are complete  
 8) Write activities in the column left hand side
- a) Step – 5, 1, 4, 6, 8, 2, 7, 3                      b) Step – 1, 3, 5, 7, 4, 8, 2, 6  
 c) Step – 1, 3, 5, 7, 8, 2, 4, 6                      d) Step – 2, 4, 6, 8, 1, 3, 5, 7
- 5) Bar charts
- 1) Can represent only continuous activities and cannot represent discontinuous activities  
 2) Will not be suitable to represent projects with a number of activities  
 3) Can be used as a good summary tool  
 4) Can represent dependencies between activities
- a) True – 1 and 2; False – 3 and 4                      b) True – 1 and 3; False – 2 and 4  
 c) True – 2 and 3; False – 1 and 4                      d) True – 1 and 4; False – 2 and 3
- 6) The key disadvantage of a bar chart is that \_\_\_\_\_ cannot be represented.
- a) Dependency                      b) Duration                      c) Progress                      d) Finish
- 7) The advantage of a bar chart is that
- 1) Intuitive representation                      2) A good communication tool  
 3) Suitable for many numbers of activities                      4) Ideal for simple projects
- a) True : 1, 2 and 3                      b) True : 2, 3 and 4                      c) True 1, 2 and 4                      d) True : 1 and 4
- 8) When total interest charged is directly proportional to principal amount invested, the interest rate and no. of years for which that principal amount is invested is called
- a) Interest                      b) Simple interest                      c) Compound interest                      d) Effective interest
- 9) For finding how much additional capital expenditure is necessary at represent time to achieve future cost benefits over the life of facility is
- a) Value Engineering                      b) Sensitivity Analysis                      c) Life cycle                      d) None of these
- 10) 20% rate per month compounded biannually is \_\_\_\_\_ type of interest rate.
- a) Nominal                      b) Effective                      c) Simple                      d) None of these
- 11) A person has taken a personal loan finance, EMI will be decided using
- a) USCAF                      b) USCRF                      c) USPWF                      d) USSFF
- 12) The value of machinery obtained when it becomes absolutely useless except for sale as junk is
- a) Bank value                      b) Salvage value                      c) Scrap value                      d) Distress value
- 13) To get fixed amount after particular period how much money will have to be deposited at the end of equal period is calculated using
- a) USPWF                      b) USSFF                      c) USCAF                      d) USCRF
- 14) If an interest rate is being compounded quarterly, the period 'n' is equal to
- a) 4                      b) 6                      c) 12                      d) 1
-



<b>Seat No.</b>	
-----------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGINEERING MANAGEMENT – II**

Day and Date : Friday, 24-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) Q. 2 and 6 are **compulsory**. Attempt **any two** out of Q. 3 to Q. 5 and **any two** out of Q. 7 to Q. 9.  
2) **Assume** suitable data if necessary but mention it **clearly**.

SECTION – I

2. A) Use the following data. The cost expenditure for performing the six activities, start date, duration is given in Table 1. Draw a bar chart and find the respective total cost on day 3, day 5 and day 6. 5

**Table 1**

Activity	Start on day	Duration	Cost/day
A	2	2	Rs. 4,550
B	3	3	Rs. 3,175
C	4	2	Rs. 6,995
D	5	3	Rs. 1,556
E	5	4	Rs. 789
F	9	1	Rs. 9,000

- B) Use the following data given in Table 2.

Activity	Duration	Predecessor
A	2	–
B	4	A
C	3	A
D	6	B, C
E	7	B
F	3	D, E

Draw the network. Show the duration and critical path of the project network. What are the ES, EF, LS, LF of the activity D ? 5

3. A) Draw the network. Show the duration and critical path of the project network. 5

	Activity	Predecessor	Duration
1	Start	–	0
2	Excavate	1	1
3	Anchor 1	2	2
4	Footing 1	2	3



5	Tower 1	4	2
6	Footing 2	4	3
7	Tower 2	5, 6	2
8	Anchor 2	3	2
9	Braces and guys	7, 8	2
10	String cables	7, 8	4
11	Hangers and pipe racks	10	4
12	Lay pipes	9, 11	3
13	Paint	12	2

B) Calculate all types of floats for all the activities in the network of Q. 3 (A).

4

4. A) The details of the Project network are given below in table.

Activity	Predecessor	Optimistic (days)	Most Likely (days)	Pessimistic (days)
A	–	2	3	5
B	–	2	4	6
C	–	4	8	14
D	A	4	8	12
E	B	8	10	15
F	B	3	3	6
G	C	6	9	12
H	D, E	2	7	9
I	E, D	1	3	7
J	F, G	2	6	10
K	F, G	4	7	10

Calculate the standard deviation for the project.

5

B) The details of the project network are given below in table.

Activity	Predecessors	Duration (days)	Resource Rate/day
A	B, C	7	7
B	–	6	5
C	–	5	6
D	C	4	3
E	A	9	2
F	D	6	4
G	D	11	4
H	F	8	6
I	E	4	3
J	I	6	2
K	H, I	9	5

If all activities are started on early start what is the maximum daily resource requirement.

4



5. Write short notes on : 9
- i) Reports generated by Project Management Software.
  - ii) Role of information in decision making.
  - iii) Precedence network.

SECTION – II

6. a) What are the various types of non-discounting methods ? Explain Payback period method. 4
- b) A building has been rented on an annual rent of Rs. 4,800. The life of the building is expected to be 12 years. If the major repairs to the building are done now, its life shall be increased by another 15 years. The major repairs will cost Rs. 25,000.
- Determine whether it would be economical to do the major repair of the building or not,  $i = 6\%$  per year. 6
7. a) What is the difference between nominal interest rate and effective interest rate ? 4
- b) When his son was born, a man deposited a sum of money in a saving bank at 10% interest per year compounded quarterly. On his 20<sup>th</sup> birthday the son received Rs. 1,00,000 that had accumulated. How much his father did deposited 20 years before ? 5
8. a) What is Time value of money ? 4
- b) A building which having a life of 80 years and 2 choices are available for a particular component replacement of the building. Choice A-Initial cost and replacement cost same as Rs. 4,000 and life of component 20 years. Choice B – Initial cost and replacement cost same as Rs. 6,000 and life of the component 40 years. Money worth is 5%, find the more economical choice. 5
9. Write a short note on (3 marks each) : 9
- a) Value engineering
  - b) Life Cycle costing
  - c) Capitalised cost method.
-



SLR-TJ – 45

Seat No.	
----------	--

Set	Q
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGINEERING MANAGEMENT – II**

Day and Date : Friday, 24-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book on Page No. 3. Each question carries 1 mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Assume suitable data if necessary but mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) When total interest charged is directly proportional to principal amount invested, the interest rate and no. of years for which that principal amount is invested is called
  - a) Interest
  - b) Simple interest
  - c) Compound interest
  - d) Effective interest
- 2) For finding how much additional capital expenditure is necessary at represent time to achieve future cost benefits over the life of facility is
  - a) Value Engineering
  - b) Sensitivity Analysis
  - c) Life cycle
  - d) None of these
- 3) 20% rate per month compounded biannually is \_\_\_\_\_ type of interest rate.
  - a) Nominal
  - b) Effective
  - c) Simple
  - d) None of these
- 4) A person has taken a personal loan finance, EMI will be decided using
  - a) USCAF
  - b) USCRF
  - c) USPWF
  - d) USSFF
- 5) The value of machinery obtained when it becomes absolutely useless except for sale as junk is
  - a) Bank value
  - b) Salvage value
  - c) Scrap value
  - d) Distress value
- 6) To get fixed amount after particular period how much money will have to be deposited at the end of equal period is calculated using
  - a) USPWF
  - b) USSFF
  - c) USCAF
  - d) USCRF
- 7) If an interest rate is being compounded quarterly, the period 'n' is equal to
  - a) 4
  - b) 6
  - c) 12
  - d) 1
- 8) Choose the correct statement from the following.
  - 1) A WBS need not be hierarchical in nature
  - 2) A WBS is a framework for converting project objectives to specific deliverables
  - 3) A WBS need not be comprehensive, there can be gaps in job logic
  - 4) A WBS should have a level of detail required to plan, communicate, monitor and control the project
  - a) All the above are true
  - b) 1 and 2 are true; 3 and 4 are false
  - c) 2 and 3 are true; 1 and 4 are false
  - d) 2 and 4 are true; 1 and 3 are false

P.T.O.



- 9) Identify the correct statements about WBS.
- 1) A WBS can have multiple dimensions
  - 2) The greater the number of positive answers for WBS level of detail guidelines, the weaker the justification for breaking down the work package
  - 3) Activities are the lowest elements of a WBS
  - 4) A lower level (child) WBS element represents 100% of work applicable to the next higher element (parent)
- a) True – 1, 2 and 4; False – 3                      b) True – 2, 3 and 4; False – 1  
c) True – 1, 3 and 4; False – 2                      d) All the above are True
- 10) Choose the best option that fits the following statement.  
The \_\_\_\_\_ of time management tools depends on the \_\_\_\_\_ of the project.
- a) Identity, Quality                                      b) Utility, Complexity  
c) Functionality, Creativity                          d) Equity, Quantity
- 11) Identify the possible generic sequence to develop a Gantt chart for the 8 steps given below :
- 1) Identify milestones
  - 2) Represent activity duration with rectangle bars
  - 3) Track the progress
  - 4) Identify duration and sequence of activity
  - 5) Identify activities
  - 6) Draw horizontal time axis
  - 7) Shade the bars when activities are complete
  - 8) Write activities in the column left hand side
- a) Step – 5, 1, 4, 6, 8, 2, 7, 3                      b) Step – 1, 3, 5, 7, 4, 8, 2, 6  
c) Step – 1, 3, 5, 7, 8, 2, 4, 6                      d) Step – 2, 4, 6, 8, 1, 3, 5, 7
- 12) Bar charts
- 1) Can represent only continuous activities and cannot represent discontinuous activities
  - 2) Will not be suitable to represent projects with a number of activities
  - 3) Can be used as a good summary tool
  - 4) Can represent dependencies between activities
- a) True – 1 and 2; False – 3 and 4                      b) True – 1 and 3; False – 2 and 4  
c) True – 2 and 3; False – 1 and 4                      d) True – 1 and 4; False – 2 and 3
- 13) The key disadvantage of a bar chart is that \_\_\_\_\_ cannot be represented.
- a) Dependency                      b) Duration                      c) Progress                      d) Finish
- 14) The advantage of a bar chart is that
- 1) Intuitive representation
  - 2) A good communication tool
  - 3) Suitable for many numbers of activities
  - 4) Ideal for simple projects
- a) True : 1, 2 and 3                      b) True : 2, 3 and 4                      c) True 1, 2 and 4                      d) True : 1 and 4
-



<b>Seat No.</b>	
-----------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGINEERING MANAGEMENT – II**

Day and Date : Friday, 24-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) Q. 2 and 6 are **compulsory**. Attempt **any two** out of Q. 3 to Q. 5 and **any two** out of Q. 7 to Q. 9.  
2) **Assume** suitable data if necessary but mention it **clearly**.

SECTION – I

2. A) Use the following data. The cost expenditure for performing the six activities, start date, duration is given in Table 1. Draw a bar chart and find the respective total cost on day 3, day 5 and day 6. 5

**Table 1**

Activity	Start on day	Duration	Cost/day
A	2	2	Rs. 4,550
B	3	3	Rs. 3,175
C	4	2	Rs. 6,995
D	5	3	Rs. 1,556
E	5	4	Rs. 789
F	9	1	Rs. 9,000

- B) Use the following data given in Table 2.

Activity	Duration	Predecessor
A	2	–
B	4	A
C	3	A
D	6	B, C
E	7	B
F	3	D, E

Draw the network. Show the duration and critical path of the project network. What are the ES, EF, LS, LF of the activity D ? 5

3. A) Draw the network. Show the duration and critical path of the project network. 5

	Activity	Predecessor	Duration
1	Start	–	0
2	Excavate	1	1
3	Anchor 1	2	2
4	Footing 1	2	3





5	Tower 1	4	2
6	Footing 2	4	3
7	Tower 2	5, 6	2
8	Anchor 2	3	2
9	Braces and guys	7, 8	2
10	String cables	7, 8	4
11	Hangers and pipe racks	10	4
12	Lay pipes	9, 11	3
13	Paint	12	2

B) Calculate all types of floats for all the activities in the network of Q. 3 (A).

4

4. A) The details of the Project network are given below in table.

Activity	Predecessor	Optimistic (days)	Most Likely (days)	Pessimistic (days)
A	–	2	3	5
B	–	2	4	6
C	–	4	8	14
D	A	4	8	12
E	B	8	10	15
F	B	3	3	6
G	C	6	9	12
H	D, E	2	7	9
I	E, D	1	3	7
J	F, G	2	6	10
K	F, G	4	7	10

Calculate the standard deviation for the project.

5

B) The details of the project network are given below in table.

Activity	Predecessors	Duration (days)	Resource Rate/day
A	B, C	7	7
B	–	6	5
C	–	5	6
D	C	4	3
E	A	9	2
F	D	6	4
G	D	11	4
H	F	8	6
I	E	4	3
J	I	6	2
K	H, I	9	5

If all activities are started on early start what is the maximum daily resource requirement.

4



5. Write short notes on : 9
- i) Reports generated by Project Management Software.
  - ii) Role of information in decision making.
  - iii) Precedence network.

SECTION – II

6. a) What are the various types of non-discounting methods ? Explain Payback period method. 4
- b) A building has been rented on an annual rent of Rs. 4,800. The life of the building is expected to be 12 years. If the major repairs to the building are done now, its life shall be increased by another 15 years. The major repairs will cost Rs. 25,000.
- Determine whether it would be economical to do the major repair of the building or not,  $i = 6\%$  per year. 6
7. a) What is the difference between nominal interest rate and effective interest rate ? 4
- b) When his son was born, a man deposited a sum of money in a saving bank at 10% interest per year compounded quarterly. On his 20<sup>th</sup> birthday the son received Rs. 1,00,000 that had accumulated. How much his father did deposited 20 years before ? 5
8. a) What is Time value of money ? 4
- b) A building which having a life of 80 years and 2 choices are available for a particular component replacement of the building. Choice A-Initial cost and replacement cost same as Rs. 4,000 and life of component 20 years. Choice B – Initial cost and replacement cost same as Rs. 6,000 and life of the component 40 years. Money worth is 5%, find the more economical choice. 5
9. Write a short note on (3 marks each) : 9
- a) Value engineering
  - b) Life Cycle costing
  - c) Capitalised cost method.
-



SLR-TJ – 45

Seat No.	
----------	--

Set	R
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGINEERING MANAGEMENT – II**

Day and Date : Friday, 24-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book on Page No. 3. Each question carries 1 mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Assume suitable data if necessary but mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) Bar charts
  - 1) Can represent only continuous activities and cannot represent discontinuous activities
  - 2) Will not be suitable to represent projects with a number of activities
  - 3) Can be used as a good summary tool
  - 4) Can represent dependencies between activities

a) True – 1 and 2; False – 3 and 4                      b) True – 1 and 3; False – 2 and 4  
c) True – 2 and 3; False – 1 and 4                      d) True – 1 and 4; False – 2 and 3
- 2) The key disadvantage of a bar chart is that \_\_\_\_\_ cannot be represented.  
a) Dependency                      b) Duration                      c) Progress                      d) Finish
- 3) The advantage of a bar chart is that
  - 1) Intuitive representation
  - 2) A good communication tool
  - 3) Suitable for many numbers of activities
  - 4) Ideal for simple projects

a) True : 1, 2 and 3                      b) True : 2, 3 and 4                      c) True 1, 2 and 4                      d) True : 1 and 4
- 4) When total interest charged is directly proportional to principal amount invested, the interest rate and no. of years for which that principal amount is invested is called  
a) Interest                      b) Simple interest                      c) Compound interest                      d) Effective interest
- 5) For finding how much additional capital expenditure is necessary at represent time to achieve future cost benefits over the life of facility is  
a) Value Engineering                      b) Sensitivity Analysis                      c) Life cycle                      d) None of these
- 6) 20% rate per month compounded biannually is \_\_\_\_\_ type of interest rate.  
a) Nominal                      b) Effective                      c) Simple                      d) None of these
- 7) A person has taken a personal loan finance, EMI will be decided using  
a) USCAF                      b) USCRF                      c) USPWF                      d) USSFF

P.T.O.



- 8) The value of machinery obtained when it becomes absolutely useless except for sale as junk is  
a) Bank value                      b) Salvage value                      c) Scrap value                      d) Distress value
- 9) To get fixed amount after particular period how much money will have to be deposited at the end of equal period is calculated using  
a) USPWF                      b) USSFF                      c) USCAF                      d) USCRF
- 10) If an interest rate is being compounded quarterly, the period 'n' is equal to  
a) 4                      b) 6                      c) 12                      d) 1
- 11) Choose the correct statement from the following.  
1) A WBS need not be hierarchical in nature  
2) A WBS is a framework for converting project objectives to specific deliverables  
3) A WBS need not be comprehensive, there can be gaps in job logic  
4) A WBS should have a level of detail required to plan, communicate, monitor and control the project  
a) All the above are true                      b) 1 and 2 are true; 3 and 4 are false  
c) 2 and 3 are true; 1 and 4 are false                      d) 2 and 4 are true; 1 and 3 are false
- 12) Identify the correct statements about WBS.  
1) A WBS can have multiple dimensions  
2) The greater the number of positive answers for WBS level of detail guidelines, the weaker the justification for breaking down the work package  
3) Activities are the lowest elements of a WBS  
4) A lower level (child) WBS element represents 100% of work applicable to the next higher element (parent)  
a) True – 1, 2 and 4; False – 3                      b) True – 2, 3 and 4; False – 1  
c) True – 1, 3 and 4; False – 2                      d) All the above are True
- 13) Choose the best option that fits the following statement.  
The \_\_\_\_\_ of time management tools depends on the \_\_\_\_\_ of the project.  
a) Identity, Quality                      b) Utility, Complexity  
c) Functionality, Creativity                      d) Equity, Quantity
- 14) Identify the possible generic sequence to develop a Gantt chart for the 8 steps given below :  
1) Identify milestones  
2) Represent activity duration with rectangle bars  
3) Track the progress  
4) Identify duration and sequence of activity  
5) Identify activities  
6) Draw horizontal time axis  
7) Shade the bars when activities are complete  
8) Write activities in the column left hand side  
a) Step – 5, 1, 4, 6, 8, 2, 7, 3                      b) Step – 1, 3, 5, 7, 4, 8, 2, 6  
c) Step – 1, 3, 5, 7, 8, 2, 4, 6                      d) Step – 2, 4, 6, 8, 1, 3, 5, 7



<b>Seat No.</b>	
-----------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGINEERING MANAGEMENT – II**

Day and Date : Friday, 24-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) Q. 2 and 6 are **compulsory**. Attempt **any two** out of Q. 3 to Q. 5 and **any two** out of Q. 7 to Q. 9.  
2) **Assume** suitable data if necessary but mention it **clearly**.

SECTION – I

2. A) Use the following data. The cost expenditure for performing the six activities, start date, duration is given in Table 1. Draw a bar chart and find the respective total cost on day 3, day 5 and day 6. 5

**Table 1**

Activity	Start on day	Duration	Cost/day
A	2	2	Rs. 4,550
B	3	3	Rs. 3,175
C	4	2	Rs. 6,995
D	5	3	Rs. 1,556
E	5	4	Rs. 789
F	9	1	Rs. 9,000

- B) Use the following data given in Table 2.

Activity	Duration	Predecessor
A	2	–
B	4	A
C	3	A
D	6	B, C
E	7	B
F	3	D, E

Draw the network. Show the duration and critical path of the project network. What are the ES, EF, LS, LF of the activity D ? 5

3. A) Draw the network. Show the duration and critical path of the project network. 5

	Activity	Predecessor	Duration
1	Start	–	0
2	Excavate	1	1
3	Anchor 1	2	2
4	Footing 1	2	3



5	Tower 1	4	2
6	Footing 2	4	3
7	Tower 2	5, 6	2
8	Anchor 2	3	2
9	Braces and guys	7, 8	2
10	String cables	7, 8	4
11	Hangers and pipe racks	10	4
12	Lay pipes	9, 11	3
13	Paint	12	2

B) Calculate all types of floats for all the activities in the network of Q. 3 (A).

4

4. A) The details of the Project network are given below in table.

Activity	Predecessor	Optimistic (days)	Most Likely (days)	Pessimistic (days)
A	–	2	3	5
B	–	2	4	6
C	–	4	8	14
D	A	4	8	12
E	B	8	10	15
F	B	3	3	6
G	C	6	9	12
H	D, E	2	7	9
I	E, D	1	3	7
J	F, G	2	6	10
K	F, G	4	7	10

Calculate the standard deviation for the project.

5

B) The details of the project network are given below in table.

Activity	Predecessors	Duration (days)	Resource Rate/day
A	B, C	7	7
B	–	6	5
C	–	5	6
D	C	4	3
E	A	9	2
F	D	6	4
G	D	11	4
H	F	8	6
I	E	4	3
J	I	6	2
K	H, I	9	5

If all activities are started on early start what is the maximum daily resource requirement.

4



5. Write short notes on : 9
- i) Reports generated by Project Management Software.
  - ii) Role of information in decision making.
  - iii) Precedence network.

SECTION – II

6. a) What are the various types of non-discounting methods ? Explain Payback period method. 4
- b) A building has been rented on an annual rent of Rs. 4,800. The life of the building is expected to be 12 years. If the major repairs to the building are done now, its life shall be increased by another 15 years. The major repairs will cost Rs. 25,000.
- Determine whether it would be economical to do the major repair of the building or not,  $i = 6\%$  per year. 6
7. a) What is the difference between nominal interest rate and effective interest rate ? 4
- b) When his son was born, a man deposited a sum of money in a saving bank at 10% interest per year compounded quarterly. On his 20<sup>th</sup> birthday the son received Rs. 1,00,000 that had accumulated. How much his father did deposited 20 years before ? 5
8. a) What is Time value of money ? 4
- b) A building which having a life of 80 years and 2 choices are available for a particular component replacement of the building. Choice A-Initial cost and replacement cost same as Rs. 4,000 and life of component 20 years. Choice B – Initial cost and replacement cost same as Rs. 6,000 and life of the component 40 years. Money worth is 5%, find the more economical choice. 5
9. Write a short note on (3 marks each) : 9
- a) Value engineering
  - b) Life Cycle costing
  - c) Capitalised cost method.
-



SLR-TJ – 45

Seat No.	
----------	--

Set	S
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGINEERING MANAGEMENT – II**

Day and Date : Friday, 24-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book on Page No. 3. Each question carries 1 mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Assume suitable data if necessary but mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) 20% rate per month compounded biannually is \_\_\_\_\_ type of interest rate.  
a) Nominal                      b) Effective                      c) Simple                      d) None of these
- 2) A person has taken a personal loan finance, EMI will be decided using  
a) USCAF                      b) USCRF                      c) USPWF                      d) USSFF
- 3) The value of machinery obtained when it becomes absolutely useless except for sale as junk is  
a) Bank value                      b) Salvage value                      c) Scrap value                      d) Distress value
- 4) To get fixed amount after particular period how much money will have to be deposited at the end of equal period is calculated using  
a) USPWF                      b) USSFF                      c) USCAF                      d) USCRF
- 5) If an interest rate is being compounded quarterly, the period 'n' is equal to  
a) 4                      b) 6                      c) 12                      d) 1
- 6) Choose the correct statement from the following.
  - 1) A WBS need not be hierarchical in nature
  - 2) A WBS is a framework for converting project objectives to specific deliverables
  - 3) A WBS need not be comprehensive, there can be gaps in job logic
  - 4) A WBS should have a level of detail required to plan, communicate, monitor and control the projecta) All the above are true                      b) 1 and 2 are true; 3 and 4 are false  
c) 2 and 3 are true; 1 and 4 are false                      d) 2 and 4 are true; 1 and 3 are false

P.T.O.





- 7) Identify the correct statements about WBS.
- 1) A WBS can have multiple dimensions
  - 2) The greater the number of positive answers for WBS level of detail guidelines, the weaker the justification for breaking down the work package
  - 3) Activities are the lowest elements of a WBS
  - 4) A lower level (child) WBS element represents 100% of work applicable to the next higher element (parent)
- a) True – 1, 2 and 4; False – 3                      b) True – 2, 3 and 4; False – 1  
c) True – 1, 3 and 4; False – 2                      d) All the above are True
- 8) Choose the best option that fits the following statement.  
The \_\_\_\_\_ of time management tools depends on the \_\_\_\_\_ of the project.
- a) Identity, Quality
  - b) Utility, Complexity
  - c) Functionality, Creativity
  - d) Equity, Quantity
- 9) Identify the possible generic sequence to develop a Gantt chart for the 8 steps given below :
- 1) Identify milestones
  - 2) Represent activity duration with rectangle bars
  - 3) Track the progress
  - 4) Identify duration and sequence of activity
  - 5) Identify activities
  - 6) Draw horizontal time axis
  - 7) Shade the bars when activities are complete
  - 8) Write activities in the column left hand side
- a) Step – 5, 1, 4, 6, 8, 2, 7, 3                      b) Step – 1, 3, 5, 7, 4, 8, 2, 6  
c) Step – 1, 3, 5, 7, 8, 2, 4, 6                      d) Step – 2, 4, 6, 8, 1, 3, 5, 7
- 10) Bar charts
- 1) Can represent only continuous activities and cannot represent discontinuous activities
  - 2) Will not be suitable to represent projects with a number of activities
  - 3) Can be used as a good summary tool
  - 4) Can represent dependencies between activities
- a) True – 1 and 2; False – 3 and 4                      b) True – 1 and 3; False – 2 and 4  
c) True – 2 and 3; False – 1 and 4                      d) True – 1 and 4; False – 2 and 3
- 11) The key disadvantage of a bar chart is that \_\_\_\_\_ cannot be represented.
- a) Dependency                      b) Duration                      c) Progress                      d) Finish
- 12) The advantage of a bar chart is that
- 1) Intuitive representation
  - 2) A good communication tool
  - 3) Suitable for many numbers of activities
  - 4) Ideal for simple projects
- a) True : 1, 2 and 3                      b) True : 2, 3 and 4                      c) True 1, 2 and 4                      d) True : 1 and 4
- 13) When total interest charged is directly proportional to principal amount invested, the interest rate and no. of years for which that principal amount is invested is called
- a) Interest                      b) Simple interest                      c) Compound interest                      d) Effective interest
- 14) For finding how much additional capital expenditure is necessary at represent time to achieve future cost benefits over the life of facility is
- a) Value Engineering                      b) Sensitivity Analysis                      c) Life cycle                      d) None of these



<b>Seat No.</b>	
-----------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
ENGINEERING MANAGEMENT – II**

Day and Date : Friday, 24-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Marks : 56

- Instructions :** 1) Q. 2 and 6 are **compulsory**. Attempt **any two** out of Q. 3 to Q. 5 and **any two** out of Q. 7 to Q. 9.  
2) **Assume** suitable data if necessary but mention it **clearly**.

SECTION – I

2. A) Use the following data. The cost expenditure for performing the six activities, start date, duration is given in Table 1. Draw a bar chart and find the respective total cost on day 3, day 5 and day 6. 5

**Table 1**

Activity	Start on day	Duration	Cost/day
A	2	2	Rs. 4,550
B	3	3	Rs. 3,175
C	4	2	Rs. 6,995
D	5	3	Rs. 1,556
E	5	4	Rs. 789
F	9	1	Rs. 9,000

- B) Use the following data given in Table 2.

Activity	Duration	Predecessor
A	2	–
B	4	A
C	3	A
D	6	B, C
E	7	B
F	3	D, E

Draw the network. Show the duration and critical path of the project network. What are the ES, EF, LS, LF of the activity D ? 5

3. A) Draw the network. Show the duration and critical path of the project network. 5

	Activity	Predecessor	Duration
1	Start	–	0
2	Excavate	1	1
3	Anchor 1	2	2
4	Footing 1	2	3



5	Tower 1	4	2
6	Footing 2	4	3
7	Tower 2	5, 6	2
8	Anchor 2	3	2
9	Braces and guys	7, 8	2
10	String cables	7, 8	4
11	Hangers and pipe racks	10	4
12	Lay pipes	9, 11	3
13	Paint	12	2

B) Calculate all types of floats for all the activities in the network of Q. 3 (A).

4

4. A) The details of the Project network are given below in table.

Activity	Predecessor	Optimistic (days)	Most Likely (days)	Pessimistic (days)
A	–	2	3	5
B	–	2	4	6
C	–	4	8	14
D	A	4	8	12
E	B	8	10	15
F	B	3	3	6
G	C	6	9	12
H	D, E	2	7	9
I	E, D	1	3	7
J	F, G	2	6	10
K	F, G	4	7	10

Calculate the standard deviation for the project.

5

B) The details of the project network are given below in table.

Activity	Predecessors	Duration (days)	Resource Rate/day
A	B, C	7	7
B	–	6	5
C	–	5	6
D	C	4	3
E	A	9	2
F	D	6	4
G	D	11	4
H	F	8	6
I	E	4	3
J	I	6	2
K	H, I	9	5

If all activities are started on early start what is the maximum daily resource requirement.

4



5. Write short notes on : 9
- i) Reports generated by Project Management Software.
  - ii) Role of information in decision making.
  - iii) Precedence network.

SECTION – II

6. a) What are the various types of non-discounting methods ? Explain Payback period method. 4
- b) A building has been rented on an annual rent of Rs. 4,800. The life of the building is expected to be 12 years. If the major repairs to the building are done now, its life shall be increased by another 15 years. The major repairs will cost Rs. 25,000.
- Determine whether it would be economical to do the major repair of the building or not,  $i = 6\%$  per year. 6
7. a) What is the difference between nominal interest rate and effective interest rate ? 4
- b) When his son was born, a man deposited a sum of money in a saving bank at 10% interest per year compounded quarterly. On his 20<sup>th</sup> birthday the son received Rs. 1,00,000 that had accumulated. How much his father did deposited 20 years before ? 5
8. a) What is Time value of money ? 4
- b) A building which having a life of 80 years and 2 choices are available for a particular component replacement of the building. Choice A-Initial cost and replacement cost same as Rs. 4,000 and life of component 20 years. Choice B – Initial cost and replacement cost same as Rs. 6,000 and life of the component 40 years. Money worth is 5%, find the more economical choice. 5
9. Write a short note on (3 marks each) : 9
- a) Value engineering
  - b) Life Cycle costing
  - c) Capitalised cost method.
-



SLR-TJ – 46

Seat No.	
----------	--

Set	P
-----	---

**T.E. Civil (Part – II) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – II**

Day and Date : Saturday, 25-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions:**
- 1) **All questions are compulsory.**
  - 2) Figure on **right** indicates **full** marks.
  - 3) Assume suitable data **wherever** needed and mention it.
  - 4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.
  - 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) The distance between \_\_\_\_\_ faces of a pair of wheel is called as wheel gauge.  
a) Inner                      b) Outer                      c) Both a) and b)                      d) None
- 2) Which of the following are the resisting forces which a locomotive has to encounter ?  
a) Train Resistance                      b) Resistance due to track profile  
c) Wind Resistance                      d) All the above
- 3) Which of the rails are commonly used now a days ?  
a) BH                      b) FF                      c) DH                      d) None
- 4) No. of sleepers per rail length is called as  
a) Sleeper weight                      b) Sleeper Density  
c) Sleeper gravity                      d) None
- 5) Train Derailments occurs due to  
a) Tracks defect                      b) Vehicular defects  
c) Operational defects                      d) All the above

P.T.O.



- 6) Simplest combination of points and crossing is called as  
a) Junction      b) Turn out      c) Both a) and b)      d) None
- 7) Shunting signals are also called as  
a) Disc signals      b) Ground signals  
c) Both a) and b)      d) None
- 8) Runway threshold is indicated by a series of parallel lines starting from a distance of  
a) 3 m from runway end      b) 6 m from runway end  
c) 10 m from runway end      d) 15 m from runway end
- 9) The runway length after correcting the elevation and temperature is 2845 m. If the effective gradient on runway is 0.5 percent then the revised runway length will be  
a) 2845 m      b) 2910 m      c) 3030 m      d) 3130 m
- 10) Pick up the correct statement from the following  
a) Fender is the cushion provided on the face of the jetty for ships to come in contact  
b) Slip is the space of water area between two adjacent piers where ships are berthed  
c) Pier head is a structure constructed near the tip of the breakwater near the harbour entrance  
d) All the above
- 11) Usually jetties are constructed  
a) Perpendicular to the shore      b) Parallel to the shore  
c) Skew to the shore      d) Both a) and b)
- 12) The construction in the form of a cluster of closely spaced piles is known as  
a) Dolphins      b) Piers      c) Wharf      d) Jetty
- 13) For supersonic aircraft, the minimum turning radius of taxiway is  
a) 60 m      b) 120 m      c) 180 m      d) 240 m
- 14) \_\_\_\_\_ are floating structures of small size employed for demarcation like entrance of harbour, approach channel boundaries and so on  
a) Light ships      b) Beacons      c) Buoys      d) Moorings
-



Seat No.	
----------	--

**T.E. Civil (Part – II) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – II**

Day and Date : Saturday, 25-11-2017

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions:** 1) **All questions are compulsory.**  
2) **Figure on right indicates full marks.**  
3) **Assume suitable data wherever needed and mention it.**

SECTION – I

2. Solve **any three** :

- a) On a B. G.  $3^\circ$  curve, the equilibrium cant is provided for a speed of 70 kmph.  
1) Calculate the value of equilibrium cant.  
2) Allowing a maximum cant deficiency, what would be the maximum permissible speed on the track ? 7
- b) On a B.G. track, a turn out takes at an angle of  $6^\circ 42' 35''$  .  
Design the turn out when it is given that :  
1) Angle of switch =  $1^\circ 34' 27''$   
2) Length of switch rails = 4.73 m  
3) Heel divergence  $d = 11.43$  cm  
4) Straight arm  $x = .85$  m. 7
- c) Draw a neat sketch of permanent way. Label the different parts and state their functions. 7
- d) Explain with sketch different types of rail sections. 6
- e) Describe mechanical method of interlocking. 6

3. Write notes on **any two (4 marks each)** :

- a) Creep in rails  
b) Functions of turn out  
c) Types of signals.

**Set P**



## SECTION – II

4. Answer **any two** questions (7 marks **each**) :

- a) Explain how the basic runway length is determined on the basis of the performance characteristics of jet and conventional engine aircrafts.
- b) Write a short notes on :
  - a) Holding aprons
  - b) Inner and outer horizontal surfaces.
- c) For the following data, plot type-I wind rose diagram and find the orientation of runway, calm period and percentage of wind coverage.

Wind Direction	Duration of wind in % of time	Wind Direction	Duration of wind in % of time
N	6.1	S	6.10
NNE	4.15	SSW	3.15
NE	1.93	SW	1.33
ENE	2.85	WSW	3.65
E	4.3	W	4.00
ESE	10.15	WNW	10.75
SE	7.80	NW	7.3
SSE	7.52	NNW	6.92

- d) Calculate the actual length of the runway from the following data :  
 Airport elevation : R. L. 100  
 Airport reference temperature : 28°C  
 Basic length of runway : 600 m  
 Highest point along the length : R.L. 98.2 Lowest point along the length : R. L. 95.2.  
 Check the total correction for elevation plus temperature as per ICAO.

5. Answer **any two** questions (7 marks **each**) :

- a) What factors to be considered while selecting a site for a harbour.
- b) What is dry dock ? Explain the construction and use of dry dock.
- c) What are dolphins ? Describe their types.
- d) Write a short notes on any two with neat sketches :
  - a) Wharf
  - b) Quays
  - c) Jetties.





SLR-TJ – 46

Seat No.	
-------------	--

Set	Q
-----	---

**T.E. Civil (Part – II) (CGPA) Examination, 2017**  
**TRANSPORTATION ENGINEERING – II**

Day and Date : Saturday, 25-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) Figure on **right** indicates **full** marks.
  - 3) Assume suitable data **wherever** needed and mention it.
  - 4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.
  - 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) Runway threshold is indicated by a series of parallel lines starting from a distance of
  - a) 3 m from runway end
  - b) 6 m from runway end
  - c) 10 m from runway end
  - d) 15 m from runway end
- 2) The runway length after correcting the elevation and temperature is 2845 m. If the effective gradient on runway is 0.5 percent then the revised runway length will be
  - a) 2845 m
  - b) 2910 m
  - c) 3030 m
  - d) 3130 m
- 3) Pick up the correct statement from the following
  - a) Fender is the cushion provided on the face of the jetty for ships to come in contact
  - b) Slip is the space of water area between two adjacent piers where ships are berthed
  - c) Pier head is a structure constructed near the tip of the breakwater near the harbour entrance
  - d) All the above

P.T.O.



- 4) Usually jetties are constructed  
a) Perpendicular to the shore      b) Parallel to the shore  
c) Skew to the shore                d) Both a) and b)
- 5) The construction in the form of a cluster of closely spaced piles is known as  
a) Dolphins      b) Piers      c) Wharf      d) Jetty
- 6) For supersonic aircraft, the minimum turning radius of taxiway is  
a) 60 m      b) 120 m      c) 180 m      d) 240 m
- 7) \_\_\_\_\_ are floating structures of small size employed for demarcation like entrance of harbour, approach channel boundaries and so on  
a) Light ships    b) Beacons    c) Buoys      d) Moorings
- 8) The distance between \_\_\_\_\_ faces of a pair of wheel is called as wheel gauge.  
a) Inner            b) Outer      c) Both a) and b)    d) None
- 9) Which of the following are the resisting forces which a locomotive has to encounter ?  
a) Train Resistance                      b) Resistance due to track profile  
c) Wind Resistance                        d) All the above
- 10) Which of the rails are commonly used now a days ?  
a) BH                b) FF                c) DH                d) None
- 11) No. of sleepers per rail length is called as  
a) Sleeper weight                          b) Sleeper Density  
c) Sleeper gravity                         d) None
- 12) Train Derailments occurs due to  
a) Tracks defect                            b) Vehicular defects  
c) Operational defects                      d) All the above
- 13) Simplest combination of points and crossing is called as  
a) Junction      b) Turn out      c) Both a) and b)    d) None
- 14) Shunting signals are also called as  
a) Disc signals                              b) Ground signals  
c) Both a) and b)                          d) None
-



Seat No.	
----------	--

**T.E. Civil (Part – II) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – II**

Day and Date : Saturday, 25-11-2017

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions:** 1) *All questions are compulsory.*  
2) *Figure on right indicates full marks.*  
3) *Assume suitable data wherever needed and mention it.*

SECTION – I

2. Solve **any three** :

a) On a B. G.  $3^\circ$  curve, the equilibrium cant is provided for a speed of 70 kmph.

- 1) Calculate the value of equilibrium cant.
- 2) Allowing a maximum cant deficiency, what would be the maximum permissible speed on the track ?

7

b) On a B.G. track, a turn out takes at an angle of  $6^\circ 42' 35''$  .

Design the turn out when it is given that :

- 1) Angle of switch =  $1^\circ 34' 27''$
- 2) Length of switch rails = 4.73 m
- 3) Heel divergence  $d = 11.43$  cm
- 4) Straight arm  $x = .85$  m.

7

c) Draw a neat sketch of permanent way. Label the different parts and state their functions.

7

d) Explain with sketch different types of rail sections.

6

e) Describe mechanical method of interlocking.

6

3. Write notes on **any two (4 marks each)** :

- a) Creep in rails
- b) Functions of turn out
- c) Types of signals.

Set Q



## SECTION – II

4. Answer **any two** questions (7 marks **each**) :

- a) Explain how the basic runway length is determined on the basis of the performance characteristics of jet and conventional engine aircrafts.
- b) Write a short notes on :
  - a) Holding aprons
  - b) Inner and outer horizontal surfaces.
- c) For the following data, plot type-I wind rose diagram and find the orientation of runway, calm period and percentage of wind coverage.

Wind Direction	Duration of wind in % of time	Wind Direction	Duration of wind in % of time
N	6.1	S	6.10
NNE	4.15	SSW	3.15
NE	1.93	SW	1.33
ENE	2.85	WSW	3.65
E	4.3	W	4.00
ESE	10.15	WNW	10.75
SE	7.80	NW	7.3
SSE	7.52	NNW	6.92

- d) Calculate the actual length of the runway from the following data :  
 Airport elevation : R. L. 100  
 Airport reference temperature : 28°C  
 Basic length of runway : 600 m  
 Highest point along the length : R.L. 98.2 Lowest point along the length : R. L. 95.2.  
 Check the total correction for elevation plus temperature as per ICAO.

5. Answer **any two** questions (7 marks **each**) :

- a) What factors to be considered while selecting a site for a harbour.
- b) What is dry dock ? Explain the construction and use of dry dock.
- c) What are dolphins ? Describe their types.
- d) Write a short notes on any two with neat sketches :
  - a) Wharf
  - b) Quays
  - c) Jetties.



SLR-TJ – 46

Seat No.	
-------------	--

Set	R
-----	---

**T.E. Civil (Part – II) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – II**

Day and Date : Saturday, 25-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions :**
- 1) **All questions are compulsory.**
  - 2) Figure on **right** indicates **full** marks.
  - 3) Assume suitable data **wherever** needed and mention it.
  - 4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.
  - 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) Train Derailments occurs due to
  - a) Tracks defect
  - b) Vehicular defects
  - c) Operational defects
  - d) All the above
- 2) Simplest combination of points and crossing is called as
  - a) Junction
  - b) Turn out
  - c) Both a) and b)
  - d) None
- 3) Shunting signals are also called as
  - a) Disc signals
  - b) Ground signals
  - c) Both a) and b)
  - d) None
- 4) Runway threshold is indicated by a series of parallel lines starting from a distance of
  - a) 3 m from runway end
  - b) 6 m from runway end
  - c) 10 m from runway end
  - d) 15 m from runway end
- 5) The runway length after correcting the elevation and temperature is 2845 m. If the effective gradient on runway is 0.5 percent then the revised runway length will be
  - a) 2845 m
  - b) 2910 m
  - c) 3030 m
  - d) 3130 m

P.T.O.



- 6) Pick up the correct statement from the following
- a) Fender is the cushion provided on the face of the jetty for ships to come in contact
  - b) Slip is the space of water area between two adjacent piers where ships are berthed
  - c) Pier head is a structure constructed near the tip of the breakwater near the harbour entrance
  - d) All the above
- 7) Usually jetties are constructed
- a) Perpendicular to the shore
  - b) Parallel to the shore
  - c) Skew to the shore
  - d) Both a) and b)
- 8) The construction in the form of a cluster of closely spaced piles is known as
- a) Dolphins
  - b) Piers
  - c) Wharf
  - d) Jetty
- 9) For supersonic aircraft, the minimum turning radius of taxiway is
- a) 60 m
  - b) 120 m
  - c) 180 m
  - d) 240 m
- 10) \_\_\_\_\_ are floating structures of small size employed for demarcation like entrance of harbour, approach channel boundaries and so on
- a) Light ships
  - b) Beacons
  - c) Buoys
  - d) Moorings
- 11) The distance between \_\_\_\_\_ faces of a pair of wheel is called as wheel gauge.
- a) Inner
  - b) Outer
  - c) Both a) and b)
  - d) None
- 12) Which of the following are the resisting forces which a locomotive has to encounter ?
- a) Train Resistance
  - b) Resistance due to track profile
  - c) Wind Resistance
  - d) All the above
- 13) Which of the rails are commonly used now a days ?
- a) BH
  - b) FF
  - c) DH
  - d) None
- 14) No. of sleepers per rail length is called as
- a) Sleeper weight
  - b) Sleeper Density
  - c) Sleeper gravity
  - d) None
-



Seat No.	
----------	--

**T.E. Civil (Part – II) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – II**

Day and Date : Saturday, 25-11-2017

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions:** 1) *All questions are compulsory.*  
2) *Figure on right indicates full marks.*  
3) *Assume suitable data wherever needed and mention it.*

SECTION – I

2. Solve **any three** :

- a) On a B. G.  $3^\circ$  curve, the equilibrium cant is provided for a speed of 70 kmph.  
1) Calculate the value of equilibrium cant.  
2) Allowing a maximum cant deficiency, what would be the maximum permissible speed on the track ? 7
- b) On a B.G. track, a turn out takes at an angle of  $6^\circ 42' 35''$  .  
Design the turn out when it is given that :  
1) Angle of switch =  $1^\circ 34' 27''$   
2) Length of switch rails = 4.73 m  
3) Heel divergence  $d = 11.43$  cm  
4) Straight arm  $x = .85$  m. 7
- c) Draw a neat sketch of permanent way. Label the different parts and state their functions. 7
- d) Explain with sketch different types of rail sections. 6
- e) Describe mechanical method of interlocking. 6

3. Write notes on **any two (4 marks each)** :

- a) Creep in rails  
b) Functions of turn out  
c) Types of signals.

Set R



## SECTION – II

4. Answer **any two** questions (7 marks **each**) :

- a) Explain how the basic runway length is determined on the basis of the performance characteristics of jet and conventional engine aircrafts.
- b) Write a short notes on :
  - a) Holding aprons
  - b) Inner and outer horizontal surfaces.
- c) For the following data, plot type-I wind rose diagram and find the orientation of runway, calm period and percentage of wind coverage.

Wind Direction	Duration of wind in % of time	Wind Direction	Duration of wind in % of time
N	6.1	S	6.10
NNE	4.15	SSW	3.15
NE	1.93	SW	1.33
ENE	2.85	WSW	3.65
E	4.3	W	4.00
ESE	10.15	WNW	10.75
SE	7.80	NW	7.3
SSE	7.52	NNW	6.92

- d) Calculate the actual length of the runway from the following data :  
 Airport elevation : R. L. 100  
 Airport reference temperature : 28°C  
 Basic length of runway : 600 m  
 Highest point along the length : R.L. 98.2 Lowest point along the length : R. L. 95.2.  
 Check the total correction for elevation plus temperature as per ICAO.

5. Answer **any two** questions (7 marks **each**) :

- a) What factors to be considered while selecting a site for a harbour.
- b) What is dry dock ? Explain the construction and use of dry dock.
- c) What are dolphins ? Describe their types.
- d) Write a short notes on any two with neat sketches :
  - a) Wharf
  - b) Quays
  - c) Jetties.





SLR-TJ – 46

Seat No.	
----------	--

Set	S
-----	---

**T.E. Civil (Part – II) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – II**

Day and Date : Saturday, 25-11-2017  
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 70

- Instructions:**
- 1) **All questions are compulsory.**
  - 2) **Figure on *right* indicates *full* marks.**
  - 3) **Assume suitable data *wherever* needed and mention it.**
  - 4) **Q. No. 1 is *compulsory*. It should be solved in *first 30 minutes* in Answer book Page No. 3. **Each** question carries **one** mark.**
  - 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) Pick up the correct statement from the following
  - a) Fender is the cushion provided on the face of the jetty for ships to come in contact
  - b) Slip is the space of water area between two adjacent piers where ships are berthed
  - c) Pier head is a structure constructed near the tip of the breakwater near the harbour entrance
  - d) All the above
- 2) Usually jetties are constructed
  - a) Perpendicular to the shore
  - b) Parallel to the shore
  - c) Skew to the shore
  - d) Both a) and b)
- 3) The construction in the form of a cluster of closely spaced piles is known as
  - a) Dolphins
  - b) Piers
  - c) Wharf
  - d) Jetty
- 4) For supersonic aircraft, the minimum turning radius of taxiway is
  - a) 60 m
  - b) 120 m
  - c) 180 m
  - d) 240 m

P.T.O.



- 5) \_\_\_\_\_ are floating structures of small size employed for demarcation like entrance of harbour, approach channel boundaries and so on  
a) Light ships    b) Beacons    c) Buoys    d) Moorings
- 6) The distance between \_\_\_\_\_ faces of a pair of wheel is called as wheel gauge.  
a) Inner    b) Outer    c) Both a) and b)    d) None
- 7) Which of the following are the resisting forces which a locomotive has to encounter ?  
a) Train Resistance    b) Resistance due to track profile  
c) Wind Resistance    d) All the above
- 8) Which of the rails are commonly used now a days ?  
a) BH    b) FF    c) DH    d) None
- 9) No. of sleepers per rail length is called as  
a) Sleeper weight    b) Sleeper Density  
c) Sleeper gravity    d) None
- 10) Train Derailments occurs due to  
a) Tracks defect    b) Vehicular defects  
c) Operational defects    d) All the above
- 11) Simplest combination of points and crossing is called as  
a) Junction    b) Turn out    c) Both a) and b)    d) None
- 12) Shunting signals are also called as  
a) Disc signals    b) Ground signals  
c) Both a) and b)    d) None
- 13) Runway threshold is indicated by a series of parallel lines starting from a distance of  
a) 3 m from runway end    b) 6 m from runway end  
c) 10 m from runway end    d) 15 m from runway end
- 14) The runway length after correcting the elevation and temperature is 2845 m. If the effective gradient on runway is 0.5 percent then the revised runway length will be  
a) 2845 m    b) 2910 m    c) 3030 m    d) 3130 m
-



Seat No.	
----------	--

**T.E. Civil (Part – II) (CGPA) Examination, 2017  
TRANSPORTATION ENGINEERING – II**

Day and Date : Saturday, 25-11-2017

Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

- Instructions:** 1) *All questions are compulsory.*  
2) *Figure on right indicates full marks.*  
3) *Assume suitable data wherever needed and mention it.*

SECTION – I

2. Solve **any three** :

- a) On a B. G.  $3^\circ$  curve, the equilibrium cant is provided for a speed of 70 kmph.  
1) Calculate the value of equilibrium cant.  
2) Allowing a maximum cant deficiency, what would be the maximum permissible speed on the track ? 7
- b) On a B.G. track, a turn out takes at an angle of  $6^\circ 42' 35''$  .  
Design the turn out when it is given that :  
1) Angle of switch =  $1^\circ 34' 27''$   
2) Length of switch rails = 4.73 m  
3) Heel divergence  $d = 11.43$  cm  
4) Straight arm  $x = .85$  m. 7
- c) Draw a neat sketch of permanent way. Label the different parts and state their functions. 7
- d) Explain with sketch different types of rail sections. 6
- e) Describe mechanical method of interlocking. 6

3. Write notes on **any two (4 marks each)** :

- a) Creep in rails  
b) Functions of turn out  
c) Types of signals.

**Set S**



## SECTION – II

4. Answer **any two** questions (7 marks **each**) :

- a) Explain how the basic runway length is determined on the basis of the performance characteristics of jet and conventional engine aircrafts.
- b) Write a short notes on :
  - a) Holding aprons
  - b) Inner and outer horizontal surfaces.
- c) For the following data, plot type-I wind rose diagram and find the orientation of runway, calm period and percentage of wind coverage.

Wind Direction	Duration of wind in % of time	Wind Direction	Duration of wind in % of time
N	6.1	S	6.10
NNE	4.15	SSW	3.15
NE	1.93	SW	1.33
ENE	2.85	WSW	3.65
E	4.3	W	4.00
ESE	10.15	WNW	10.75
SE	7.80	NW	7.3
SSE	7.52	NNW	6.92

- d) Calculate the actual length of the runway from the following data :  
 Airport elevation : R. L. 100  
 Airport reference temperature : 28°C  
 Basic length of runway : 600 m  
 Highest point along the length : R.L. 98.2 Lowest point along the length : R. L. 95.2.  
 Check the total correction for elevation plus temperature as per ICAO.

5. Answer **any two** questions (7 marks **each**) :

- a) What factors to be considered while selecting a site for a harbour.
- b) What is dry dock ? Explain the construction and use of dry dock.
- c) What are dolphins ? Describe their types.
- d) Write a short notes on any two with neat sketches :
  - a) Wharf
  - b) Quays
  - c) Jetties.



SLR-TJ – 47

Seat No.	
----------	--

Set 

P
---

T.E. (Civil Engineering) (Part – II) (CGPA) Examination, 2017  
**PAVEMENT ANALYSIS AND DESIGN**  
(Self-Learning-Technical Course)

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Max. Marks : 50

- Instructions :**
- 1) Figures on **right** indicates **full** marks.
  - 2) Assume **suitable** data wherever needed and mention it **clearly**.
  - 3) Q. No. 1 is **compulsory**. It should be solved in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Marks : 10

1. Choose the correct answer :

10

- 1) With addition of lime in soil
  - a) LL increases and PL decreases
  - b) Plasticity index increases
  - c) LL changes very slightly and PL increases
  - d) LL and PL both decreases
- 2) Which one of the following defects indicates progressive disintegration of bituminous premix carpet surfacing by loss of aggregates
  - a) Potholes
  - b) Ravelling
  - c) Edge breaking
  - d) Rutting
- 3) The pavement thickness for soil with CBR
  - a) Increases with increase in CBR
  - b) Decreases with increase in CBR
  - c) First increases and then decreases
  - d) No change in the pavement thickness
- 4) Benkelman beam deflection method is used for design of
  - a) Rigid overlays on rigid pavement
  - b) Rigid overlays on flexible pavement
  - c) Flexible overlays on flexible pavement
  - d) Flexible overlays on rigid pavement
- 5) The bitumen of grade 80/100 means
  - a) Its penetration value 8 mm
  - b) Its penetration value 10 mm
  - c) Its penetration value is 8 mm to 10 mm
  - d) Its penetration value is 8 cm to 10 cm

P.T.O.



- 6) Which of the following represents hardest grade of bitumen ?  
 a) 30/40                      b) 60/70                      c) 80/100                      d) 100/120
- 7) The corrected modulus of subgrade reaction for standard diameter plate is  $6 \text{ kg/cm}^3$ . What would be the modulus of subgrade reaction of the soil when tested with a 30 cm diameter plat ?  
 a)  $15 \text{ kg/cm}^3$                       b)  $25 \text{ kg/cm}^3$                       c)  $30 \text{ kg/cm}^3$                       d)  $60 \text{ kg/cm}^3$
- 8) Match List – I (Test) with List – II (Purpose) and select the correct answer using the codes :

**List – I**

- A. Impact test  
 B. Los Angeles abrasion test  
 C. Crushing test  
 D. Stripping test

**List – II**

1. Bitumen  
 2. Toughness  
 3. Hardness  
 4. Strength

**Codes :**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
a)	2	3	4	1
b)	4	1	2	3
c)	4	3	2	1
d)	2	1	4	3

- 9) For the construction of Water Bound Macadam (WBM) roads, the correct sequence of operations after spreading coarse aggregates is  
 a) Dry rolling, wet rolling, application of screening and application of filler  
 b) Dry rolling, application of filler, wet rolling and application of screening  
 c) Dry rolling, application of screening, wet rolling and application of filler  
 d) Dry rolling, application of screening, application of filler and wet rolling
- 10) Consider the following statements with reference to pavements  
 1. Flexible pavement is more suitable than rigid pavements in regions where subgrade strength is uneven.  
 2. Load carrying capacity of rigid pavements depends more on the properties of concrete than the strength of subgrade.  
 3. Compared to flexible pavements, rigid pavements are more affected by temperature variations.

Which of these statements is/are correct ?

- a) 1 and 2                      b) 1 and 3                      c) 2 and 3                      d) 3 alone



Seat No.	
----------	--

**T.E. (Civil Engineering) (Part – II) (CGPA) Examination, 2017  
PAVEMENT ANALYSIS AND DESIGN  
(Self-Learning-Technical Course)**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Marks : 40

**Instructions :** 1) *Figures on right indicates full marks.*  
2) *Assume suitable data wherever needed and mention it clearly.*

2. Answer **any five** questions (**8 marks each**) : **(8×5=40)**

- a) Explain 'Flexible Pavement and Rigid Pavement' and bring out the points of difference.
- b) Classify different types of joints in CC pavements and mention the object of each.
- c) Calculate the stresses at the interior, edge and corner region of cement concrete pavement using Westergaard's analysis. Use the following data : Wheel Load  $P = 4100$  kg, Modulus of elasticity of cement concrete  $E = 0.3$  million  $\text{kg/cm}^2$ , pavement thickness,  $h = 15$  cm, Poisson's ratio,  $\mu = 0.15$ , modulus of subgrade reaction,  $K = 3.0$   $\text{kg/cm}^3$ , radius of contact area,  $a = 15$  cm.
- d) Write design steps of CBR method of flexible pavement design as per IRC guidelines. Calculate the CSA for the given data.
  - 1) Type of road- two lane undivided carriageway.
  - 2) Design CBR value - 5.0%.
  - 3) Initial traffic on completion of construction = 300 cv per day.
  - 4) Average growth rate = 6.0% per year.
  - 5) Design life = 10 years.
  - 6) VDF value = 2.5.
  - 7) Lane distribution factor = 0.75.
- e) Mention the specifications of materials and construction steps for Bituminous concrete road.
- f) List the different distresses in :
  - i) Flexible pavement
  - ii) Rigid pavement
- g) With a diagram explain the working of Benkelman beam for measurement of pavement deflection.
- h) The rebound deflection values determined at 15 spots are given below. Determine the values of
  - i) Mean deflection
  - ii) Standard deviation and
  - iii) Characteristic deflection.

Rebound deflection values in mm : 1.40, 1.32, 1.25, 1.35, 1.48, 1.60, 1.65, 1.55, 1.45, 1.40, 1.36, 1.46, 1.50, 1.52 and 1.45.







SLR-TJ – 47

Seat No.	
----------	--

Set **Q**

T.E. (Civil Engineering) (Part – II) (CGPA) Examination, 2017  
**PAVEMENT ANALYSIS AND DESIGN**  
(Self-Learning-Technical Course)

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Max. Marks : 50

- Instructions :**
- 1) Figures on **right** indicates **full** marks.
  - 2) Assume **suitable** data wherever needed and mention it **clearly**.
  - 3) Q. No. 1 is **compulsory**. It should be solved in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Marks : 10

1. Choose the correct answer :

10

- 1) For the construction of Water Bound Macadam (WBM) roads, the correct sequence of operations after spreading coarse aggregates is
  - a) Dry rolling, wet rolling, application of screening and application of filler
  - b) Dry rolling, application of filler, wet rolling and application of screening
  - c) Dry rolling, application of screening, wet rolling and application of filler
  - d) Dry rolling, application of screening, application of filler and wet rolling
- 2) Consider the following statements with reference to pavements
  1. Flexible pavement is more suitable than rigid pavements in regions where subgrade strength is uneven.
  2. Load carrying capacity of rigid pavements depends more on the properties of concrete than the strength of subgrade.
  3. Compared to flexible pavements, rigid pavements are more affected by temperature variations.Which of these statements is/are correct ?
  - a) 1 and 2
  - b) 1 and 3
  - c) 2 and 3
  - d) 3 alone
- 3) The corrected modulus of subgrade reaction for standard diameter plate is  $6 \text{ kg/cm}^3$ . What would be the modulus of subgrade reaction of the soil when tested with a 30 cm diameter plate ?
  - a)  $15 \text{ kg/cm}^3$
  - b)  $25 \text{ kg/cm}^3$
  - c)  $30 \text{ kg/cm}^3$
  - d)  $60 \text{ kg/cm}^3$

P.T.O.



- 4) Match List – I (Test) with List – II (Purpose) and select the correct answer using the codes :

**List – I**

- A. Impact test
- B. Los Angeles abrasion test
- C. Crushing test
- D. Stripping test

**List – II**

- 1. Bitumen
- 2. Toughness
- 3. Hardness
- 4. Strength

**Codes :**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
a)	2	3	4	1
b)	4	1	2	3
c)	4	3	2	1
d)	2	1	4	3

- 5) With addition of lime in soil
- a) LL increases and PL decreases
  - b) Plasticity index increases
  - c) LL changes very slightly and PL increases
  - d) LL and PL both decreases
- 6) Which one of the following defects indicates progressive disintegration of bituminous premix carpet surfacing by loss of aggregates
- a) Potholes
  - b) Ravelling
  - c) Edge breaking
  - d) Rutting
- 7) The pavement thickness for soil with CBR
- a) Increases with increase in CBR
  - b) Decreases with increase in CBR
  - c) First increases and then decreases
  - d) No change in the pavement thickness
- 8) Benkelman beam deflection method is used for design of
- a) Rigid overlays on rigid pavement
  - b) Rigid overlays on flexible pavement
  - c) Flexible overlays on flexible pavement
  - d) Flexible overlays on rigid pavement
- 9) The bitumen of grade 80/100 means
- a) Its penetration value 8 mm
  - b) Its penetration value 10 mm
  - c) Its penetration value is 8 mm to 10 mm
  - d) Its penetration value is 8 cm to 10 cm
- 10) Which of the following represents hardest grade of bitumen ?
- a) 30/40
  - b) 60/70
  - c) 80/100
  - d) 100/120



Seat No.	
----------	--

**T.E. (Civil Engineering) (Part – II) (CGPA) Examination, 2017  
PAVEMENT ANALYSIS AND DESIGN  
(Self-Learning-Technical Course)**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Marks : 40

**Instructions :** 1) *Figures on right indicates full marks.*  
2) *Assume suitable data wherever needed and mention it clearly.*

2. Answer **any five** questions (**8 marks each**) : **(8×5=40)**

- a) Explain 'Flexible Pavement and Rigid Pavement' and bring out the points of difference.
- b) Classify different types of joints in CC pavements and mention the object of each.
- c) Calculate the stresses at the interior, edge and corner region of cement concrete pavement using Westergaard's analysis. Use the following data : Wheel Load  $P = 4100$  kg, Modulus of elasticity of cement concrete  $E = 0.3$  million  $\text{kg/cm}^2$ , pavement thickness,  $h = 15$  cm, Poisson's ratio,  $\mu = 0.15$ , modulus of subgrade reaction,  $K = 3.0$   $\text{kg/cm}^3$ , radius of contact area,  $a = 15$  cm.
- d) Write design steps of CBR method of flexible pavement design as per IRC guidelines. Calculate the CSA for the given data.
  - 1) Type of road- two lane undivided carriageway.
  - 2) Design CBR value - 5.0%.
  - 3) Initial traffic on completion of construction = 300 cv per day.
  - 4) Average growth rate = 6.0% per year.
  - 5) Design life = 10 years.
  - 6) VDF value = 2.5.
  - 7) Lane distribution factor = 0.75.
- e) Mention the specifications of materials and construction steps for Bituminous concrete road.
- f) List the different distresses in :
  - i) Flexible pavement
  - ii) Rigid pavement
- g) With a diagram explain the working of Benkelman beam for measurement of pavement deflection.
- h) The rebound deflection values determined at 15 spots are given below. Determine the values of
  - i) Mean deflection
  - ii) Standard deviation and
  - iii) Characteristic deflection.

Rebound deflection values in mm : 1.40, 1.32, 1.25, 1.35, 1.48, 1.60, 1.65, 1.55, 1.45, 1.40, 1.36, 1.46, 1.50, 1.52 and 1.45.





SLR-TJ – 47

Seat No.	
----------	--

Set 

R
---

**T.E. (Civil Engineering) (Part – II) (CGPA) Examination, 2017  
PAVEMENT ANALYSIS AND DESIGN  
(Self-Learning-Technical Course)**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Max. Marks : 50

- Instructions :**
- 1) Figures on **right** indicates **full** marks.
  - 2) Assume **suitable** data wherever needed and mention it **clearly**.
  - 3) Q. No. 1 is **compulsory**. It should be solved in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Marks : 10

1. Choose the correct answer :

10

- 1) The bitumen of grade 80/100 means
  - a) Its penetration value 8 mm
  - b) Its penetration value 10 mm
  - c) Its penetration value is 8 mm to 10 mm
  - d) Its penetration value is 8 cm to 10 cm
- 2) Which of the following represents hardest grade of bitumen ?
  - a) 30/40
  - b) 60/70
  - c) 80/100
  - d) 100/120
- 3) For the construction of Water Bound Macadam (WBM) roads, the correct sequence of operations after spreading coarse aggregates is
  - a) Dry rolling, wet rolling, application of screening and application of filler
  - b) Dry rolling, application of filler, wet rolling and application of screening
  - c) Dry rolling, application of screening, wet rolling and application of filler
  - d) Dry rolling, application of screening, application of filler and wet rolling
- 4) Consider the following statements with reference to pavements
  1. Flexible pavement is more suitable than rigid pavements in regions where subgrade strength is uneven.
  2. Load carrying capacity of rigid pavements depends more on the properties of concrete than the strength of subgrade.
  3. Compared to flexible pavements, rigid pavements are more affected by temperature variations.Which of these statements is/are correct ?
  - a) 1 and 2
  - b) 1 and 3
  - c) 2 and 3
  - d) 3 alone

P.T.O.



- 5) The pavement thickness for soil with CBR
- Increases with increase in CBR
  - Decreases with increase in CBR
  - First increases and then decreases
  - No change in the pavement thickness
- 6) Benkelman beam deflection method is used for design of
- Rigid overlays on rigid pavement
  - Rigid overlays on flexible pavement
  - Flexible overlays on flexible pavement
  - Flexible overlays on rigid pavement
- 7) With addition of lime in soil
- LL increases and PL decreases
  - Plasticity index increases
  - LL changes very slightly and PL increases
  - LL and PL both decreases
- 8) Which one of the following defects indicates progressive disintegration of bituminous premix carpet surfacing by loss of aggregates
- Potholes
  - Ravelling
  - Edge breaking
  - Rutting
- 9) The corrected modulus of subgrade reaction for standard diameter plate is  $6 \text{ kg/cm}^3$ . What would be the modulus of subgrade reaction of the soil when tested with a 30 cm diameter plat ?
- $15 \text{ kg/cm}^3$
  - $25 \text{ kg/cm}^3$
  - $30 \text{ kg/cm}^3$
  - $60 \text{ kg/cm}^3$
- 10) Match List – I (Test) with List – II (Purpose) and select the correct answer using the codes :

**List – I**

- Impact test
- Los Angeles abrasion test
- Crushing test
- Stripping test

**List – II**

- Bitumen
- Toughness
- Hardness
- Strength

**Codes :**

- |    | <b>A</b> | <b>B</b> | <b>C</b> | <b>D</b> |
|----|----------|----------|----------|----------|
| a) | 2        | 3        | 4        | 1        |
| b) | 4        | 1        | 2        | 3        |
| c) | 4        | 3        | 2        | 1        |
| d) | 2        | 1        | 4        | 3        |



Seat No.	
----------	--

**T.E. (Civil Engineering) (Part – II) (CGPA) Examination, 2017  
PAVEMENT ANALYSIS AND DESIGN  
(Self-Learning-Technical Course)**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Marks : 40

**Instructions :** 1) *Figures on right indicates full marks.*  
2) *Assume suitable data wherever needed and mention it clearly.*

2. Answer **any five** questions (**8 marks each**) : **(8×5=40)**

- a) Explain 'Flexible Pavement and Rigid Pavement' and bring out the points of difference.
- b) Classify different types of joints in CC pavements and mention the object of each.
- c) Calculate the stresses at the interior, edge and corner region of cement concrete pavement using Westergaard's analysis. Use the following data : Wheel Load  $P = 4100$  kg, Modulus of elasticity of cement concrete  $E = 0.3$  million  $\text{kg/cm}^2$ , pavement thickness,  $h = 15$  cm, Poisson's ratio,  $\mu = 0.15$ , modulus of subgrade reaction,  $K = 3.0$   $\text{kg/cm}^3$ , radius of contact area,  $a = 15$  cm.
- d) Write design steps of CBR method of flexible pavement design as per IRC guidelines. Calculate the CSA for the given data.
  - 1) Type of road- two lane undivided carriageway.
  - 2) Design CBR value - 5.0%.
  - 3) Initial traffic on completion of construction = 300 cv per day.
  - 4) Average growth rate = 6.0% per year.
  - 5) Design life = 10 years.
  - 6) VDF value = 2.5.
  - 7) Lane distribution factor = 0.75.
- e) Mention the specifications of materials and construction steps for Bituminous concrete road.
- f) List the different distresses in :
  - i) Flexible pavement
  - ii) Rigid pavement
- g) With a diagram explain the working of Benkelman beam for measurement of pavement deflection.
- h) The rebound deflection values determined at 15 spots are given below. Determine the values of
  - i) Mean deflection
  - ii) Standard deviation and
  - iii) Characteristic deflection.

Rebound deflection values in mm : 1.40, 1.32, 1.25, 1.35, 1.48, 1.60, 1.65, 1.55, 1.45, 1.40, 1.36, 1.46, 1.50, 1.52 and 1.45.







SLR-TJ – 47

Seat No.	
----------	--

Set 

S
---

T.E. (Civil Engineering) (Part – II) (CGPA) Examination, 2017  
PAVEMENT ANALYSIS AND DESIGN  
(Self-Learning-Technical Course)

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Max. Marks : 50

- Instructions :**
- 1) Figures on **right** indicates **full** marks.
  - 2) Assume **suitable** data wherever needed and mention it **clearly**.
  - 3) Q. No. 1 is **compulsory**. It should be solved in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Marks : 10

1. Choose the correct answer :

10

- 1) The pavement thickness for soil with CBR
  - a) Increases with increase in CBR
  - b) Decreases with increase in CBR
  - c) First increases and then decreases
  - d) No change in the pavement thickness
- 2) Benkelman beam deflection method is used for design of
  - a) Rigid overlays on rigid pavement
  - b) Rigid overlays on flexible pavement
  - c) Flexible overlays on flexible pavement
  - d) Flexible overlays on rigid pavement
- 3) The bitumen of grade 80/100 means
  - a) Its penetration value 8 mm
  - b) Its penetration value 10 mm
  - c) Its penetration value is 8 mm to 10 mm
  - d) Its penetration value is 8 cm to 10 cm
- 4) Which of the following represents hardest grade of bitumen ?
  - a) 30/40
  - b) 60/70
  - c) 80/100
  - d) 100/120
- 5) The corrected modulus of subgrade reaction for standard diameter plate is  $6 \text{ kg/cm}^3$ . What would be the modulus of subgrade reaction of the soil when tested with a 30 cm diameter plat ?
  - a)  $15 \text{ kg/cm}^3$
  - b)  $25 \text{ kg/cm}^3$
  - c)  $30 \text{ kg/cm}^3$
  - d)  $60 \text{ kg/cm}^3$

P.T.O.



- 6) Match List – I (Test) with List – II (Purpose) and select the correct answer using the codes :

<b>List – I</b>	<b>List – II</b>
A. Impact test	1. Bitumen
B. Los Angeles abrasion test	2. Toughness
C. Crushing test	3. Hardness
D. Stripping test	4. Strength

**Codes :**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
a)	2	3	4	1
b)	4	1	2	3
c)	4	3	2	1
d)	2	1	4	3

- 7) For the construction of Water Bound Macadam (WBM) roads, the correct sequence of operations after spreading coarse aggregates is
- Dry rolling, wet rolling, application of screening and application of filler
  - Dry rolling, application of filler, wet rolling and application of screening
  - Dry rolling, application of screening, wet rolling and application of filler
  - Dry rolling, application of screening, application of filler and wet rolling
- 8) Consider the following statements with reference to pavements
- Flexible pavement is more suitable than rigid pavements in regions where subgrade strength is uneven.
  - Load carrying capacity of rigid pavements depends more on the properties of concrete than the strength of subgrade.
  - Compared to flexible pavements, rigid pavements are more affected by temperature variations.
- Which of these statements is/are correct ?
- a) 1 and 2                      b) 1 and 3                      c) 2 and 3                      d) 3 alone
- 9) With addition of lime in soil
- LL increases and PL decreases
  - Plasticity index increases
  - LL changes very slightly and PL increases
  - LL and PL both decreases
- 10) Which one of the following defects indicates progressive disintegration of bituminous premix carpet surfacing by loss of aggregates
- Potholes
  - Ravelling
  - Edge breaking
  - Rutting



Seat No.	
----------	--

**T.E. (Civil Engineering) (Part – II) (CGPA) Examination, 2017  
PAVEMENT ANALYSIS AND DESIGN  
(Self-Learning-Technical Course)**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Marks : 40

**Instructions :** 1) *Figures on right indicates full marks.*  
2) *Assume suitable data wherever needed and mention it clearly.*

2. Answer **any five** questions (**8 marks each**) : **(8×5=40)**

- a) Explain 'Flexible Pavement and Rigid Pavement' and bring out the points of difference.
- b) Classify different types of joints in CC pavements and mention the object of each.
- c) Calculate the stresses at the interior, edge and corner region of cement concrete pavement using Westergaard's analysis. Use the following data : Wheel Load  $P = 4100$  kg, Modulus of elasticity of cement concrete  $E = 0.3$  million  $\text{kg/cm}^2$ , pavement thickness,  $h = 15$  cm, Poisson's ratio,  $\mu = 0.15$ , modulus of subgrade reaction,  $K = 3.0$   $\text{kg/cm}^3$ , radius of contact area,  $a = 15$  cm.
- d) Write design steps of CBR method of flexible pavement design as per IRC guidelines. Calculate the CSA for the given data.
  - 1) Type of road- two lane undivided carriageway.
  - 2) Design CBR value - 5.0%.
  - 3) Initial traffic on completion of construction = 300 cv per day.
  - 4) Average growth rate = 6.0% per year.
  - 5) Design life = 10 years.
  - 6) VDF value = 2.5.
  - 7) Lane distribution factor = 0.75.
- e) Mention the specifications of materials and construction steps for Bituminous concrete road.
- f) List the different distresses in :
  - i) Flexible pavement
  - ii) Rigid pavement
- g) With a diagram explain the working of Benkelman beam for measurement of pavement deflection.
- h) The rebound deflection values determined at 15 spots are given below. Determine the values of
  - i) Mean deflection
  - ii) Standard deviation and
  - iii) Characteristic deflection.

Rebound deflection values in mm : 1.40, 1.32, 1.25, 1.35, 1.48, 1.60, 1.65, 1.55, 1.45, 1.40, 1.36, 1.46, 1.50, 1.52 and 1.45.





SLR-TJ – 48

Seat No.	
----------	--

Set	P
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOSYNTHETICS AND REINFORCED SOIL STRUCTURES  
(Self Learning Technical Course)**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 Noon

Max. Marks : 50

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in Answer Book on Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Assume additional data, if required and state it **clearly**.  
4) Figures to the **right** indicate **full** marks.

**MCQ/Objective Type Questions**

Marks : 10

I. Choose the correct answer : **(1 mark each)**

- 1) Minimum FOS against pullout of reinforcing element of wall is  
a) 1.2                      b) 1.5                      c) 2.0                      d) 2.5
- 2) Coefficient of friction between soil and other material is given by  
a)  $\tan \phi$                       b)  $\tan \mu$                       c)  $\tan \delta$                       d) none
- 3) Most of the geotextiles are commercially available in rolls of width of around  
a) 1 m    b) 5 m  
c) 10 m    d) None of the above
- 4) Which one of the following geosynthetics is a geocomposite ?  
a) Geogrid    b) Geonet  
c) Geosynthetic clay liner                      d) None of the above
- 5) Which one of the following is a basic function of geosynthetics ?  
a) Absorption                      b) Insulation                      c) Screening                      d) Protection

P.T.O.



- 6) Filtration function also provides
- a) Reinforcement benefits
  - b) Separation benefits
  - c) Fluid barrier benefits
  - d) None
- 7) The gauge length of the geosynthetic specimen for the wide-width tensile strength test is
- a) 10 mm
  - b) 100 mm
  - c) 200 mm
  - d) None of the above
- 8) Which geosynthetic can serve the fluid barrier as a primary function ?
- a) Geotextile and geocomposite
  - b) Geotextile and geogrid
  - c) Geotextile and geonet
  - d) None of the above
- 9) Within a soil slope, geosynthetic sheets are usually placed in
- a) Inclined planes towards the slope face
  - b) Inclined planes away from the slope face
  - c) Vertical planes
  - d) Horizontal planes
- 10) The major functions served by the geotextile in unpaved roads are
- a) Separation and filtration
  - b) Separation and reinforcement
  - c) Reinforcement and filtration
  - d) Filtration and drainage
-



Seat No.	
-------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOSYNTHETICS AND REINFORCED SOIL STRUCTURES  
(Self Learning Technical Course)**

Day and Date : Monday, 27-11-2017

Marks : 40

Time : 10.00 a.m. to 12.00 Noon

**Instructions :** 1) Assume additional data, if required and state it **clearly**.  
2) Figures to the **right** indicate **full** marks.

II. Attempt **any eight** questions :

**(5×8=40)**

- 1) What are geogrid, geofoam, geonet, GCL and geopipe ? Give one application for each product.
  - 2) What are the concepts of reinforced soil ?
  - 3) Explain the effect of reinforcement orientation.
  - 4) What are the mechanical properties of geosynthetics ?
  - 5) How are impact and abrasion test conducted ?
  - 6) What are the different construction factors that affect the performance of reinforced soil ?
  - 7) What are the steps involved in the design of reinforced soil slope ?
  - 8) How do you evaluate tensile failure of reinforcement ?
  - 9) Illustrate with sketches different failure modes that need to be considered.
  - 10) Write short notes on geosynthetic filter criteria.
-







SLR-TJ – 48

Seat No.	
----------	--

Set	Q
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOSYNTHETICS AND REINFORCED SOIL STRUCTURES  
(Self Learning Technical Course)**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 Noon

Max. Marks : 50

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in Answer Book on Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Assume additional data, if required and state it **clearly**.  
4) Figures to the **right** indicate **full** marks.

**MCQ/Objective Type Questions**

Marks : 10

I. Choose the correct answer : **(1 mark each)**

- 1) Within a soil slope, geosynthetic sheets are usually placed in
  - a) Inclined planes towards the slope face
  - b) Inclined planes away from the slope face
  - c) Vertical planes
  - d) Horizontal planes
- 2) The major functions served by the geotextile in unpaved roads are
  - a) Separation and filtration
  - b) Separation and reinforcement
  - c) Reinforcement and filtration
  - d) Filtration and drainage
- 3) The gauge length of the geosynthetic specimen for the wide-width tensile strength test is
  - a) 10 mm
  - b) 100 mm
  - c) 200 mm
  - d) None of the above

P.T.O.



- 4) Which geosynthetic can serve the fluid barrier as a primary function ?
- a) Geotextile and geocomposite      b) Geotextile and geogrid  
c) Geotextile and geonet              d) None of the above
- 5) Minimum FOS against pullout of reinforcing element of wall is
- a) 1.2                                      b) 1.5                                      c) 2.0                                      d) 2.5
- 6) Coefficient of friction between soil and other material is given by
- a)  $\tan \phi$                                   b)  $\tan \mu$                                   c)  $\tan \delta$                                   d) none
- 7) Most of the geotextiles are commercially available in rolls of width of around
- a) 1 m    b) 5 m  
c) 10 m    d) None of the above
- 8) Which one of the following geosynthetics is a geocomposite ?
- a) Geogrid    b) Geonet  
c) Geosynthetic clay liner                      d) None of the above
- 9) Which one of the following is a basic function of geosynthetics ?
- a) Absorption                                  b) Insulation                                  c) Screening                                  d) Protection
- 10) Filtration function also provides
- a) Reinforcement benefits                      b) Separation benefits  
c) Fluid barrier benefits                              d) None
-



Seat No.	
-------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOSYNTHETICS AND REINFORCED SOIL STRUCTURES  
(Self Learning Technical Course)**

Day and Date : Monday, 27-11-2017

Marks : 40

Time : 10.00 a.m. to 12.00 Noon

**Instructions :** 1) Assume additional data, if required and state it **clearly**.  
2) Figures to the **right** indicate **full** marks.

II. Attempt **any eight** questions :

**(5×8=40)**

- 1) What are geogrid, geofoam, geonet, GCL and geopipe ? Give one application for each product.
  - 2) What are the concepts of reinforced soil ?
  - 3) Explain the effect of reinforcement orientation.
  - 4) What are the mechanical properties of geosynthetics ?
  - 5) How are impact and abrasion test conducted ?
  - 6) What are the different construction factors that affect the performance of reinforced soil ?
  - 7) What are the steps involved in the design of reinforced soil slope ?
  - 8) How do you evaluate tensile failure of reinforcement ?
  - 9) Illustrate with sketches different failure modes that need to be considered.
  - 10) Write short notes on geosynthetic filter criteria.
-





SLR-TJ – 48

Seat No.	
----------	--

Set	R
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOSYNTHETICS AND REINFORCED SOIL STRUCTURES  
(Self Learning Technical Course)**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 Noon

Max. Marks : 50

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in Answer Book on Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Assume additional data, if required and state it **clearly**.  
4) Figures to the **right** indicate **full** marks.

**MCQ/Objective Type Questions**

Marks : 10

I. Choose the correct answer : **(1 mark each)**

- 1) Which one of the following is a basic function of geosynthetics ?  
a) Absorption      b) Insulation      c) Screening      d) Protection
- 2) Filtration function also provides  
a) Reinforcement benefits      b) Separation benefits  
c) Fluid barrier benefits      d) None
- 3) Within a soil slope, geosynthetic sheets are usually placed in  
a) Inclined planes towards the slope face  
b) Inclined planes away from the slope face  
c) Vertical planes  
d) Horizontal planes
- 4) The major functions served by the geotextile in unpaved roads are  
a) Separation and filtration      b) Separation and reinforcement  
c) Reinforcement and filtration      d) Filtration and drainage

P.T.O.



- 5) Most of the geotextiles are commercially available in rolls of width of around
  - a) 1 m
  - b) 5 m
  - c) 10 m
  - d) None of the above
  
- 6) Which one of the following geosynthetics is a geocomposite ?
  - a) Geogrid
  - b) Geonet
  - c) Geosynthetic clay linear
  - d) None of the above
  
- 7) Minimum FOS against pullout of reinforcing element of wall is
  - a) 1.2
  - b) 1.5
  - c) 2.0
  - d) 2.5
  
- 8) Coefficient of friction between soil and other material is given by
  - a)  $\tan \phi$
  - b)  $\tan \mu$
  - c)  $\tan \delta$
  - d) none
  
- 9) The gauge length of the geosynthetic specimen for the wide-width tensile strength test is
  - a) 10 mm
  - b) 100 mm
  - c) 200 mm
  - d) None of the above
  
- 10) Which geosynthetic can serve the fluid barrier as a primary function ?
  - a) Geotextile and geocomposite
  - b) Geotextile and geogrid
  - c) Geotextile and geonet
  - d) None of the above



Seat No.	
-------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOSYNTHETICS AND REINFORCED SOIL STRUCTURES  
(Self Learning Technical Course)**

Day and Date : Monday, 27-11-2017

Marks : 40

Time : 10.00 a.m. to 12.00 Noon

**Instructions :** 1) Assume additional data, if required and state it **clearly**.  
2) Figures to the **right** indicate **full** marks.

II. Attempt **any eight** questions :

**(5×8=40)**

- 1) What are geogrid, geofoam, geonet, GCL and geopipe ? Give one application for each product.
- 2) What are the concepts of reinforced soil ?
- 3) Explain the effect of reinforcement orientation.
- 4) What are the mechanical properties of geosynthetics ?
- 5) How are impact and abrasion test conducted ?
- 6) What are the different construction factors that affect the performance of reinforced soil ?
- 7) What are the steps involved in the design of reinforced soil slope ?
- 8) How do you evaluate tensile failure of reinforcement ?
- 9) Illustrate with sketches different failure modes that need to be considered.
- 10) Write short notes on geosynthetic filter criteria.







SLR-TJ – 48

Seat No.	
----------	--

Set	S
-----	---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOSYNTHETICS AND REINFORCED SOIL STRUCTURES  
(Self Learning Technical Course)**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 Noon

Max. Marks : 50

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in Answer Book on Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Assume additional data, if required and state it **clearly**.  
4) Figures to the **right** indicate **full** marks.

**MCQ/Objective Type Questions**

Marks : 10

I. Choose the correct answer : **(1 mark each)**

- 1) Most of the geotextiles are commercially available in rolls of width of around
  - a) 1 m
  - b) 5 m
  - c) 10 m
  - d) None of the above
- 2) Which one of the following geosynthetics is a geocomposite ?
  - a) Geogrid
  - b) Geonet
  - c) Geosynthetic clay linear
  - d) None of the above
- 3) Which one of the following is a basic function of geosynthetics ?
  - a) Absorption
  - b) Insulation
  - c) Screening
  - d) Protection
- 4) Filtration function also provides
  - a) Reinforcement benefits
  - b) Separation benefits
  - c) Fluid barrier benefits
  - d) None

P.T.O.



- 5) The gauge length of the geosynthetic specimen for the wide-width tensile strength test is
- a) 10 mm                                  b) 100 mm  
c) 200 mm                                 d) None of the above
- 6) Which geosynthetic can serve the fluid barrier as a primary function ?
- a) Geotextile and geocomposite        b) Geotextile and geogrid  
c) Geotextile and geonet                d) None of the above
- 7) Within a soil slope, geosynthetic sheets are usually placed in
- a) Inclined planes towards the slope face  
b) Inclined planes away from the slope face  
c) Vertical planes  
d) Horizontal planes
- 8) The major functions served by the geotextile in unpaved roads are
- a) Separation and filtration                b) Separation and reinforcement  
c) Reinforcement and filtration             d) Filtration and drainage
- 9) Minimum FOS against pullout of reinforcing element of wall is
- a) 1.2                                  b) 1.5                                  c) 2.0                                  d) 2.5
- 10) Coefficient of friction between soil and other material is given by
- a)  $\tan \phi$                                 b)  $\tan \mu$                                 c)  $\tan \delta$                                 d) none
-



Seat No.	
-------------	--

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
GEOSYNTHETICS AND REINFORCED SOIL STRUCTURES  
(Self Learning Technical Course)**

Day and Date : Monday, 27-11-2017

Marks : 40

Time : 10.00 a.m. to 12.00 Noon

**Instructions :** 1) Assume additional data, if required and state it **clearly**.  
2) Figures to the **right** indicate **full** marks.

II. Attempt **any eight** questions :

**(5×8=40)**

- 1) What are geogrid, geofoam, geonet, GCL and geopipe ? Give one application for each product.
- 2) What are the concepts of reinforced soil ?
- 3) Explain the effect of reinforcement orientation.
- 4) What are the mechanical properties of geosynthetics ?
- 5) How are impact and abrasion test conducted ?
- 6) What are the different construction factors that affect the performance of reinforced soil ?
- 7) What are the steps involved in the design of reinforced soil slope ?
- 8) How do you evaluate tensile failure of reinforcement ?
- 9) Illustrate with sketches different failure modes that need to be considered.
- 10) Write short notes on geosynthetic filter criteria.





SLR-TJ – 49

Seat No.	
-------------	--

Set **P**

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017  
PLANNING FOR SUSTAINABLE DEVELOPMENT  
(Self Learning) (Technical)**

Day and Date : Monday, 27-11-2017

Max. Marks : 50

Time : 10.00 a.m. to 12.00 noon

**Instructions :** 1) Solve **any five** questions.

2) Figures to the **right** indicates **full** marks.

1. Explain topology of environmental innovation. **10**
  2. Write a detailed note on 'Innovation for sustainable development'. **10**
  3. Explain major perspectives of sustainable development. **10**
  4. Discuss concerns and criticism regarding sustainable development. **10**
  5. Explain 'event oriented thinking' and how it can be applied in practice. **10**
  6. What is eco-innovations ? Explain. **10**
  7. Discuss two way relations between sustainable development and climate change. **10**
-



SLR-TJ – 50

Seat No.	
-------------	--

Set 

P
---

**T.E. Civil (Part – II) (CGPA) Examination, 2017**  
**SELF LEARNING : (TECHNICAL) TQM AND MIS IN CIVIL ENGINEERING**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Max. Marks : 50

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in Answer Book Page No. 3. Each question carries **one** mark.  
2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

**MCQ/Objective Type Questions**

Marks : 10

1. Choose the correct answer :

- 1) Malcolm Baldrige National Quality Award is for (MBNQA)
  - a) Total Quality Management
  - b) International Standard Organization
  - c) Total Productive Maintenance
  - d) Total Quality Control
- 2) Control chart is a
  - a) Process monitoring tool
  - b) Process control tool
  - c) Both a and b
  - d) None of the above
- 3) The objective of ISO-9000 family of Quality management is
  - a) Customer satisfaction
  - b) Employee satisfaction
  - c) Skill enhancement
  - d) Environmental issues
- 4) Total Quality Management (TQM) focuses on
  - a) Employee
  - b) Customer
  - c) Both a and b
  - d) None of the above
- 5) Which of the following is responsible for quality objective ?
  - a) Top level management
  - b) Middle level management
  - c) Frontline management
  - d) All of the above

P.T.O.



- 6) TQM and ISO both focuses on
- a) Customer
  - b) Employee
  - c) Supplier
  - d) All of the above
- 7) According to Deming, Quality problems are
- a) Due to management
  - b) Due to method
  - c) Due to machine
  - d) Due to material
- 8) While setting Quality objective, \_\_\_\_\_ to be considered.
- a) Material quality
  - b) Customer need
  - c) Market demand
  - d) All of the above
- 9) The most important characteristics of hardware in a computer is
- a) Speed and size
  - b) Data and size
  - c) Data and speed
  - d) Memory
- 10) Which of the following is for Environment management ?
- a) ISO-9000
  - b) ISO-14000
  - c) ISO-26000
  - d) ISO-31000
-



<b>Seat No.</b>	
---------------------	--

**T.E. Civil (Part – II) (CGPA) Examination, 2017**  
**SELF LEARNING : (TECHNICAL) TQM AND MIS IN CIVIL ENGINEERING**

Day and Date : Monday, 27-11-2017

Marks : 40

Time : 10.00 a.m. to 12.00 noon

***Instruction : Attempt any four from Question No. 2 to Question no. 7.***

2. What are the key management challenges involved in building, operating and maintaining information systems today ? **10**
  3. What are the dimensions of quality ? Discuss eight of them with reference to construction industry. **10**
  4. Write a note on MIS. **10**
  5. What are the barriers to TQM implementation ? How are they eliminated ? **10**
  6. Write a note on ISO : 9002. **10**
  7. Write a note on Supply Chain Management in TQM. **10**
-







SLR-TJ – 50

Seat No.	
-------------	--

Set 

Q
---

**T.E. Civil (Part – II) (CGPA) Examination, 2017**  
**SELF LEARNING : (TECHNICAL) TQM AND MIS IN CIVIL ENGINEERING**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Max. Marks : 50

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Marks : 10

1. Choose the correct answer :

- 1) The most important characteristics of hardware in a computer is
  - a) Speed and size
  - b) Data and size
  - c) Data and speed
  - d) Memory
- 2) Which of the following is for Environment management ?
  - a) ISO-9000
  - b) ISO-14000
  - c) ISO-26000
  - d) ISO-31000
- 3) According to Deming, Quality problems are
  - a) Due to management
  - b) Due to method
  - c) Due to machine
  - d) Due to material
- 4) While setting Quality objective, \_\_\_\_\_ to be considered.
  - a) Material quality
  - b) Customer need
  - c) Market demand
  - d) All of the above
- 5) Malcolm Baldrige National Quality Award is for (MBNQA)
  - a) Total Quality Management
  - b) International Standard Organization
  - c) Total Productive Maintenance
  - d) Total Quality Control

P.T.O.



- 6) Control chart is a
- a) Process monitoring tool
  - b) Process control tool
  - c) Both a and b
  - d) None of the above
- 7) The objective of ISO-9000 family of Quality management is
- a) Customer satisfaction
  - b) Employee satisfaction
  - c) Skill enhancement
  - d) Environmental issues
- 8) Total Quality Management (TQM) focuses on
- a) Employee
  - b) Customer
  - c) Both a and b
  - d) None of the above
- 9) Which of the following is responsible for quality objective ?
- a) Top level management
  - b) Middle level management
  - c) Frontline management
  - d) All of the above
- 10) TQM and ISO both focuses on
- a) Customer
  - b) Employee
  - c) Supplier
  - d) All of the above
-



<b>Seat No.</b>	
---------------------	--

**T.E. Civil (Part – II) (CGPA) Examination, 2017**  
**SELF LEARNING : (TECHNICAL) TQM AND MIS IN CIVIL ENGINEERING**

Day and Date : Monday, 27-11-2017

Marks : 40

Time : 10.00 a.m. to 12.00 noon

***Instruction : Attempt any four from Question No. 2 to Question no. 7.***

2. What are the key management challenges involved in building, operating and maintaining information systems today ? **10**
  3. What are the dimensions of quality ? Discuss eight of them with reference to construction industry. **10**
  4. Write a note on MIS. **10**
  5. What are the barriers to TQM implementation ? How are they eliminated ? **10**
  6. Write a note on ISO : 9002. **10**
  7. Write a note on Supply Chain Management in TQM. **10**
-





SLR-TJ – 50

Seat No.	
-------------	--

Set 

R
---

**T.E. Civil (Part – II) (CGPA) Examination, 2017**  
**SELF LEARNING : (TECHNICAL) TQM AND MIS IN CIVIL ENGINEERING**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Max. Marks : 50

**Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.*  
2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*

**MCQ/Objective Type Questions**

Marks : 10

1. Choose the correct answer :

- 1) Which of the following is responsible for quality objective ?
  - a) Top level management
  - b) Middle level management
  - c) Frontline management
  - d) All of the above
- 2) TQM and ISO both focuses on
  - a) Customer
  - b) Employee
  - c) Supplier
  - d) All of the above
- 3) The most important characteristics of hardware in a computer is
  - a) Speed and size
  - b) Data and size
  - c) Data and speed
  - d) Memory
- 4) Which of the following is for Environment management ?
  - a) ISO-9000
  - b) ISO-14000
  - c) ISO-26000
  - d) ISO-31000
- 5) The objective of ISO-9000 family of Quality management is
  - a) Customer satisfaction
  - b) Employee satisfaction
  - c) Skill enhancement
  - d) Environmental issues

P.T.O.



- 6) Total Quality Management (TQM) focuses on
- a) Employee
  - b) Customer
  - c) Both a and b
  - d) None of the above
- 7) Malcolm Baldrige National Quality Award is for (MBNQA)
- a) Total Quality Management
  - b) International Standard Organization
  - c) Total Productive Maintenance
  - d) Total Quality Control
- 8) Control chart is a
- a) Process monitoring tool
  - b) Process control tool
  - c) Both a and b
  - d) None of the above
- 9) According to Deming, Quality problems are
- a) Due to management
  - b) Due to method
  - c) Due to machine
  - d) Due to material
- 10) While setting Quality objective, \_\_\_\_\_ to be considered.
- a) Material quality
  - b) Customer need
  - c) Market demand
  - d) All of the above
-



<b>Seat No.</b>	
---------------------	--

**T.E. Civil (Part – II) (CGPA) Examination, 2017**  
**SELF LEARNING : (TECHNICAL) TQM AND MIS IN CIVIL ENGINEERING**

Day and Date : Monday, 27-11-2017

Marks : 40

Time : 10.00 a.m. to 12.00 noon

***Instruction : Attempt any four from Question No. 2 to Question no. 7.***

2. What are the key management challenges involved in building, operating and maintaining information systems today ? **10**
  3. What are the dimensions of quality ? Discuss eight of them with reference to construction industry. **10**
  4. Write a note on MIS. **10**
  5. What are the barriers to TQM implementation ? How are they eliminated ? **10**
  6. Write a note on ISO : 9002. **10**
  7. Write a note on Supply Chain Management in TQM. **10**
-







SLR-TJ – 50

Seat No.	
-------------	--

Set 

S
---

**T.E. Civil (Part – II) (CGPA) Examination, 2017**  
**SELF LEARNING : (TECHNICAL) TQM AND MIS IN CIVIL ENGINEERING**

Day and Date : Monday, 27-11-2017  
Time : 10.00 a.m. to 12.00 noon

Max. Marks : 50

- Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.*  
2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*

**MCQ/Objective Type Questions**

Marks : 10

1. Choose the correct answer :

- 1) The objective of ISO-9000 family of Quality management is
  - a) Customer satisfaction
  - b) Employee satisfaction
  - c) Skill enhancement
  - d) Environmental issues
- 2) Total Quality Management (TQM) focuses on
  - a) Employee
  - b) Customer
  - c) Both a and b
  - d) None of the above
- 3) Which of the following is responsible for quality objective ?
  - a) Top level management
  - b) Middle level management
  - c) Frontline management
  - d) All of the above
- 4) TQM and ISO both focuses on
  - a) Customer
  - b) Employee
  - c) Supplier
  - d) All of the above
- 5) According to Deming, Quality problems are
  - a) Due to management
  - b) Due to method
  - c) Due to machine
  - d) Due to material

P.T.O.



- 6) While setting Quality objective, \_\_\_\_\_ to be considered.
- a) Material quality
  - b) Customer need
  - c) Market demand
  - d) All of the above
- 7) The most important characteristics of hardware in a computer is
- a) Speed and size
  - b) Data and size
  - c) Data and speed
  - d) Memory
- 8) Which of the following is for Environment management ?
- a) ISO-9000
  - b) ISO-14000
  - c) ISO-26000
  - d) ISO-31000
- 9) Malcolm Baldrige National Quality Award is for (MBNQA)
- a) Total Quality Management
  - b) International Standard Organization
  - c) Total Productive Maintenance
  - d) Total Quality Control
- 10) Control chart is a
- a) Process monitoring tool
  - b) Process control tool
  - c) Both a and b
  - d) None of the above
-



<b>Seat No.</b>	
---------------------	--

**T.E. Civil (Part – II) (CGPA) Examination, 2017**  
**SELF LEARNING : (TECHNICAL) TQM AND MIS IN CIVIL ENGINEERING**

Day and Date : Monday, 27-11-2017

Marks : 40

Time : 10.00 a.m. to 12.00 noon

***Instruction : Attempt any four from Question No. 2 to Question no. 7.***

2. What are the key management challenges involved in building, operating and maintaining information systems today ? **10**
  3. What are the dimensions of quality ? Discuss eight of them with reference to construction industry. **10**
  4. Write a note on MIS. **10**
  5. What are the barriers to TQM implementation ? How are they eliminated ? **10**
  6. Write a note on ISO : 9002. **10**
  7. Write a note on Supply Chain Management in TQM. **10**
-





SLR-TJ – 51

Seat No.	
-------------	--

Set 

P
---

**T.E. (Civil) (Part – II) (CGPA) Examination, 2017**  
**EARTHQUAKE RESISTANT NON-ENGINEERED CONSTRUCTION**  
**(Self Learning Technical Course)**

Day and Date : Monday, 27-11-2017

Total Marks : 50

Time : 10.00 a.m. to 12.00 noon

**Instructions:** 1) Solve **any five** questions.

2) Figures to **right** indicate **full** marks.

3) **Assume** suitable data if necessary and mention it **clearly**.

1. Write detailed note on internal structure of Earth. 10
  2. Which are the seismic waves generated after earthquake ? 10
  3. What are the quantitative and qualitative measurement of an earthquake ?  
Explain in detail. 10
  4. What are causes of damages due to earthquake in the Brick masonry  
construction ? 10
  5. Explain the soil liquefaction as an effect of earthquake. 10
  6. Write a detailed note on “strengthening of walls” with suitable sketches. 10
-



SLR-TJ – 53

Seat No.	
----------	--

Set	<b>P</b>
-----	----------

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – I**

Day and Date : Tuesday, 28-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) **IS 456-2000 is not allowed** to refer while solving MCQ in **first 30 minutes**.
  - 4) Non-programmable **calculator** is allowed.
  - 5) Assume suitable data if **required** and state it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

I. Choose the correct answer :

- 1) The effective cover of beam depends upon **1**
  - a) Diameter of main reinforcement
  - b) Grade of steel
  - c) Width of beam
  - d) All of these
- 2) In an under reinforced concrete beam **1**
  - a) Actual depth of neutral axis is less than the critical depth of neutral axis
  - b) Moment of resistance is less than that of balanced sections
  - c) Both a) and b)
  - d) None of these
- 3) The lateral ties are provided in columns **1**
  - a) to decrease shear strength
  - b) to resist axial force
  - c) to resist lateral buckling
  - d) none of these
- 4) In ultimate limit state, the partial safety factor for dead load is **1**
  - a) 1.0 for dead and live load combination
  - b) 1.2 for dead and live load combination
  - c) 1.5 for dead and live load combination
  - d) 1.5 for dead, live and wind load combination

P.T.O.



- 5) According to IS456 : 2000, the maximum diameter of reinforcing bars shall not exceed 1
- a) One-fourth of total thickness of slab
  - b) One-sixth of total thickness of slab
  - c) One-eighth of total thickness of slab
  - d) One-tenth of total thickness of slab
- 6)  $V_{us}/d$  depends on 1
- a)  $A_{sv}$
  - b) Spacing of shear reinforcement
  - c) Grade of steel
  - d) All of these
- 7) An unrestrained reinforced concrete slab of effective dimension  $4.5 \text{ m} \times 6.0 \text{ m}$  is simply supported on all four walls. It has to carry a characteristic live load of  $10 \text{ kN/sq.m.}$  in addition to the dead load. Assuming M25 and Fe415, thickness of the slab being  $200 \text{ mm}$  and finishing load of  $1 \text{ kN/sq.m.}$ , what should be the design load as per limit state method ? 2
- a)  $16 \text{ kN/sq.m.}$
  - b)  $24 \text{ kN/sq.m.}$
  - c)  $20 \text{ kN/sq.m.}$
  - d)  $22 \text{ kN/sq.m.}$
- 8) The rectangular beam of width,  $250 \text{ mm}$  is having effective depth of  $317 \text{ mm}$ . The concrete grade is M20 and the grade of reinforcing steel is Fe 415. The moment capacity of the section due to concrete as per limit state method is 2
- a)  $52.046 \text{ kNm}$
  - b)  $69.395 \text{ kNm}$
  - c)  $86.744 \text{ kNm}$
  - d)  $104.093 \text{ kNm}$
- 9) A concrete column is reinforced with 4 bars of  $20 \text{ mm}$  dia. Determine the load capacity of the column using M25 grade concrete and Fe 415 grade steel if the size of the column is  $400 \text{ mm} \times 400 \text{ mm}$ . 2
- a)  $1950 \text{ kN}$
  - b)  $2000 \text{ kN}$
  - c)  $1500 \text{ kN}$
  - d)  $1100 \text{ kN}$
- 10) Calculate the effective width of a RCC T-beam section having the following sectional properties : Distance between points of zero moments in the beam =  $3000 \text{ mm}$ ; Width of flange =  $1800 \text{ mm}$ ; Thickness of flange =  $150 \text{ mm}$ ; Breadth of the web =  $200 \text{ mm}$ ; Effective depth =  $300 \text{ mm}$ ; Reinforcement = 4- $20 \text{ mm}$  diameter  $Fe_{500}$  steel bars on tension side. Grade of concrete =  $M_{25}$ . 2
- a)  $1800 \text{ mm}$
  - b)  $1400 \text{ mm}$
  - c)  $1600 \text{ mm}$
  - d)  $1200 \text{ mm}$





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – I**

Day and Date : Tuesday, 28-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) Q. No. II and VI are **compulsory**.
  - 2) Solve **any two** from Q. No. III to Q. No. V in Section – I and Q. No. VII to Q. No. IX in Section – II.
  - 3) **Use of IS 456 : 2000** original and non-programmable calculator is **allowed**.
  - 4) Assume suitable data if **required** and state it **clearly**.
  - 5) Draw **neat** sketches of reinforcement details.

SECTION – I

- II. A singly reinforced beam 230 mm × 450 mm is reinforced with 4-bars of 16 mm  $\Phi$  with an effective cover of 50 mm. Effective span of the beam is 5 m. Assuming  $M_{20}$  concrete and Fe 415 steel, determine the udl, that can be carried by the beam in addition to its self weight. 8
- III. A T-beam slab floor has 150 mm thick slab forming part of T-beams which are of 10 m clear span. The end bearings are 300 mm thick. Spacing of T-beams is 3.2 m. The live load on the floor is 4 kN/m<sup>2</sup> (including floor finish). Design one of the T-beam using  $M_{25}$  concrete and Fe<sub>500</sub> steel. 10
- IV. Design a reinforced concrete slab for a room of clear dimension 3.6 m × 5.5 m. The slab is supported all around on the wall of width 300 mm. The slab has to carry a live load of 3 kN/m<sup>2</sup> and floor finish 1 kN/m<sup>2</sup>. Use  $M_{20}$  concrete and Fe<sub>415</sub> steel. Assume corners are held down. 10
- V. Design a rectangular beam of section 230 mm × 600 mm of effective span 6.5 m. The effective cover provided is 50 mm. The beam is carrying a imposed load of 55 kN/m. Use  $M_{25}$  and Fe<sub>415</sub> steel. 10



## SECTION – II

- VI. Find the area of steel required for a short reinforced concrete column  $400 \text{ mm} \times 400 \text{ mm}$  to carry an axial load of  $1000 \text{ kN}$ . Use  $M_{20}$  concrete and  $Fe_{500}$  steel. **8**
- VII. Design a three span continuous beam of span of  $5.5 \text{ m}$  each to carry a live load on slab  $4 \text{ kN/m}^2$  including its self weight. The centre to centre distance between the continuous beams is  $3.5 \text{ m}$ . Assume the thickness of slab  $120 \text{ mm}$ . Use  $M_{25}$  concrete and  $Fe_{500}$  steel. **10**
- VIII. Determine reinforcement required for a beam size  $230 \text{ mm} \times 600 \text{ mm}$  subjected to shear force of  $60 \text{ kN}$ , torsional moment of  $35 \text{ kN.m}$  and bending moment of  $80 \text{ kN.m}$ . Use  $M_{20}$  concrete and  $Fe_{500}$  steel. **10**
- IX. a) A reinforced concrete circular column of  $3.2 \text{ m}$  long with effectively held in position at both ends, restrained against rotation at one end and carries an axial load of  $1400 \text{ kN}$ . Design the column using  $M_{25}$  concrete and  $Fe_{415}$  steel. **7**
- b) Write on “Interaction diagrams” for column stating their salient features. **3**
-



SLR-TJ – 53

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – I**

Day and Date : Tuesday, 28-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) **IS 456-2000 is not allowed to refer while solving MCQ in first 30 minutes.**
  - 4) **Non-programmable calculator is allowed.**
  - 5) **Assume suitable data if required and state it clearly.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

I. Choose the correct answer :

- 1) In an under reinforced concrete beam 1
  - a) Actual depth of neutral axis is less than the critical depth of neutral axis
  - b) Moment of resistance is less than that of balanced sections
  - c) Both a) and b)
  - d) None of these
- 2) In ultimate limit state, the partial safety factor for dead load is 1
  - a) 1.0 for dead and live load combination
  - b) 1.2 for dead and live load combination
  - c) 1.5 for dead and live load combination
  - d) 1.5 for dead, live and wind load combination
- 3)  $V_{us}/d$  depends on 1
  - a)  $A_{sv}$
  - b) Spacing of shear reinforcement
  - c) Grade of steel
  - d) All of these
- 4) The effective cover of beam depends upon 1
  - a) Diameter of main reinforcement
  - b) Grade of steel
  - c) Width of beam
  - d) All of these

P.T.O.



- 5) The lateral ties are provided in columns 1  
a) to decrease shear strength                      b) to resist axial force  
c) to resist lateral buckling                      d) none of these
- 6) According to IS456 : 2000, the maximum diameter of reinforcing bars shall not exceed 1  
a) One-fourth of total thickness of slab  
b) One-sixth of total thickness of slab  
c) One-eighth of total thickness of slab  
d) One-tenth of total thickness of slab
- 7) The rectangular beam of width, 250 mm is having effective depth of 317 mm. The concrete grade is M20 and the grade of reinforcing steel is Fe 415. The moment capacity of the section due to concrete as per limit state method is 2  
a) 52.046 kNm    b) 69.395 kNm  
c) 86.744 kNm    d) 104.093 kNm
- 8) Calculate the effective width of a RCC T-beam section having the following sectional properties : Distance between points of zero moments in the beam = 3000 mm; Width of flange = 1800 mm; Thickness of flange = 150 mm; Breadth of the web = 200 mm; Effective depth = 300 mm; Reinforcement = 4-20 mm diameter Fe<sub>500</sub> steel bars on tension side. Grade of concrete = M<sub>25</sub>. 2  
a) 1800 mm    b) 1400 mm  
c) 1600 mm    d) 1200 mm
- 9) An unrestrained reinforced concrete slab of effective dimension 4.5 m × 6.0 m is simply supported on all four walls. It has to carry a characteristic live load of 10 kN/sq.m. in addition to the dead load. Assuming M25 and Fe415, thickness of the slab being 200 mm and finishing load of 1 kN/sq.m., what should be the design load as per limit state method ? 2  
a) 16 kN/sq.m.    b) 24 kN/sq.m.  
c) 20 kN/sq.m.    d) 22 kN/sq.m.
- 10) A concrete column is reinforced with 4 bars of 20 mm dia. Determine the load capacity of the column using M25 grade concrete and Fe 415 grade steel if the size of the column is 400 mm × 400 mm. 2  
a) 1950 kN    b) 2000 kN  
c) 1500 kN    d) 1100 kN
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – I**

Day and Date : Tuesday, 28-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) Q. No. II and VI are **compulsory**.
  - 2) Solve **any two** from Q. No. III to Q. No. V in Section – I and Q. No. VII to Q. No. IX in Section – II.
  - 3) **Use of IS 456 : 2000** original and non-programmable calculator is **allowed**.
  - 4) Assume suitable data if **required** and state it **clearly**.
  - 5) Draw **neat** sketches of reinforcement details.

SECTION – I

- II. A singly reinforced beam 230 mm × 450 mm is reinforced with 4-bars of 16 mm  $\Phi$  with an effective cover of 50 mm. Effective span of the beam is 5 m. Assuming  $M_{20}$  concrete and Fe 415 steel, determine the udl, that can be carried by the beam in addition to its self weight. 8
- III. A T-beam slab floor has 150 mm thick slab forming part of T-beams which are of 10 m clear span. The end bearings are 300 mm thick. Spacing of T-beams is 3.2 m. The live load on the floor is 4 kN/m<sup>2</sup> (including floor finish). Design one of the T-beam using  $M_{25}$  concrete and Fe<sub>500</sub> steel. 10
- IV. Design a reinforced concrete slab for a room of clear dimension 3.6 m × 5.5 m. The slab is supported all around on the wall of width 300 mm. The slab has to carry a live load of 3 kN/m<sup>2</sup> and floor finish 1 kN/m<sup>2</sup>. Use  $M_{20}$  concrete and Fe<sub>415</sub> steel. Assume corners are held down. 10
- V. Design a rectangular beam of section 230 mm × 600 mm of effective span 6.5 m. The effective cover provided is 50 mm. The beam is carrying a imposed load of 55 kN/m. Use  $M_{25}$  and Fe<sub>415</sub> steel. 10

Set Q



## SECTION – II

- VI. Find the area of steel required for a short reinforced concrete column  $400 \text{ mm} \times 400 \text{ mm}$  to carry an axial load of  $1000 \text{ kN}$ . Use  $M_{20}$  concrete and  $Fe_{500}$  steel. **8**
- VII. Design a three span continuous beam of span of  $5.5 \text{ m}$  each to carry a live load on slab  $4 \text{ kN/m}^2$  including its self weight. The centre to centre distance between the continuous beams is  $3.5 \text{ m}$ . Assume the thickness of slab  $120 \text{ mm}$ . Use  $M_{25}$  concrete and  $Fe_{500}$  steel. **10**
- VIII. Determine reinforcement required for a beam size  $230 \text{ mm} \times 600 \text{ mm}$  subjected to shear force of  $60 \text{ kN}$ , torsional moment of  $35 \text{ kN.m}$  and bending moment of  $80 \text{ kN.m}$ . Use  $M_{20}$  concrete and  $Fe_{500}$  steel. **10**
- IX. a) A reinforced concrete circular column of  $3.2 \text{ m}$  long with effectively held in position at both ends, restrained against rotation at one end and carries an axial load of  $1400 \text{ kN}$ . Design the column using  $M_{25}$  concrete and  $Fe_{415}$  steel. **7**
- b) Write on “Interaction diagrams” for column stating their salient features. **3**
-



SLR-TJ – 53

Seat No.	
----------	--

Set	R
-----	---

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – I**

Day and Date : Tuesday, 28-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) **IS 456-2000 is not allowed to refer while solving MCQ in first 30 minutes.**
  - 4) **Non-programmable calculator is allowed.**
  - 5) **Assume suitable data if required and state it clearly.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

I. Choose the correct answer :

- 1)  $V_{us}/d$  depends on 1
  - a)  $A_{sv}$
  - b) Spacing of shear reinforcement
  - c) Grade of steel
  - d) All of these
- 2) According to IS456 : 2000, the maximum diameter of reinforcing bars shall not exceed 1
  - a) One-fourth of total thickness of slab
  - b) One-sixth of total thickness of slab
  - c) One-eighth of total thickness of slab
  - d) One-tenth of total thickness of slab
- 3) In ultimate limit state, the partial safety factor for dead load is 1
  - a) 1.0 for dead and live load combination
  - b) 1.2 for dead and live load combination
  - c) 1.5 for dead and live load combination
  - d) 1.5 for dead, live and wind load combination
- 4) The lateral ties are provided in columns 1
  - a) to decrease shear strength
  - b) to resist axial force
  - c) to resist lateral buckling
  - d) none of these

P.T.O.



- 5) In an under reinforced concrete beam 1  
a) Actual depth of neutral axis is less than the critical depth of neutral axis  
b) Moment of resistance is less than that of balanced sections  
c) Both a) and b)  
d) None of these
- 6) The effective cover of beam depends upon 1  
a) Diameter of main reinforcement      b) Grade of steel  
c) Width of beam                              d) All of these
- 7) A concrete column is reinforced with 4 bars of 20 mm dia. Determine the load capacity of the column using M25 grade concrete and Fe 415 grade steel if the size of the column is 400 mm × 400 mm. 2  
a) 1950 kN                                      b) 2000 kN  
c) 1500 kN                                      d) 1100 kN
- 8) An unrestrained reinforced concrete slab of effective dimension 4.5 m × 6.0 m is simply supported on all four walls. It has to carry a characteristic live load of 10 kN/sq.m. in addition to the dead load. Assuming M25 and Fe415, thickness of the slab being 200 mm and finishing load of 1 kN/sq.m., what should be the design load as per limit state method ? 2  
a) 16 kN/sq.m.                                      b) 24 kN/sq.m.  
c) 20 kN/sq.m.                                      d) 22 kN/sq.m.
- 9) Calculate the effective width of a RCC T-beam section having the following sectional properties : Distance between points of zero moments in the beam = 3000 mm; Width of flange = 1800 mm; Thickness of flange = 150 mm; Breadth of the web = 200 mm; Effective depth = 300 mm; Reinforcement = 4-20 mm diameter Fe<sub>500</sub> steel bars on tension side. Grade of concrete = M<sub>25</sub>. 2  
a) 1800 mm                                      b) 1400 mm  
c) 1600 mm                                      d) 1200 mm
- 10) The rectangular beam of width, 250 mm is having effective depth of 317 mm. The concrete grade is M20 and the grade of reinforcing steel is Fe 415. The moment capacity of the section due to concrete as per limit state method is 2  
a) 52.046 kNm                                      b) 69.395 kNm  
c) 86.744 kNm                                      d) 104.093 kNm
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – I**

Day and Date : Tuesday, 28-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) Q. No. II and VI are **compulsory**.
  - 2) Solve **any two** from Q. No. III to Q. No. V in Section – I and Q. No. VII to Q. No. IX in Section – II.
  - 3) **Use of IS 456 : 2000** original and non-programmable calculator is **allowed**.
  - 4) Assume suitable data if **required** and state it **clearly**.
  - 5) Draw **neat** sketches of reinforcement details.

SECTION – I

- II. A singly reinforced beam 230 mm × 450 mm is reinforced with 4-bars of 16 mm  $\Phi$  with an effective cover of 50 mm. Effective span of the beam is 5 m. Assuming  $M_{20}$  concrete and Fe 415 steel, determine the udl, that can be carried by the beam in addition to its self weight. 8
- III. A T-beam slab floor has 150 mm thick slab forming part of T-beams which are of 10 m clear span. The end bearings are 300 mm thick. Spacing of T-beams is 3.2 m. The live load on the floor is 4 kN/m<sup>2</sup> (including floor finish). Design one of the T-beam using  $M_{25}$  concrete and Fe<sub>500</sub> steel. 10
- IV. Design a reinforced concrete slab for a room of clear dimension 3.6 m × 5.5 m. The slab is supported all around on the wall of width 300 mm. The slab has to carry a live load of 3 kN/m<sup>2</sup> and floor finish 1 kN/m<sup>2</sup>. Use  $M_{20}$  concrete and Fe<sub>415</sub> steel. Assume corners are held down. 10
- V. Design a rectangular beam of section 230 mm × 600 mm of effective span 6.5 m. The effective cover provided is 50 mm. The beam is carrying a imposed load of 55 kN/m. Use  $M_{25}$  and Fe<sub>415</sub> steel. 10



## SECTION – II

- VI. Find the area of steel required for a short reinforced concrete column 400 mm × 400 mm to carry an axial load of 1000 kN. Use M<sub>20</sub> concrete and Fe<sub>500</sub> steel. **8**
- VII. Design a three span continuous beam of span of 5.5 m each to carry a live load on slab 4 kN/m<sup>2</sup> including its self weight. The centre to centre distance between the continuous beams is 3.5 m. Assume the thickness of slab 120 mm. Use M<sub>25</sub> concrete and Fe<sub>500</sub> steel. **10**
- VIII. Determine reinforcement required for a beam size 230 mm × 600 mm subjected to shear force of 60 kN, torsional moment of 35 kN.m and bending moment of 80 kN.m. Use M<sub>20</sub> concrete and Fe<sub>500</sub> steel. **10**
- IX. a) A reinforced concrete circular column of 3.2 m long with effectively held in position at both ends, restrained against rotation at one end and carries an axial load of 1400 kN. Design the column using M<sub>25</sub> concrete and Fe<sub>415</sub> steel. **7**
- b) Write on “Interaction diagrams” for column stating their salient features. **3**
-



SLR-TJ – 53

Seat No.	
----------	--

Set	S
-----	---

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – I**

Day and Date : Tuesday, 28-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) **IS 456-2000 is not allowed to refer while solving MCQ in first 30 minutes.**
  - 4) **Non-programmable calculator is allowed.**
  - 5) **Assume suitable data if required and state it clearly.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

I. Choose the correct answer :

- 1) The lateral ties are provided in columns 1
  - a) to decrease shear strength
  - b) to resist axial force
  - c) to resist lateral buckling
  - d) none of these
- 2) The effective cover of beam depends upon 1
  - a) Diameter of main reinforcement
  - b) Grade of steel
  - c) Width of beam
  - d) All of these
- 3) According to IS456 : 2000, the maximum diameter of reinforcing bars shall not exceed 1
  - a) One-fourth of total thickness of slab
  - b) One-sixth of total thickness of slab
  - c) One-eighth of total thickness of slab
  - d) One-tenth of total thickness of slab
- 4) In an under reinforced concrete beam 1
  - a) Actual depth of neutral axis is less than the critical depth of neutral axis
  - b) Moment of resistance is less than that of balanced sections
  - c) Both a) and b)
  - d) None of these

P.T.O.



- 5)  $V_{us}/d$  depends on **1**
- a)  $A_{sv}$  b) Spacing of shear reinforcement  
c) Grade of steel d) All of these
- 6) In ultimate limit state, the partial safety factor for dead load is **1**
- a) 1.0 for dead and live load combination  
b) 1.2 for dead and live load combination  
c) 1.5 for dead and live load combination  
d) 1.5 for dead, live and wind load combination
- 7) Calculate the effective width of a RCC T-beam section having the following sectional properties : Distance between points of zero moments in the beam = 3000 mm; Width of flange = 1800 mm; Thickness of flange = 150 mm; Breadth of the web = 200 mm; Effective depth = 300 mm; Reinforcement = 4-20 mm diameter  $F_{e500}$  steel bars on tension side. Grade of concrete =  $M_{25}$ . **2**
- a) 1800 mm b) 1400 mm  
c) 1600 mm d) 1200 mm
- 8) A concrete column is reinforced with 4 bars of 20 mm dia. Determine the load capacity of the column using M25 grade concrete and Fe 415 grade steel if the size of the column is 400 mm  $\times$  400 mm. **2**
- a) 1950 kN b) 2000 kN  
c) 1500 kN d) 1100 kN
- 9) The rectangular beam of width, 250 mm is having effective depth of 317 mm. The concrete grade is M20 and the grade of reinforcing steel is Fe 415. The moment capacity of the section due to concrete as per limit state method is **2**
- a) 52.046 kNm b) 69.395 kNm  
c) 86.744 kNm d) 104.093 kNm
- 10) An unrestrained reinforced concrete slab of effective dimension 4.5 m  $\times$  6.0 m is simply supported on all four walls. It has to carry a characteristic live load of 10 kN/sq.m. in addition to the dead load. Assuming M25 and Fe415, thickness of the slab being 200 mm and finishing load of 1 kN/sq.m., what should be the design load as per limit state method ? **2**
- a) 16 kN/sq.m. b) 24 kN/sq.m.  
c) 20 kN/sq.m. d) 22 kN/sq.m.
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – I**

Day and Date : Tuesday, 28-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :**
- 1) Q. No. II and VI are **compulsory**.
  - 2) Solve **any two** from Q. No. III to Q. No. V in Section – I and Q. No. VII to Q. No. IX in Section – II.
  - 3) **Use of IS 456 : 2000** original and non-programmable calculator is **allowed**.
  - 4) Assume suitable data if **required** and state it **clearly**.
  - 5) Draw **neat** sketches of reinforcement details.

SECTION – I

- II. A singly reinforced beam 230 mm × 450 mm is reinforced with 4-bars of 16 mm  $\Phi$  with an effective cover of 50 mm. Effective span of the beam is 5 m. Assuming  $M_{20}$  concrete and Fe 415 steel, determine the udl, that can be carried by the beam in addition to its self weight. 8
- III. A T-beam slab floor has 150 mm thick slab forming part of T-beams which are of 10 m clear span. The end bearings are 300 mm thick. Spacing of T-beams is 3.2 m. The live load on the floor is 4 kN/m<sup>2</sup> (including floor finish). Design one of the T-beam using  $M_{25}$  concrete and Fe<sub>500</sub> steel. 10
- IV. Design a reinforced concrete slab for a room of clear dimension 3.6 m × 5.5 m. The slab is supported all around on the wall of width 300 mm. The slab has to carry a live load of 3 kN/m<sup>2</sup> and floor finish 1 kN/m<sup>2</sup>. Use  $M_{20}$  concrete and Fe<sub>415</sub> steel. Assume corners are held down. 10
- V. Design a rectangular beam of section 230 mm × 600 mm of effective span 6.5 m. The effective cover provided is 50 mm. The beam is carrying a imposed load of 55 kN/m. Use  $M_{25}$  and Fe<sub>415</sub> steel. 10



## SECTION – II

- VI. Find the area of steel required for a short reinforced concrete column 400 mm × 400 mm to carry an axial load of 1000 kN. Use M<sub>20</sub> concrete and Fe<sub>500</sub> steel. **8**
- VII. Design a three span continuous beam of span of 5.5 m each to carry a live load on slab 4 kN/m<sup>2</sup> including its self weight. The centre to centre distance between the continuous beams is 3.5 m. Assume the thickness of slab 120 mm. Use M<sub>25</sub> concrete and Fe<sub>500</sub> steel. **10**
- VIII. Determine reinforcement required for a beam size 230 mm × 600 mm subjected to shear force of 60 kN, torsional moment of 35 kN.m and bending moment of 80 kN.m. Use M<sub>20</sub> concrete and Fe<sub>500</sub> steel. **10**
- IX. a) A reinforced concrete circular column of 3.2 m long with effectively held in position at both ends, restrained against rotation at one end and carries an axial load of 1400 kN. Design the column using M<sub>25</sub> concrete and Fe<sub>415</sub> steel. **7**
- b) Write on “Interaction diagrams” for column stating their salient features. **3**
-



SLR-TJ – 54

Seat No.	
----------	--

Set	<b>P</b>
-----	----------

**B.E. (Civil) (Part – I) (CGPA) Examination, 2017  
QUANTITY SURVEYING AND VALUATION (New)**

Day and Date : Thursday, 30-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Q. No. 2 and Q. No. 9 are **compulsory**. Attempt **any two** out of Q. No. 3 to Q. No. 5 and **any two** out of Q. No. 6 to Q. No. 8.
  - 4) **Assume** suitable data if necessary but mention **it clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) For calculating the depreciation of machines and equipments following method is used
  - a) Unit cost method
  - b) Sinking fund method
  - c) Straight line method
  - d) Quantity survey method
- 2) The standard rent is fixed in relation to
  - a) Premises
  - b) Persons
  - c) Both a) and b)
  - d) None of these
- 3) In normal circumstances minimum period before striking soffit formwork of slabs (props to be refixed immediately after removal of formwork) shall be
  - a) 16-24 Hr.
  - b) 3 days
  - c) 7 days
  - d) 14 days
- 4) In normal circumstances, minimum period before striking soffit formwork to beams (props to be refixed immediately after removal of formwork) shall be
  - a) 16-24 Hr.
  - b) 3 days
  - c) 7 days
  - d) 14 days
- 5) In normal circumstances, Minimum period before striking props to slabs (Spanning up to 4.5 m) shall be
  - a) 16-24 Hr.
  - b) 3 days
  - c) 7 days
  - d) 14 days

P.T.O.



- 6) In normal circumstances, Minimum period before striking props to slabs (spanning over 4.5 m) shall be  
a) 16-24 Hr.                      b) 3 days                      c) 7 days                      d) 14 days
- 7) In normal circumstances, minimum period before striking props to slabs (Spanning up to 6 m) shall be  
a) 21 days                      b) 3 days                      c) 7 days                      d) 14 days
- 8) In normal circumstances, minimum period before striking props to slabs (Spanning over 6 m) shall be  
a) 21 days                      b) 3 days                      c) 7 days                      d) 14 days
- 9) In the designation of concrete mix, the number to the specified compressive strength of '\_\_\_\_\_ mm' sizecube at '28 days' expressed in 'N/mm<sup>2</sup>.  
a) 50                      b) 100                      c) 150                      d) 300
- 10) The pH value of water for concreting shall be not less than  
a) 6                      b) 7                      c) 8                      d) 9
- 11) For a longitudinal reinforcing bar (diameter greater than 20 mm) in a column, nominal cover shall in any case not be less than  
a) 40 mm or the diameter of such bar  
b) 25 mm or the diameter of such bar  
c) 50 mm or the diameter of such bar  
d) 20 mm or the diameter of such bar
- 12) For RCC footings minimum cover shall be  
a) 20 mm                      b) 25 mm                      c) 40 mm                      d) 50 mm
- 13) As per CBRI the cement (in Tonn) requirement for framed multistoried construction is given by the formula (where 'A' is plinth area is Sq. M.)  
a)  $-26.2 + 2.96A - 0.0096A^2$                       b)  $0.182A - 5.35$   
c)  $-1491 + 92A - 0.36 A^2 + 465$                       d)  $0.561A - 3.98$
- 14) Guarantee in the shape of money, given by contractor alongwith the tender, confirming willingness to work is called  
a) Earnest money                      b) Security deposit  
c) Bank Guarantee                      d) None of these
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (CGPA) Examination, 2017  
QUANTITY SURVEYING AND VALUATION (New)**

Day and Date : Thursday, 30-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

- Instructions :** 1) Q. No. 2 and Q. No. 9 are **compulsory**. Attempt **any two** out of Q. No. 3 to Q. No. 5 and **any two** out of Q. No. 6 to Q. No. 8.  
2) **Assume** suitable data if necessary but mention **it clearly**.

SECTION – I

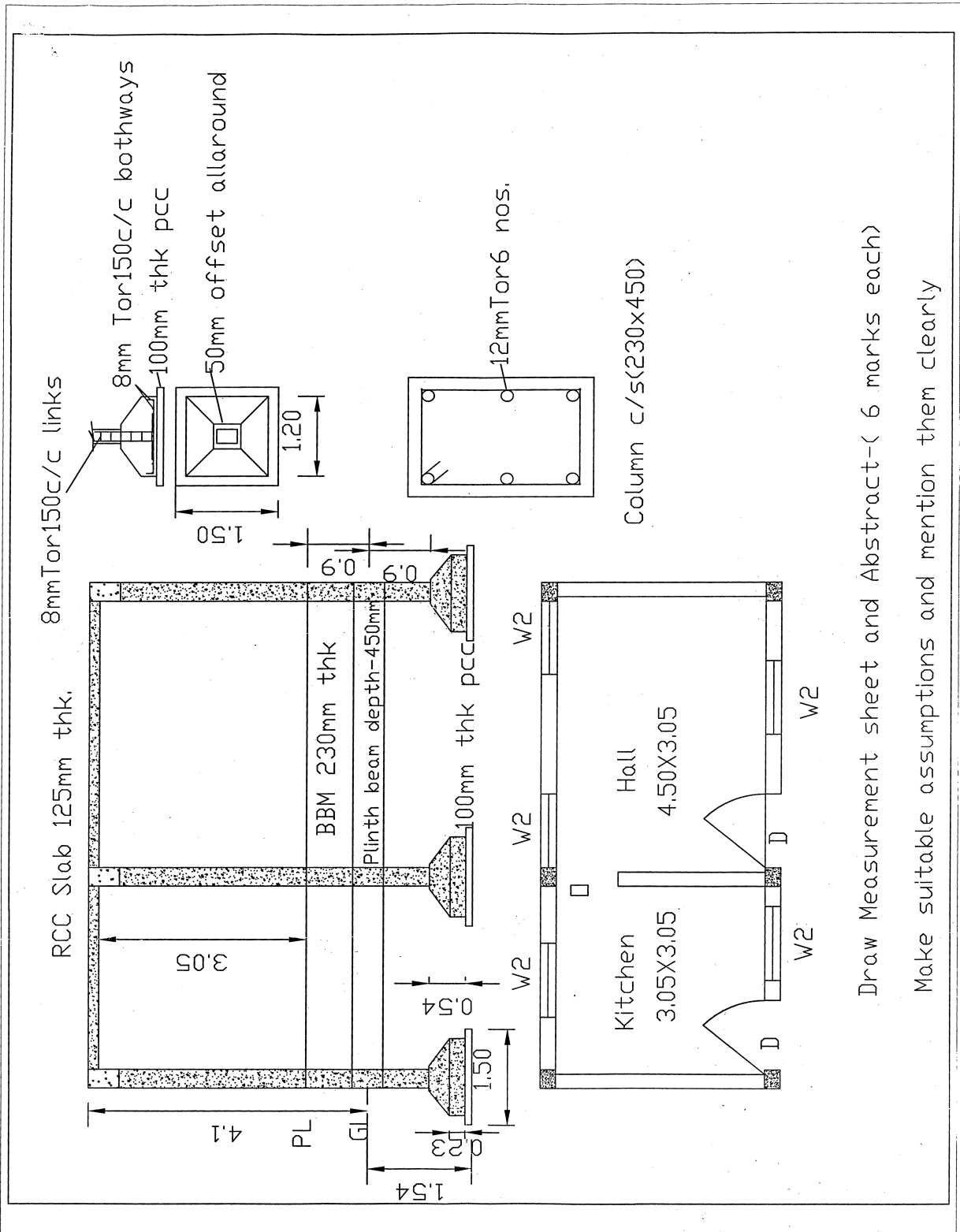
2. Calculate the quantity of cement concrete required in R.C.C. column and footing shown in attached Drawing. 12
3. A) Prepare the rough estimate for a proposed commercial complex for a municipal corporation for the following data :
- Plinth Area = 500 m<sup>2</sup>/floor, Ht of each storey = 3.5 m, No. of storeys = G + 2, cubical content rate = Rs. 1,000/m<sup>3</sup>.
- Provided for following as a percentage of structured cost.
- a) Water supply and sanitary arrangement – 8%.  
b) Electrification – 6%.  
c) Fluctuation of rates – 5%.  
d) Contractors profit – 10%.  
e) Petty supervision and contingencies – 3%. 4
- B) Write percentage breakup of the cost for residential buildings. 4
4. Write the detailed specifications for 8
- a) First class Brickwork in Cement Mortar.  
b) External Cement plastering.
5. Carry out Rate analysis for the following items : 8
- a) First class Brickwork in Cement Mortar 1 : 6.  
b) External Cement plastering in CM 1 : 6.

Set P



## SECTION – II

6. Explain :
- A) Percentage rate contract. 4
  - B) Terms and conditions to contracts. 4
7. A) Write any eight factors affecting the valuation of properties. 4
- B) Define : 4
- 1) Book value,
  - 2) Distress value,
  - 3) Sentimental value,
  - 4) Accommodation value.
8. A) Determine the depreciation and book value for each year by sinking fund method, assuming the rate of interest as 4%. 4
- B) Valuation based on land and building. 4
9. A) Find out value of a hotel (capitalizing the net annual rent at 8% in perpetuity with YP) constructed on a freehold plot admeasuring 248 Sq. M. in the heart of town. The gross receipts during the year works out to be Rs. 4,15,940/-. The owner has to spend Rs. 1,35,940/- for purchase of food-stuff items. If the owner has to pay an amount of Rs. 17,452/- towards insurance, municipal taxes, etc. Assume working expenses as 40% of gross profit and repairs and maintenance as 22% of balance of gross profit after deduction of insurance and allied expenses. 6
- B) Explain the principle of Rating-Ribus Sic stantibus. 6



Draw Measurement sheet and Abstract-( 6 marks each)

Make suitable assumptions and mention them clearly





SLR-TJ – 54

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) (Part – I) (CGPA) Examination, 2017  
QUANTITY SURVEYING AND VALUATION (New)**

Day and Date : Thursday, 30-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Q. No. 2 and Q. No. 9 are **compulsory**. Attempt **any two** out of Q. No. 3 to Q. No. 5 and **any two** out of Q. No. 6 to Q. No. 8.
  - 4) **Assume** suitable data if necessary but mention **it clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) In normal circumstances, minimum period before striking props to slabs (Spanning over 6 m) shall be  
a) 21 days                      b) 3 days                      c) 7 days                      d) 14 days
- 2) In the designation of concrete mix, the number to the specified compressive strength of '\_\_\_\_\_ mm' sizecube at '28 days' expressed in 'N/mm<sup>2</sup>.  
a) 50                              b) 100                              c) 150                              d) 300
- 3) The pH value of water for concreting shall be not less than  
a) 6                              b) 7                              c) 8                              d) 9
- 4) For a longitudinal reinforcing bar (diameter greater than 20 mm) in a column, nominal cover shall in any case not be less than  
a) 40 mm or the diameter of such bar  
b) 25 mm or the diameter of such bar  
c) 50 mm or the diameter of such bar  
d) 20 mm or the diameter of such bar
- 5) For RCC footings minimum cover shall be  
a) 20 mm                      b) 25 mm                      c) 40 mm                      d) 50 mm

P.T.O.



- 6) As per CBRI the cement (in Tonn) requirement for framed multistoried construction is given by the formula (where 'A' is plinth area is Sq. M.)
- a)  $- 26.2 + 2.96A - 0.0096A^2$       b)  $0.182A - 5.35$   
c)  $- 1491 + 92A - 0.36 A^2 + 465$       d)  $0.561A - 3.98$
- 7) Guarantee in the shape of money, given by contractor alongwith the tender, confirming willingness to work is called
- a) Earnest money      b) Security deposit  
c) Bank Guarantee      d) None of these
- 8) For calculating the depreciation of machines and equipments following method is used
- a) Unit cost method      b) Sinking fund method  
c) Straight line method      d) Quantity survey method
- 9) The standard rent is fixed in relation to
- a) Premises      b) Persons  
c) Both a) and b)      d) None of these
- 10) In normal circumstances minimum period before striking soffit formwork of slabs (props to be refixed immediately after removal of formwork) shall be
- a) 16-24 Hr.      b) 3 days      c) 7 days      d) 14 days
- 11) In normal circumstances, minimum period before striking soffit formwork to beams (props to be refixed immediately after removal of formwork) shall be
- a) 16-24 Hr.      b) 3 days  
c) 7 days      d) 14 days
- 12) In normal circumstances, Minimum period before striking props to slabs (Spanning up to 4.5 m) shall be
- a) 16-24 Hr.      b) 3 days      c) 7 days      d) 14 days
- 13) In normal circumstances, Minimum period before striking props to slabs (spanning over 4.5 m) shall be
- a) 16-24 Hr.      b) 3 days      c) 7 days      d) 14 days
- 14) In normal circumstances, minimum period before striking props to slabs (Spanning up to 6 m) shall be
- a) 21 days      b) 3 days      c) 7 days      d) 14 days
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (CGPA) Examination, 2017  
QUANTITY SURVEYING AND VALUATION (New)**

Day and Date : Thursday, 30-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

- Instructions :** 1) Q. No. 2 and Q. No. 9 are **compulsory**. Attempt **any two** out of Q. No. 3 to Q. No. 5 and **any two** out of Q. No. 6 to Q. No. 8.  
2) **Assume** suitable data if necessary but mention **it clearly**.

SECTION – I

2. Calculate the quantity of cement concrete required in R.C.C. column and footing shown in attached Drawing. 12
3. A) Prepare the rough estimate for a proposed commercial complex for a municipal corporation for the following data :
- Plinth Area = 500 m<sup>2</sup>/floor, Ht of each storey = 3.5 m, No. of storeys = G + 2, cubical content rate = Rs. 1,000/m<sup>3</sup>.
- Provided for following as a percentage of structured cost.
- a) Water supply and sanitary arrangement – 8%.  
b) Electrification – 6%.  
c) Fluctuation of rates – 5%.  
d) Contractors profit – 10%.  
e) Petty supervision and contingencies – 3%. 4
- B) Write percentage breakup of the cost for residential buildings. 4
4. Write the detailed specifications for 8
- a) First class Brickwork in Cement Mortar.  
b) External Cement plastering.
5. Carry out Rate analysis for the following items : 8
- a) First class Brickwork in Cement Mortar 1 : 6.  
b) External Cement plastering in CM 1 : 6.

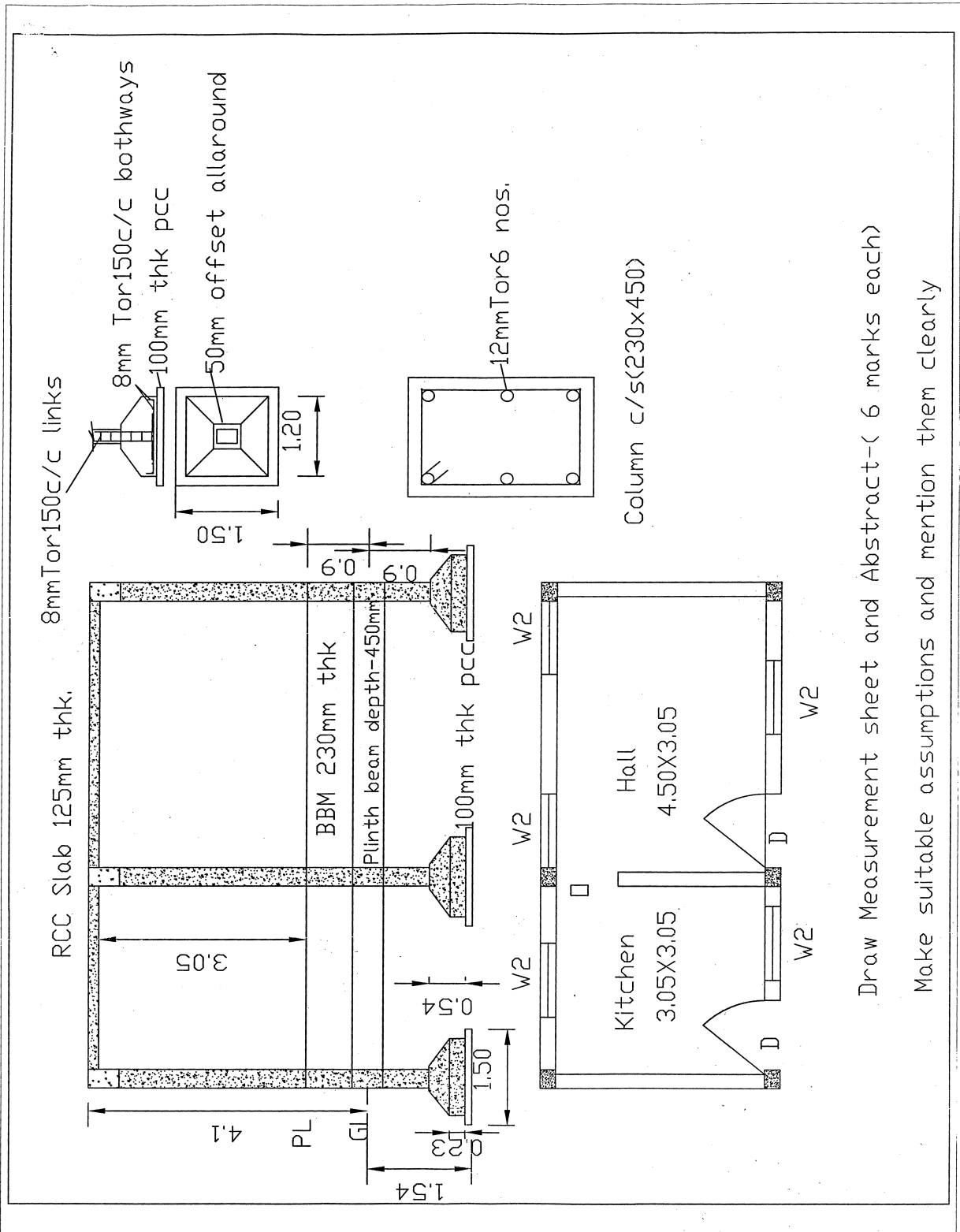
**Set Q**



## SECTION – II

6. Explain :
- A) Percentage rate contract. 4
  - B) Terms and conditions to contracts. 4
7. A) Write any eight factors affecting the valuation of properties. 4
- B) Define : 4
- 1) Book value,
  - 2) Distress value,
  - 3) Sentimental value,
  - 4) Accommodation value.
8. A) Determine the depreciation and book value for each year by sinking fund method, assuming the rate of interest as 4%. 4
- B) Valuation based on land and building. 4
9. A) Find out value of a hotel (capitalizing the net annual rent at 8% in perpetuity with YP) constructed on a freehold plot admeasuring 248 Sq. M. in the heart of town. The gross receipts during the year works out to be Rs. 4,15,940/-. The owner has to spend Rs. 1,35,940/- for purchase of food-stuff items. If the owner has to pay an amount of Rs. 17,452/- towards insurance, municipal taxes, etc. Assume working expenses as 40% of gross profit and repairs and maintenance as 22% of balance of gross profit after deduction of insurance and allied expenses. 6
- B) Explain the principle of Rating-Ribus Sic stantibus. 6





Draw Measurement sheet and Abstract-( 6 marks each)

Make suitable assumptions and mention them clearly





SLR-TJ – 54

Seat No.	
----------	--

Set	R
-----	---

**B.E. (Civil) (Part – I) (CGPA) Examination, 2017  
QUANTITY SURVEYING AND VALUATION (New)**

Day and Date : Thursday, 30-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Q. No. 2 and Q. No. 9 are **compulsory**. Attempt **any two** out of Q. No. 3 to Q. No. 5 and **any two** out of Q. No. 6 to Q. No. 8.
  - 4) **Assume** suitable data if necessary but mention **it clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) In normal circumstances, Minimum period before striking props to slabs (Spanning up to 4.5 m) shall be  
a) 16-24 Hr.      b) 3 days      c) 7 days      d) 14 days
- 2) In normal circumstances, Minimum period before striking props to slabs (spanning over 4.5 m) shall be  
a) 16-24 Hr.      b) 3 days      c) 7 days      d) 14 days
- 3) In normal circumstances, minimum period before striking props to slabs (Spanning up to 6 m) shall be  
a) 21 days      b) 3 days      c) 7 days      d) 14 days
- 4) In normal circumstances, minimum period before striking props to slabs (Spanning over 6 m) shall be  
a) 21 days      b) 3 days      c) 7 days      d) 14 days
- 5) In the designation of concrete mix, the number to the specified compressive strength of '\_\_\_\_\_ mm' sizecube at '28 days' expressed in 'N/mm<sup>2</sup>.  
a) 50      b) 100      c) 150      d) 300
- 6) The pH value of water for concreting shall be not less than  
a) 6      b) 7      c) 8      d) 9

P.T.O.



- 7) For a longitudinal reinforcing bar (diameter greater than 20 mm) in a column, nominal cover shall in any case not be less than
- 40 mm or the diameter of such bar
  - 25 mm or the diameter of such bar
  - 50 mm or the diameter of such bar
  - 20 mm or the diameter of such bar
- 8) For RCC footings minimum cover shall be
- 20 mm
  - 25 mm
  - 40 mm
  - 50 mm
- 9) As per CBRI the cement (in Tonn) requirement for framed multistoried construction is given by the formula (where 'A' is plinth area in Sq. M.)
- $-26.2 + 2.96A - 0.0096A^2$
  - $0.182A - 5.35$
  - $-1491 + 92A - 0.36A^2 + 465$
  - $0.561A - 3.98$
- 10) Guarantee in the shape of money, given by contractor along with the tender, confirming willingness to work is called
- Earnest money
  - Security deposit
  - Bank Guarantee
  - None of these
- 11) For calculating the depreciation of machines and equipments following method is used
- Unit cost method
  - Sinking fund method
  - Straight line method
  - Quantity survey method
- 12) The standard rent is fixed in relation to
- Premises
  - Persons
  - Both a) and b)
  - None of these
- 13) In normal circumstances minimum period before striking soffit formwork of slabs (props to be refixed immediately after removal of formwork) shall be
- 16-24 Hr.
  - 3 days
  - 7 days
  - 14 days
- 14) In normal circumstances, minimum period before striking soffit formwork to beams (props to be refixed immediately after removal of formwork) shall be
- 16-24 Hr.
  - 3 days
  - 7 days
  - 14 days
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (CGPA) Examination, 2017  
QUANTITY SURVEYING AND VALUATION (New)**

Day and Date : Thursday, 30-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

- Instructions :** 1) Q. No. 2 and Q. No. 9 are **compulsory**. Attempt **any two** out of Q. No. 3 to Q. No. 5 and **any two** out of Q. No. 6 to Q. No. 8.  
2) **Assume** suitable data if necessary but mention **it clearly**.

SECTION – I

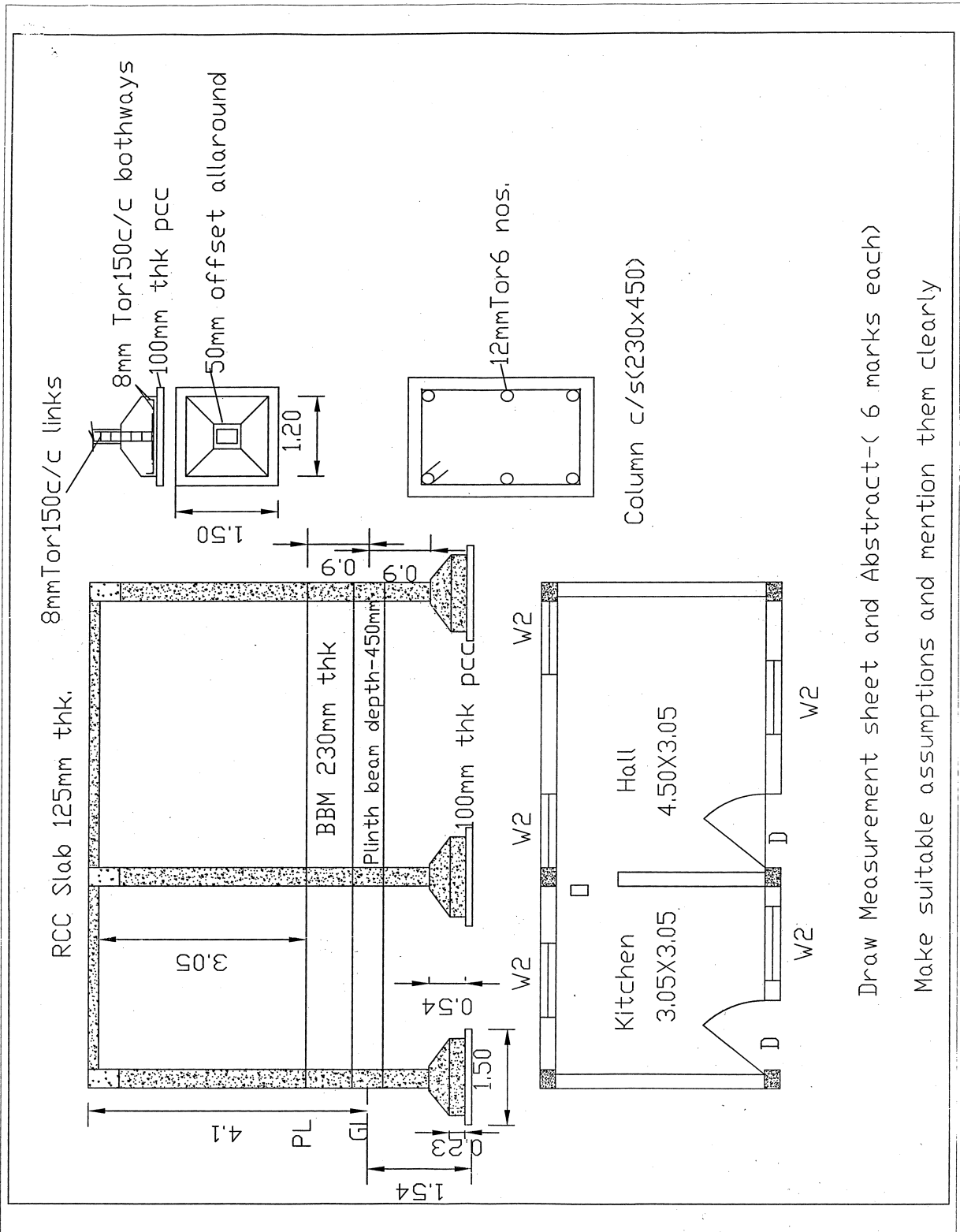
2. Calculate the quantity of cement concrete required in R.C.C. column and footing shown in attached Drawing. 12
3. A) Prepare the rough estimate for a proposed commercial complex for a municipal corporation for the following data :
- Plinth Area = 500 m<sup>2</sup>/floor, Ht of each storey = 3.5 m, No. of storeys = G + 2, cubical content rate = Rs. 1,000/m<sup>3</sup>.
- Provided for following as a percentage of structured cost.
- a) Water supply and sanitary arrangement – 8%.  
b) Electrification – 6%.  
c) Fluctuation of rates – 5%.  
d) Contractors profit – 10%.  
e) Petty supervision and contingencies – 3%. 4
- B) Write percentage breakup of the cost for residential buildings. 4
4. Write the detailed specifications for 8
- a) First class Brickwork in Cement Mortar.  
b) External Cement plastering.
5. Carry out Rate analysis for the following items : 8
- a) First class Brickwork in Cement Mortar 1 : 6.  
b) External Cement plastering in CM 1 : 6.

Set R



## SECTION – II

6. Explain :
- A) Percentage rate contract. 4
  - B) Terms and conditions to contracts. 4
7. A) Write any eight factors affecting the valuation of properties. 4
- B) Define : 4
- 1) Book value,
  - 2) Distress value,
  - 3) Sentimental value,
  - 4) Accommodation value.
8. A) Determine the depreciation and book value for each year by sinking fund method, assuming the rate of interest as 4%. 4
- B) Valuation based on land and building. 4
9. A) Find out value of a hotel (capitalizing the net annual rent at 8% in perpetuity with YP) constructed on a freehold plot admeasuring 248 Sq. M. in the heart of town. The gross receipts during the year works out to be Rs. 4,15,940/-. The owner has to spend Rs. 1,35,940/- for purchase of food-stuff items. If the owner has to pay an amount of Rs. 17,452/- towards insurance, municipal taxes, etc. Assume working expenses as 40% of gross profit and repairs and maintenance as 22% of balance of gross profit after deduction of insurance and allied expenses. 6
- B) Explain the principle of Rating-Ribus Sic stantibus. 6



Draw Measurement sheet and Abstract-( 6 marks each)

Make suitable assumptions and mention them clearly







SLR-TJ – 54

Seat No.	
----------	--

Set	<b>S</b>
-----	----------

**B.E. (Civil) (Part – I) (CGPA) Examination, 2017  
QUANTITY SURVEYING AND VALUATION (New)**

Day and Date : Thursday, 30-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Total Marks : 70

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Q. No. 2 and Q. No. 9 are **compulsory**. Attempt **any two** out of Q. No. 3 to Q. No. 5 and **any two** out of Q. No. 6 to Q. No. 8.
  - 4) **Assume** suitable data if necessary but mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

14

- 1) The pH value of water for concreting shall be not less than  
a) 6                      b) 7                      c) 8                      d) 9
- 2) For a longitudinal reinforcing bar (diameter greater than 20 mm) in a column, nominal cover shall in any case not be less than  
a) 40 mm or the diameter of such bar  
b) 25 mm or the diameter of such bar  
c) 50 mm or the diameter of such bar  
d) 20 mm or the diameter of such bar
- 3) For RCC footings minimum cover shall be  
a) 20 mm                      b) 25 mm                      c) 40 mm                      d) 50 mm
- 4) As per CBRI the cement (in Tonn) requirement for framed multistoried construction is given by the formula (where 'A' is plinth area is Sq. M.)  
a)  $- 26.2 + 2.96A - 0.0096A^2$                       b)  $0.182A - 5.35$   
c)  $- 1491 + 92A - 0.36 A^2 + 465$                       d)  $0.561A - 3.98$
- 5) Guarantee in the shape of money, given by contractor alongwith the tender, confirming willingness to work is called  
a) Earnest money                      b) Security deposit  
c) Bank Guarantee                      d) None of these

P.T.O.



- 6) For calculating the depreciation of machines and equipments following method is used
- |                         |                           |
|-------------------------|---------------------------|
| a) Unit cost method     | b) Sinking fund method    |
| c) Straight line method | d) Quantity survey method |
- 7) The standard rent is fixed in relation to
- |                   |                  |
|-------------------|------------------|
| a) Premises       | b) Persons       |
| c) Both a) and b) | d) None of these |
- 8) In normal circumstances minimum period before striking soffit formwork of slabs (props to be refixed immediately after removal of formwork) shall be
- |              |           |           |            |
|--------------|-----------|-----------|------------|
| a) 16-24 Hr. | b) 3 days | c) 7 days | d) 14 days |
|--------------|-----------|-----------|------------|
- 9) In normal circumstances, minimum period before striking soffit formwork to beams (props to be refixed immediately after removal of formwork) shall be
- |              |            |
|--------------|------------|
| a) 16-24 Hr. | b) 3 days  |
| c) 7 days    | d) 14 days |
- 10) In normal circumstances, Minimum period before striking props to slabs (Spanning up to 4.5 m) shall be
- |              |           |           |            |
|--------------|-----------|-----------|------------|
| a) 16-24 Hr. | b) 3 days | c) 7 days | d) 14 days |
|--------------|-----------|-----------|------------|
- 11) In normal circumstances, Minimum period before striking props to slabs (spanning over 4.5 m) shall be
- |              |           |           |            |
|--------------|-----------|-----------|------------|
| a) 16-24 Hr. | b) 3 days | c) 7 days | d) 14 days |
|--------------|-----------|-----------|------------|
- 12) In normal circumstances, minimum period before striking props to slabs (Spanning up to 6 m) shall be
- |            |           |           |            |
|------------|-----------|-----------|------------|
| a) 21 days | b) 3 days | c) 7 days | d) 14 days |
|------------|-----------|-----------|------------|
- 13) In normal circumstances, minimum period before striking props to slabs (Spanning over 6 m) shall be
- |            |           |           |            |
|------------|-----------|-----------|------------|
| a) 21 days | b) 3 days | c) 7 days | d) 14 days |
|------------|-----------|-----------|------------|
- 14) In the designation of concrete mix, the number to the specified compressive strength of '\_\_\_\_\_ mm' sizecube at '28 days' expressed in 'N/mm<sup>2</sup>.
- |       |        |        |        |
|-------|--------|--------|--------|
| a) 50 | b) 100 | c) 150 | d) 300 |
|-------|--------|--------|--------|
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (CGPA) Examination, 2017  
QUANTITY SURVEYING AND VALUATION (New)**

Day and Date : Thursday, 30-11-2017  
Time : 3.00 p.m. to 7.00 p.m.

Marks : 56

- Instructions :** 1) Q. No. 2 and Q. No. 9 are **compulsory**. Attempt **any two** out of Q. No. 3 to Q. No. 5 and **any two** out of Q. No. 6 to Q. No. 8.  
2) **Assume** suitable data if necessary but mention **it clearly**.

SECTION – I

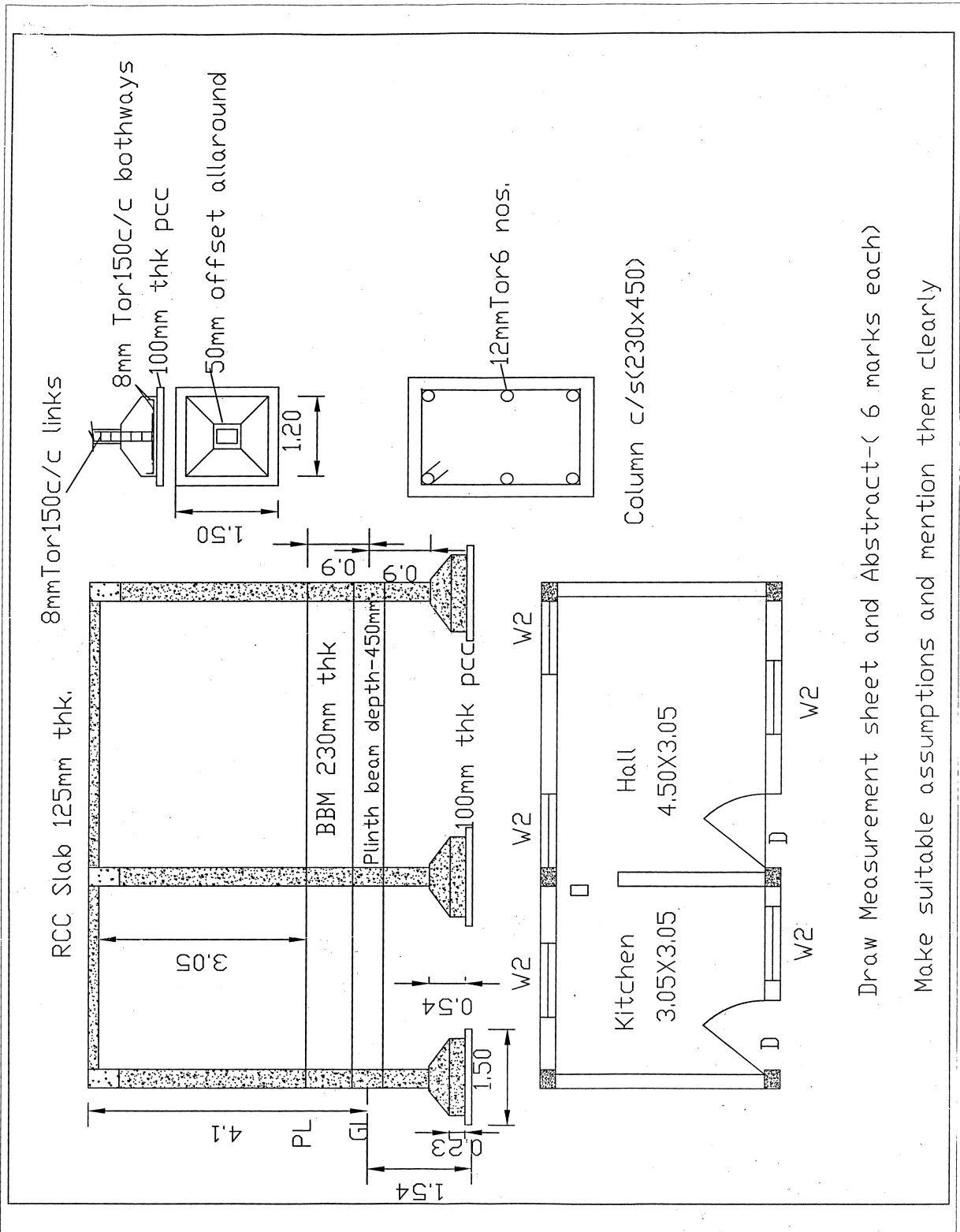
2. Calculate the quantity of cement concrete required in R.C.C. column and footing shown in attached Drawing. 12
3. A) Prepare the rough estimate for a proposed commercial complex for a municipal corporation for the following data :
- Plinth Area = 500 m<sup>2</sup>/floor, Ht of each storey = 3.5 m, No. of storeys = G + 2, cubical content rate = Rs. 1,000/m<sup>3</sup>.
- Provided for following as a percentage of structured cost.
- a) Water supply and sanitary arrangement – 8%.  
b) Electrification – 6%.  
c) Fluctuation of rates – 5%.  
d) Contractors profit – 10%.  
e) Petty supervision and contingencies – 3%. 4
- B) Write percentage breakup of the cost for residential buildings. 4
4. Write the detailed specifications for 8
- a) First class Brickwork in Cement Mortar.  
b) External Cement plastering.
5. Carry out Rate analysis for the following items : 8
- a) First class Brickwork in Cement Mortar 1 : 6.  
b) External Cement plastering in CM 1 : 6.

Set S



## SECTION – II

6. Explain :
- A) Percentage rate contract. 4
  - B) Terms and conditions to contracts. 4
7. A) Write any eight factors affecting the valuation of properties. 4
- B) Define : 4
- 1) Book value,
  - 2) Distress value,
  - 3) Sentimental value,
  - 4) Accommodation value.
8. A) Determine the depreciation and book value for each year by sinking fund method, assuming the rate of interest as 4%. 4
- B) Valuation based on land and building. 4
9. A) Find out value of a hotel (capitalizing the net annual rent at 8% in perpetuity with YP) constructed on a freehold plot admeasuring 248 Sq. M. in the heart of town. The gross receipts during the year works out to be Rs. 4,15,940/-. The owner has to spend Rs. 1,35,940/- for purchase of food-stuff items. If the owner has to pay an amount of Rs. 17,452/- towards insurance, municipal taxes, etc. Assume working expenses as 40% of gross profit and repairs and maintenance as 22% of balance of gross profit after deduction of insurance and allied expenses. 6
- B) Explain the principle of Rating-Ribus Sic stantibus. 6



Draw Measurement sheet and Abstract-( 6 marks each)

Make suitable assumptions and mention them clearly





SLR-TJ – 55

Seat No.	
----------	--

Set 

P
---

**B.E. (Civil) (Part – I) (New) (CGPA) Examination, 2017  
EARTHQUAKE ENGINEERING**

Day and Date : Monday, 4-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to **right** indicate **full** marks.  
4) **Use of only IS 1893** is allowed.  
5) Assume suitable data if **necessary** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) The S-waves (secondary or shear waves) travel through 1  
a) Solids only b) Both solids and fluids  
c) Fluids only d) Gases
- 2) Out of the many effects of earthquakes, IS-1893-2002 addresses only 1  
a) Liquefaction of the soil strata b) Landslides due to earthquake  
c) Inertia forces on structure d) Flood causes by earthquake
- 3) The zone factors indicate reasonably estimated values of \_\_\_\_\_ in the respective zone. 1  
a) Peak intensity of earthquake b) Peak ground velocity  
c) Peak ground acceleration d) None of the above
- 4) The transient motion 1  
a) Lasts for the entire duration of excitation force  
b) Lasts for a very short duration at the beginning  
c) Lasts for a very short duration at the end  
d) None of above
- 5) The transmissibility is equal to 1 at the frequency ratio ( $\omega/\omega_n$ ) equal to 2  
a) 0.5 b) 1.0 c)  $\sqrt{2}$  d)  $2^2$

P.T.O.



- 6) The transmissibility is greatly affected by cdamping in the region **2**  
a)  $\omega/\omega_n < 0.5$       b)  $\omega/\omega_n > 1.5$       c)  $\omega/\omega_n = 0$       d)  $\omega/\omega_n = 1$
- 7) The importance factor for a school building is **2**  
a) 1                      b) 1.25                      c) 1.5                      d) 2
- 8) The acceleration response spectrum in IS-1893-2002 is for the damping of **2**  
a) 2%    b) 10%  
c) 5%    d) None of the above
- 9) The zone factor for zone III is **2**  
a) 0.16                      b) 0.36                      c) 0.24                      d) 0.10
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New) (CGPA) Examination, 2017  
EARTHQUAKE ENGINEERING**

Day and Date : Monday, 4-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) Q. No. 1 and 5 are **compulsory**. Solve **any two** questions from Q. 2 to 4 from Section I.  
2) Solve **any two** questions from Q. 6 to 8 from Section II.  
3) Figures to **right** indicate **full** marks.  
4) **Use of only IS 1893** is allowed.  
5) Assume suitable data if **necessary** and mention it **clearly**.

SECTION – I

1. What do you understand by magnitude of an earthquake ? Explain the different scales that are commonly used. **8**
  
2. From first principle derive the governing differential equation for free vibration of a undamped SDOF system. Obtain the general solution of this differential equation. Plot the graph if system is given initial displacement  $y_0$ . **10**
  
3. Derive the government differential equation of undamped forced vibration of a SDOF system subjected to harmonic loading. Also obtain complete solution of differential equation and plot graph of magnification factor vs frequency ratio 'r'. **10**
  
4. a) Explain the concept of Duhamel's integral for damped systems. Derive its expression. **5**  
b) What is combined spectrum ? What are its characteristics ? **5**



## SECTION – II

5. It is proposed to construct a R.C.C. four storied commercial building having plan dimensions as shown in fig. 1 in zone IV with following data. Determine the lateral forces and base shear. The all column sizes are  $250 \times 450$  mm and beams sizes are  $250 \times 450$  mm. The slab thickness is 140 mm and thk. Of walls is 230 mm. The ht. Of floor is 3.2 m and live load is  $3.0 \text{ kN/m}^2$  IS 13920 will be used. The strata is hard.

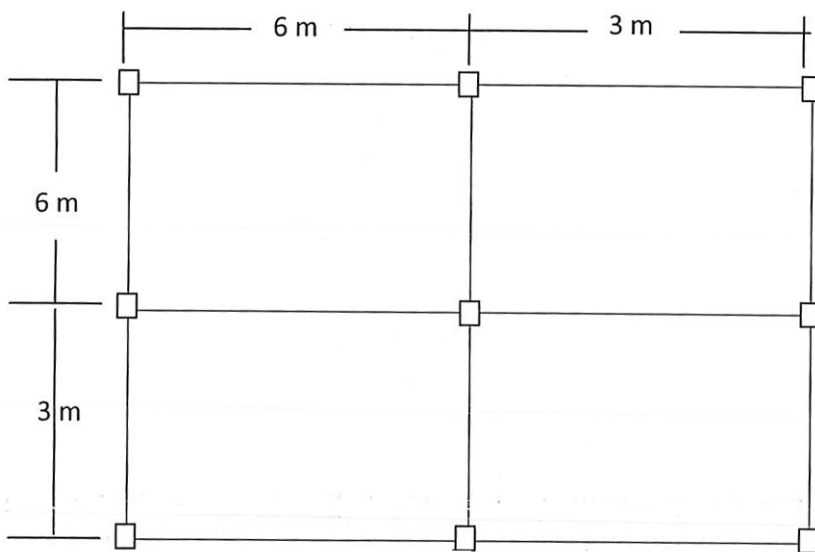


Figure No. 1

6. What are the two seismic design requirements an engineer has to account for the analysis and design of earthquake-resistant building? Discuss briefly how these are incorporated to achieve the objective. 12
7. Explain the significance of ductility in earthquake resistant buildings. 8
8. Discuss the behaviour of the following masonry walls in seismic regions. 8
- i) unreinforced masonry walls
  - ii) reinforced masonry walls.



SLR-TJ – 55

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) (Part – I) (New) (CGPA) Examination, 2017  
EARTHQUAKE ENGINEERING**

Day and Date : Monday, 4-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to **right** indicate **full** marks.  
4) **Use of only IS 1893 is allowed.**  
5) Assume suitable data if **necessary** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) Out of the many effects of earthquakes, IS-1893-2002 addresses only **1**  
a) Liquefaction of the soil strata      b) Landslides due to earthquake  
c) Inertia forces on structure      d) Flood causes by earthquake
- 2) The zone factors indicate reasonably estimated values of \_\_\_\_\_ in the respective zone. **1**  
a) Peak intensity of earthquake      b) Peak ground velocity  
c) Peak ground acceleration      d) None of the above
- 3) The transient motion **1**  
a) Lasts for the entire duration of excitation force  
b) Lasts for a very short duration at the beginning  
c) Lasts for a very short duration at the end  
d) None of above
- 4) The S-waves (secondary or shear waves) travel through **1**  
a) Solids only      b) Both solids and fluids  
c) Fluids only      d) Gases
- 5) The transmissibility is greatly affected by cdamping in the region **2**  
a)  $\omega/\omega_n < 0.5$       b)  $\omega/\omega_n > 1.5$       c)  $\omega/\omega_n = 0$       d)  $\omega/\omega_n = 1$

P.T.O.



- 6) The importance factor for a school building is **2**  
a) 1                      b) 1.25                      c) 1.5                      d) 2
- 7) The acceleration response spectrum in IS-1893-2002 is for the damping of **2**  
a) 2%                      b) 10%  
c) 5%                      d) None of the above
- 8) The zone factor for zone III is **2**  
a) 0.16                      b) 0.36                      c) 0.24                      d) 0.10
- 9) The transmissibility is equal to 1 at the frequency ratio ( $\omega/\omega_n$ ) equal to **2**  
a) 0.5                      b) 1.0                      c)  $\sqrt{2}$                       d)  $2^2$
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New) (CGPA) Examination, 2017  
EARTHQUAKE ENGINEERING**

Day and Date : Monday, 4-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) Q. No. 1 and 5 are **compulsory**. Solve **any two** questions from Q. 2 to 4 from Section I.  
2) Solve **any two** questions from Q. 6 to 8 from Section II.  
3) Figures to **right** indicate **full** marks.  
4) **Use of only IS 1893** is allowed.  
5) Assume suitable data if **necessary** and mention it **clearly**.

SECTION – I

1. What do you understand by magnitude of an earthquake ? Explain the different scales that are commonly used. **8**
  
2. From first principle derive the governing differential equation for free vibration of a undamped SDOF system. Obtain the general solution of this differential equation. Plot the graph if system is given initial displacement  $y_0$ . **10**
  
3. Derive the government differential equation of undamped forced vibration of a SDOF system subjected to harmonic loading. Also obtain complete solution of differential equation and plot graph of magnification factor vs frequency ratio 'r'. **10**
  
4. a) Explain the concept of Duhamel's integral for damped systems. Derive its expression. **5**  
b) What is combined spectrum ? What are its characteristics ? **5**

**Set Q**



## SECTION – II

5. It is proposed to construct a R.C.C. four storied commercial building having plan dimensions as shown in fig. 1 in zone IV with following data. Determine the lateral forces and base shear. The all column sizes are  $250 \times 450$  mm and beams sizes are  $250 \times 450$  mm. The slab thickness is 140 mm and thk. Of walls is 230 mm. The ht. Of floor is 3.2 m and live load is  $3.0 \text{ kN/m}^2$  IS 13920 will be used. The strata is hard.

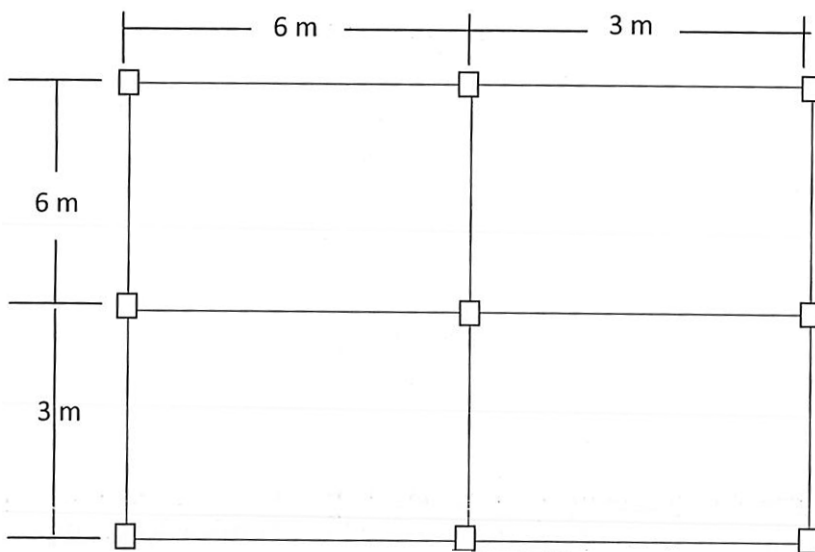


Figure No. 1

6. What are the two seismic design requirements an engineer has to account for the analysis and design of earthquake-resistant building? Discuss briefly how these are incorporated to achieve the objective. 8
7. Explain the significance of ductility in earthquake resistant buildings. 8
8. Discuss the behaviour of the following masonry walls in seismic regions. 8
- i) unreinforced masonry walls
  - ii) reinforced masonry walls.



SLR-TJ – 55

Seat No.	
----------	--

Set	R
-----	---

**B.E. (Civil) (Part – I) (New) (CGPA) Examination, 2017  
EARTHQUAKE ENGINEERING**

Day and Date : Monday, 4-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to **right** indicate **full** marks.  
4) **Use of only IS 1893** is allowed.  
5) Assume suitable data if **necessary** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) The zone factors indicate reasonably estimated values of \_\_\_\_\_ in the respective zone. 1  
a) Peak intensity of earthquake      b) Peak ground velocity  
c) Peak ground acceleration      d) None of the above
- 2) The transient motion 1  
a) Lasts for the entire duration of excitation force  
b) Lasts for a very short duration at the beginning  
c) Lasts for a very short duration at the end  
d) None of above
- 3) The S-waves (secondary or shear waves) travel through 1  
a) Solids only      b) Both solids and fluids  
c) Fluids only      d) Gases
- 4) Out of the many effects of earthquakes, IS-1893-2002 addresses only 1  
a) Liquefaction of the soil strata      b) Landslides due to earthquake  
c) Inertia forces on structure      d) Flood causes by earthquake
- 5) The importance factor for a school building is 2  
a) 1      b) 1.25      c) 1.5      d) 2

P.T.O.



- 6) The acceleration response spectrum in IS-1893-2002 is for the damping of **2**  
a) 2%    b) 10%  
c) 5%    d) None of the above
- 7) The zone factor for zone III is **2**  
a) 0.16                      b) 0.36                      c) 0.24                      d) 0.10
- 8) The transmissibility is equal to 1 at the frequency ratio ( $\omega/\omega_n$ ) equal to **2**  
a) 0.5                      b) 1.0                      c)  $\sqrt{2}$                       d)  $2^2$
- 9) The transmissibility is greatly affected by damping in the region **2**  
a)  $\omega/\omega_n < 0.5$       b)  $\omega/\omega_n > 1.5$       c)  $\omega/\omega_n = 0$       d)  $\omega/\omega_n = 1$
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New) (CGPA) Examination, 2017  
EARTHQUAKE ENGINEERING**

Day and Date : Monday, 4-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) Q. No. 1 and 5 are **compulsory**. Solve **any two** questions from Q. 2 to 4 from Section I.  
2) Solve **any two** questions from Q. 6 to 8 from Section II.  
3) Figures to **right** indicate **full** marks.  
4) **Use of only IS 1893** is allowed.  
5) Assume suitable data if **necessary** and mention it **clearly**.

SECTION – I

1. What do you understand by magnitude of an earthquake ? Explain the different scales that are commonly used. **8**
  
2. From first principle derive the governing differential equation for free vibration of a undamped SDOF system. Obtain the general solution of this differential equation. Plot the graph if system is given initial displacement  $y_0$ . **10**
  
3. Derive the government differential equation of undamped forced vibration of a SDOF system subjected to harmonic loading. Also obtain complete solution of differential equation and plot graph of magnification factor vs frequency ratio 'r'. **10**
  
4. a) Explain the concept of Duhamel's integral for damped systems. Derive its expression. **5**  
b) What is combined spectrum ? What are its characteristics ? **5**

**Set R**



## SECTION – II

5. It is proposed to construct a R.C.C. four storied commercial building having plan dimensions as shown in fig. 1 in zone IV with following data. Determine the lateral forces and base shear. The all column sizes are  $250 \times 450$  mm and beams sizes are  $250 \times 450$  mm. The slab thickness is 140 mm and thk. Of walls is 230 mm. The ht. Of floor is 3.2 m and live load is  $3.0 \text{ kN/m}^2$  IS 13920 will be used. The strata is hard.

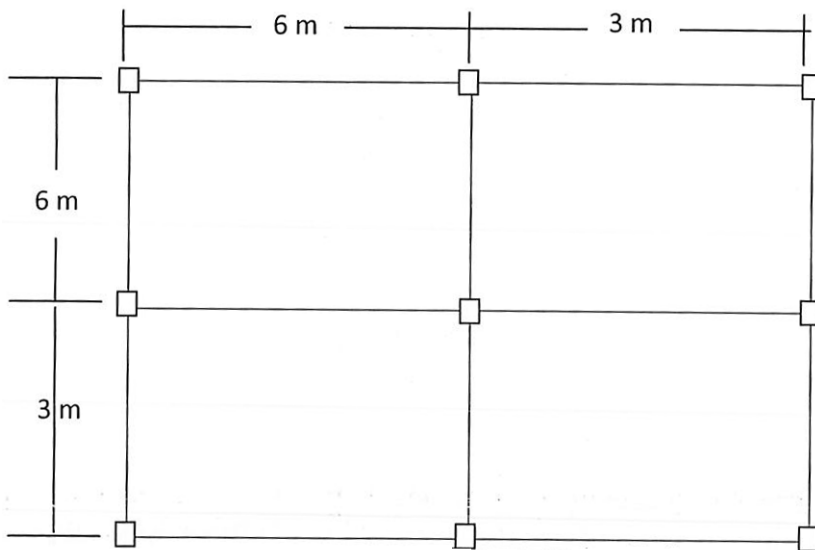


Figure No. 1

6. What are the two seismic design requirements an engineer has to account for the analysis and design of earthquake-resistant building? Discuss briefly how these are incorporated to achieve the objective. 8
7. Explain the significance of ductility in earthquake resistant buildings. 8
8. Discuss the behaviour of the following masonry walls in seismic regions. 8
- i) unreinforced masonry walls
  - ii) reinforced masonry walls.



SLR-TJ – 55

Seat No.	
----------	--

Set 

S
---

**B.E. (Civil) (Part – I) (New) (CGPA) Examination, 2017  
EARTHQUAKE ENGINEERING**

Day and Date : Monday, 4-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to **right** indicate **full** marks.  
4) **Use of only IS 1893** is allowed.  
5) Assume suitable data if **necessary** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

- 1) The transient motion 1  
a) Lasts for the entire duration of excitation force  
b) Lasts for a very short duration at the beginning  
c) Lasts for a very short duration at the end  
d) None of above
- 2) The S-waves (secondary or shear waves) travel through 1  
a) Solids only b) Both solids and fluids  
c) Fluids only d) Gases
- 3) Out of the many effects of earthquakes, IS-1893-2002 addresses only 1  
a) Liquefaction of the soil strata b) Landslides due to earthquake  
c) Inertia forces on structure d) Flood causes by earthquake
- 4) The zone factors indicate reasonably estimated values of \_\_\_\_\_ in the respective zone. 1  
a) Peak intensity of earthquake b) Peak ground velocity  
c) Peak ground acceleration d) None of the above

P.T.O.





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New) (CGPA) Examination, 2017  
EARTHQUAKE ENGINEERING**

Day and Date : Monday, 4-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) Q. No. 1 and 5 are **compulsory**. Solve **any two** questions from Q. 2 to 4 from Section I.  
2) Solve **any two** questions from Q. 6 to 8 from Section II.  
3) Figures to **right** indicate **full** marks.  
4) **Use of only IS 1893** is allowed.  
5) Assume suitable data if **necessary** and mention it **clearly**.

SECTION – I

1. What do you understand by magnitude of an earthquake ? Explain the different scales that are commonly used. **8**
  
2. From first principle derive the governing differential equation for free vibration of a undamped SDOF system. Obtain the general solution of this differential equation. Plot the graph if system is given initial displacement  $y_0$ . **10**
  
3. Derive the government differential equation of undamped forced vibration of a SDOF system subjected to harmonic loading. Also obtain complete solution of differential equation and plot graph of magnification factor vs frequency ratio 'r'. **10**
  
4. a) Explain the concept of Duhamel's integral for damped systems. Derive its expression. **5**  
b) What is combined spectrum ? What are its characteristics ? **5**

**Set S**



## SECTION – II

5. It is proposed to construct a R.C.C. four storied commercial building having plan dimensions as shown in fig. 1 in zone IV with following data. Determine the lateral forces and base shear. The all column sizes are  $250 \times 450$  mm and beams sizes are  $250 \times 450$  mm. The slab thickness is 140 mm and thk. Of walls is 230 mm. The ht. Of floor is 3.2 m and live load is  $3.0 \text{ kN/m}^2$  IS 13920 will be used. The strata is hard.

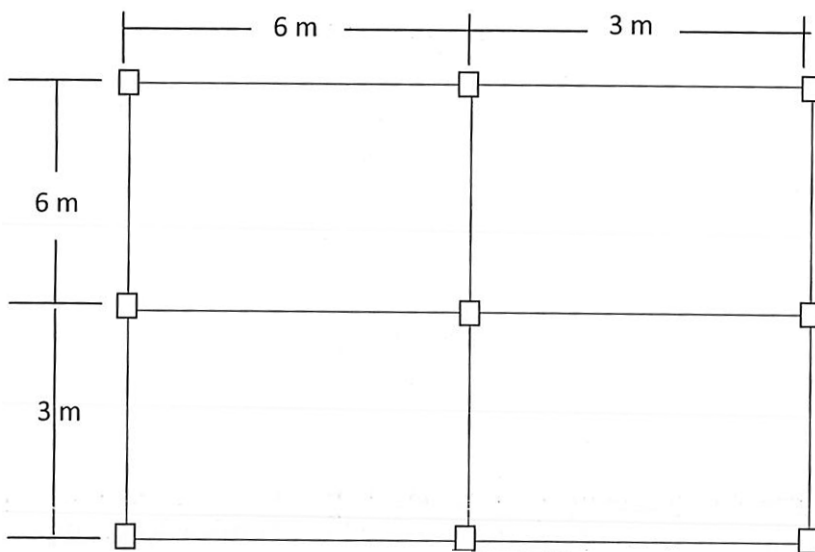


Figure No. 1

6. What are the two seismic design requirements an engineer has to account for the analysis and design of earthquake-resistant building? Discuss briefly how these are incorporated to achieve the objective. 8
7. Explain the significance of ductility in earthquake resistant buildings. 8
8. Discuss the behaviour of the following masonry walls in seismic regions. 8
- i) unreinforced masonry walls
  - ii) reinforced masonry walls.



SLR-TJ – 56

Seat  
No.

--

Set

P

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – II**

Day and Date : Wednesday, 6-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries 1 mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Draw neat labeled sketches **wherever** necessary.
  - 4) Assume suitable data if necessary and state it clearly.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer.

(14×1=14)

- 1) The 'useful storage' in a dam reservoir is the volume of water stored between
  - a) minimum and maximum reservoir levels
  - b) minimum and normal reservoir levels
  - c) normal and maximum reservoir levels
  - d) none of the above
- 2) Trap efficiency of a storage reservoir is defined as
  - a) (Total annual sediment inflow)/ (Reservoir capacity)
  - b) (Total sediment deposited in a given period) /(Total sediment inflow in that period)
  - c) (Total annual sediment deposited in the reservoir)/ (Dead storage capacity of the reservoir)
  - d) None of the above
- 3) A gravity dam is subjected to hydro dynamic pressure, caused by
  - a) the rising waters of the reservoir when a flood wave enters into it
  - b) the rising waves in the reservoir due to high winds
  - c) the increase in water pressure, momentarily caused by the horizontal earthquake, acting towards the reservoir
  - d) the increase in water pressure, momentarily caused by the horizontal earthquake, acting towards the dam
- 4) The most preferred soil for the central impervious core of a zoned embankment type of an earthen dam, is
  - a) highly impervious clay
  - b) highly pervious gravel
  - c) coarse sand
  - d) clay mixed with fine sand

P.T.O.



- 5) The most preferred type of an earthen dam section is the one, in which the
  - a) entire embankment is made of one type of soil
  - b) inner embankment is made of highly porous soil, surrounded by the outer shell of highly impervious soil, both separated by transition filter material of medium permeability
  - c) inner embankment is made of highly impervious soil surrounded by the outer shell of highly pervious soil, both separated by transition filter material of medium permeability
  - d) none of the above
- 6) When the crest of an ogee spillway is designed to be in accordance with the lower nappe of a free falling water jet over a duly ventilated sharp crested weir, then theoretically
  - a) the pressure on the spillway crest will always be zero (i. e. atmospheric pressure)
  - b) the pressure on the spilway will be zero at design head only
  - c) the pressure on the spillway crest will always be negative
  - d) the pressure on the spillway crest will always be positive
- 7) In computing the spilling capacity of high ogee spillways, the velocity head is usually
  - a) very small and hence neglected
  - b) very large and but can be neglected
  - c) very large and hence cannot be neglected
  - d) neither (a) nor (b)
- 8) Water-logging of cropped land leads to reduced crop yields, due to
  - a) ill-aeration of root zone, causing lack of oxygen to plants
  - b) growth of water-loving plants interfering with the sown crop
  - c) surrounding of the root zone by the resultant saline water, which extracts the good water from plant roots by osmosis
  - d) all of the above
- 9) A recently reclaimed alkaline soil should preferably be sown with a salt resistant crop, like
  - a) wheat
  - b) cotton
  - c) barseem
  - d) any of the above
- 10) The type of canal alignment, which involves maximum cross-drainage works, is a
  - a) ridge canal
  - b) contour canal
  - c) side slope canal
  - d) all of the above
- 11) The repelling groynes which are largely constructed projecting from river embankments as anti-erosion works, are
  - a) pointing upstream
  - b) pointing downstream
  - c) perpendicular to the bank
  - d) none of these
- 12) The river reach upstream of a newly built dam may behave, as
  - a) aggrading
  - b) degrading
  - c) virgin
  - d) none of them
- 13) An irrigational canal, freely flowing under a drainage channel, is specifically called a
  - a) canal junction
  - b) canal crossing
  - c) canal siphon
  - d) super passage
- 14) The only statement, which is incorrect in regard to hydropower, is
  - a) the system efficiency of a hydropower plant is quite high
  - b) the installation cost of a hydropower plant is very high
  - c) the running cost of a hydro power plant is very low
  - d) the hydraulic turbines takes a lot of time in being put off and on





Seat No.	
----------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – II**

Day and Date : Wednesday, 6-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I (Questions 2, 3, 4, 5) and **any three** questions from Section II (Questions 6, 7, 8, 9).  
2) Draw neat labeled sketches **wherever** necessary.  
3) Assume suitable data if **necessary** and state it clearly.

SECTION – I

2. a) Enlist and discuss factors affecting silting in impounding reservoirs. Discuss the principal measures that should be undertaken to control the sediment inflow to an impounding reservoir. **4**
- b) Classify various types of dams according to construction materials used. Distinguish clearly between rigid and non rigid dams. **5**
3. a) What do you mean by elementary profile of a gravity dam ? What are its dimensions ? How the profile is modified into Practical Profile ? **4**
- b) A profile of a gravity dam is shown in figure (I) with the important levels. If the coefficient of friction between dam and foundations is 0.75, is the dam safe against sliding ? Take unit weight of concrete as  $24 \text{ kN/m}^3$ . Assume Horizontal Earthquake coefficient as 0.05 g and there is no tail water. Neglect uplift. **6**

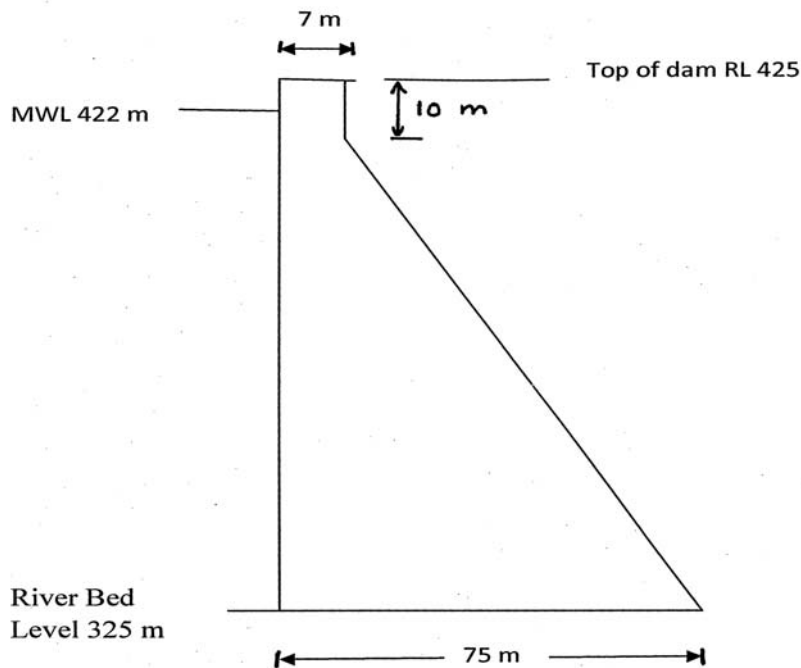


Figure – I



4. a) Write short note on : 4  
    i) Rock toe  
    ii) Design of drainage filters for earthen dams
- b) Draw a cross section of a 'Zoned Embankment type Earth Dam' and discuss the significance of each component. 5
5. a) Enumerate important types of spillway gates. Describe with a neat sketch the construction and working of 'Radial Gate'. 4
- b) What is meant by energy dissipater ? Discuss the various methods used for energy dissipation below spillways. 5

## SECTION – II

6. a) What are the main causes of failures of weirs on permeable foundations, and what remedies would you suggest to prevent them ? 4
- b) Write short notes on watershed canals and contour canals. 5
7. a) State under what circumstances you will recommend the use of the following cross drainage structures : 4  
    i) Syphon ii) Aqueduct
- b) Explain how do the following river training structures assist in river control.  
    i) Spurs ii) Revetment iii) Guide bunds 6
8. a) Discuss different types of drainage systems provided in irrigated tracts as precautions against water-logging. Give salient features of an open drain system. 4
- b) How will you justify economically the necessity of lining an existing canal ? What added benefits you will expect if the canal to be lined is new and yet to be constructed ? 5
9. a) Enlist different types of hydropower plants and discuss their suitability according to the site and hydrological conditions. Draw a neat sketch of Storage Type Hydropower plant and label the components. 4
- b) A runoff river plant is installed on a river having a minimum flow 15 cumec. Head available at the plant is 16 m and the plant efficiency may be assumed as 80%. If the plant is used as a peak load plant operating for 6 hours daily, compute the firm capacity of the plant :  
    i) Without pondage  
    ii) With pondage, but allowing 8% water to be lost in evaporation and other losses. 5



SLR-TJ – 56

Seat  
No.

--

Set **Q**

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – II**

Day and Date : Wednesday, 6-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries 1 mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Draw neat labeled sketches **wherever** necessary.
  - 4) Assume suitable data if necessary and state it clearly.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer.

**(14×1=14)**

- 1) Water-logging of cropped land leads to reduced crop yields, due to
  - a) ill-aeration of root zone, causing lack of oxygen to plants
  - b) growth of water-loving plants interfering with the sown crop
  - c) surrounding of the root zone by the resultant saline water, which extracts the good water from plant roots by osmosis
  - d) all of the above
- 2) A recently reclaimed alkaline soil should preferably be sown with a salt resistant crop, like
  - a) wheat
  - b) cotton
  - c) barseem
  - d) any of the above
- 3) The type of canal alignment, which involves maximum cross-drainage works, is a
  - a) ridge canal
  - b) contour canal
  - c) side slope canal
  - d) all of the above
- 4) The repelling groynes which are largely constructed projecting from river embankments as anti-erosion works, are
  - a) pointing upstream
  - b) pointing downstream
  - c) perpendicular to the bank
  - d) none of these
- 5) The river reach upstream of a newly built dam may behave, as
  - a) aggrading
  - b) degrading
  - c) virgin
  - d) none of them
- 6) An irrigational canal, freely flowing under a drainage channel, is specifically called a
  - a) canal junction
  - b) canal crossing
  - c) canal siphon
  - d) super passage
- 7) The only statement, which is incorrect in regard to hydropower, is
  - a) the system efficiency of a hydropower plant is quite high
  - b) the installation cost of a hydropower plant is very high
  - c) the running cost of a hydro power plant is very low
  - d) the hydraulic turbines takes a lot of time in being put off and on

P.T.O.



- 8) The 'useful storage' in a dam reservoir is the volume of water stored between
- minimum and maximum reservoir levels
  - minimum and normal reservoir levels
  - normal and maximum reservoir levels
  - none of the above
- 9) Trap efficiency of a storage reservoir is defined as
- $(\text{Total annual sediment inflow}) / (\text{Reservoir capacity})$
  - $(\text{Total sediment deposited in a given period}) / (\text{Total sediment inflow in that period})$
  - $(\text{Total annual sediment deposited in the reservoir}) / (\text{Dead storage capacity of the reservoir})$
  - None of the above
- 10) A gravity dam is subjected to hydro dynamic pressure, caused by
- the rising waters of the reservoir when a flood wave enters into it
  - the rising waves in the reservoir due to high winds
  - the increase in water pressure, momentarily caused by the horizontal earthquake, acting towards the reservoir
  - the increase in water pressure, momentarily caused by the horizontal earthquake, acting towards the dam
- 11) The most preferred soil for the central impervious core of a zoned embankment type of an earthen dam, is
- highly impervious clay
  - highly pervious gravel
  - coarse sand
  - clay mixed with fine sand
- 12) The most preferred type of an earthen dam section is the one, in which the
- entire embankment is made of one type of soil
  - inner embankment is made of highly porous soil, surrounded by the outer shell of highly impervious soil, both separated by transition filter material of medium permeability
  - inner embankment is made of highly impervious soil surrounded by the outer shell of highly pervious soil, both separated by transition filter material of medium permeability
  - none of the above
- 13) When the crest of an ogee spillway is designed to be in accordance with the lower nappe of a free falling water jet over a duly ventilated sharp crested weir, then theoretically
- the pressure on the spillway crest will always be zero (i. e. atmospheric pressure)
  - the pressure on the spilway will be zero at design head only
  - the pressure on the spillway crest will always be negative
  - the pressure on the spillway crest will always be positive
- 14) In computing the spilling capacity of high ogee spillways, the velocity head is usually
- very small and hence neglected
  - very large and but can be neglected
  - very large and hence cannot be neglected
  - neither (a) nor (b)



Seat No.	
----------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – II**

Day and Date : Wednesday, 6-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I (Questions 2, 3, 4, 5) and **any three** questions from Section II (Questions 6, 7, 8, 9).  
2) Draw neat labeled sketches **wherever** necessary.  
3) Assume suitable data if **necessary** and state it clearly.

SECTION – I

2. a) Enlist and discuss factors affecting silting in impounding reservoirs. Discuss the principal measures that should be undertaken to control the sediment inflow to an impounding reservoir. **4**
- b) Classify various types of dams according to construction materials used. Distinguish clearly between rigid and non rigid dams. **5**
3. a) What do you mean by elementary profile of a gravity dam ? What are its dimensions ? How the profile is modified into Practical Profile ? **4**
- b) A profile of a gravity dam is shown in figure (I) with the important levels. If the coefficient of friction between dam and foundations is 0.75, is the dam safe against sliding ? Take unit weight of concrete as  $24 \text{ kN/m}^3$ . Assume Horizontal Earthquake coefficient as 0.05 g and there is no tail water. Neglect uplift. **6**

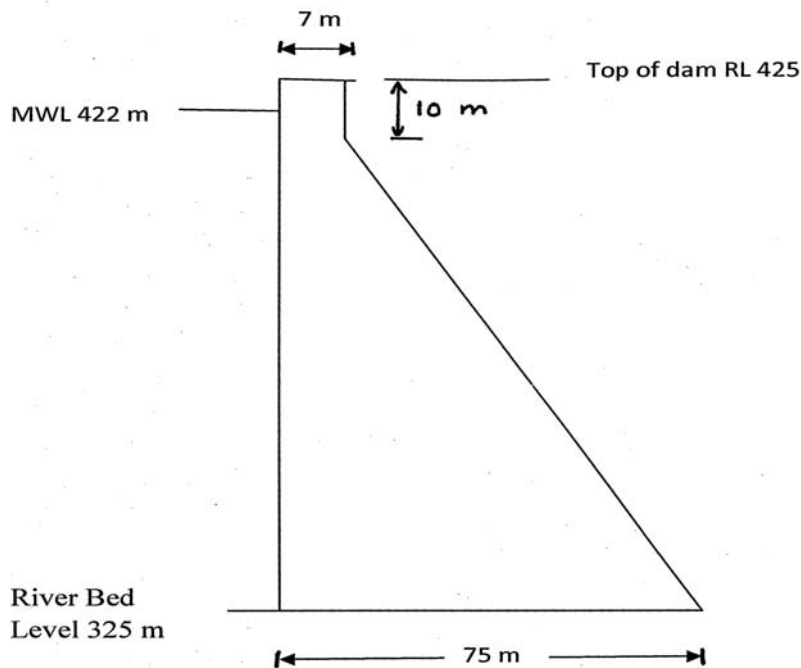


Figure – I



4. a) Write short note on : 4  
     i) Rock toe  
     ii) Design of drainage filters for earthen dams
- b) Draw a cross section of a 'Zoned Embankment type Earth Dam' and discuss the significance of each component. 5
5. a) Enumerate important types of spillway gates. Describe with a neat sketch the construction and working of 'Radial Gate'. 4
- b) What is meant by energy dissipater ? Discuss the various methods used for energy dissipation below spillways. 5

## SECTION – II

6. a) What are the main causes of failures of weirs on permeable foundations, and what remedies would you suggest to prevent them ? 4
- b) Write short notes on watershed canals and contour canals. 5
7. a) State under what circumstances you will recommend the use of the following cross drainage structures : 4  
     i) Syphon ii) Aqueduct
- b) Explain how do the following river training structures assist in river control.  
     i) Spurs ii) Revetment iii) Guide bunds 6
8. a) Discuss different types of drainage systems provided in irrigated tracts as precautions against water-logging. Give salient features of an open drain system. 4
- b) How will you justify economically the necessity of lining an existing canal ? What added benefits you will expect if the canal to be lined is new and yet to be constructed ? 5
9. a) Enlist different types of hydropower plants and discuss their suitability according to the site and hydrological conditions. Draw a neat sketch of Storage Type Hydropower plant and label the components. 4
- b) A runoff river plant is installed on a river having a minimum flow 15 cumec. Head available at the plant is 16 m and the plant efficiency may be assumed as 80%. If the plant is used as a peak load plant operating for 6 hours daily, compute the firm capacity of the plant :  
     i) Without pondage  
     ii) With pondage, but allowing 8% water to be lost in evaporation and other losses. 5



SLR-TJ – 56

Seat No.	
----------	--

Set 

R
---

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – II**

Day and Date : Wednesday, 6-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries 1 mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Draw neat labeled sketches **wherever** necessary.
  - 4) Assume suitable data if necessary and state it clearly.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer.

(14×1=14)

- 1) The most preferred type of an earthen dam section is the one, in which the
  - a) entire embankment is made of one type of soil
  - b) inner embankment is made of highly porous soil, surrounded by the outer shell of highly impervious soil, both separated by transition filter material of medium permeability
  - c) inner embankment is made of highly impervious soil surrounded by the outer shell of highly pervious soil, both separated by transition filter material of medium permeability
  - d) none of the above
- 2) When the crest of an ogee spillway is designed to be in accordance with the lower nappe of a free falling water jet over a duly ventilated sharp crested weir, then theoretically
  - a) the pressure on the spillway crest will always be zero (i. e. atmospheric pressure)
  - b) the pressure on the spillway will be zero at design head only
  - c) the pressure on the spillway crest will always be negative
  - d) the pressure on the spillway crest will always be positive
- 3) In computing the spilling capacity of high ogee spillways, the velocity head is usually
  - a) very small and hence neglected
  - b) very large and but can be neglected
  - c) very large and hence cannot be neglected
  - d) neither (a) nor (b)
- 4) Water-logging of cropped land leads to reduced crop yields, due to
  - a) ill-aeration of root zone, causing lack of oxygen to plants
  - b) growth of water-loving plants interfering with the sown crop
  - c) surrounding of the root zone by the resultant saline water, which extracts the good water from plant roots by osmosis
  - d) all of the above

P.T.O.



- 5) A recently reclaimed alkaline soil should preferably be sown with a salt resistant crop, like  
a) wheat                      b) cotton                      c) barseem                      d) any of the above
- 6) The type of canal alignment, which involves maximum cross-drainage works, is a  
a) ridge canal                      b) contour canal                      c) side slope canal                      d) all of the above
- 7) The repelling groynes which are largely constructed projecting from river embankments as anti-erosion works, are  
a) pointing upstream                      b) pointing downstream  
c) perpendicular to the bank                      d) none of these
- 8) The river reach upstream of a newly built dam may behave, as  
a) aggrading                      b) degrading                      c) virgin                      d) none of them
- 9) An irrigational canal, freely flowing under a drainage channel, is specifically called a  
a) canal junction                      b) canal crossing                      c) canal siphon                      d) super passage
- 10) The only statement, which is incorrect in regard to hydropower, is  
a) the system efficiency of a hydropower plant is quite high  
b) the installation cost of a hydropower plant is very high  
c) the running cost of a hydro power plant is very low  
d) the hydraulic turbines takes a lot of time in being put off and on
- 11) The 'useful storage' in a dam reservoir is the volume of water stored between  
a) minimum and maximum reservoir levels  
b) minimum and normal reservoir levels  
c) normal and maximum reservoir levels  
d) none of the above
- 12) Trap efficiency of a storage reservoir is defined as  
a)  $(\text{Total annual sediment inflow}) / (\text{Reservoir capacity})$   
b)  $(\text{Total sediment deposited in a given period}) / (\text{Total sediment inflow in that period})$   
c)  $(\text{Total annual sediment deposited in the reservoir}) / (\text{Dead storage capacity of the reservoir})$   
d) None of the above
- 13) A gravity dam is subjected to hydro dynamic pressure, caused by  
a) the rising waters of the reservoir when a flood wave enters into it  
b) the rising waves in the reservoir due to high winds  
c) the increase in water pressure, momentarily caused by the horizontal earthquake, acting towards the reservoir  
d) the increase in water pressure, momentarily caused by the horizontal earthquake, acting towards the dam
- 14) The most preferred soil for the central impervious core of a zoned embankment type of an earthen dam, is  
a) highly impervious clay                      b) highly pervious gravel  
c) coarse sand                      d) clay mixed with fine sand
-





Seat No.	
----------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – II**

Day and Date : Wednesday, 6-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I (Questions 2, 3, 4, 5) and **any three** questions from Section II (Questions 6, 7, 8, 9).  
2) Draw neat labeled sketches **wherever** necessary.  
3) Assume suitable data if **necessary** and state it clearly.

SECTION – I

2. a) Enlist and discuss factors affecting silting in impounding reservoirs. Discuss the principal measures that should be undertaken to control the sediment inflow to an impounding reservoir. **4**
- b) Classify various types of dams according to construction materials used. Distinguish clearly between rigid and non rigid dams. **5**
3. a) What do you mean by elementary profile of a gravity dam ? What are its dimensions ? How the profile is modified into Practical Profile ? **4**
- b) A profile of a gravity dam is shown in figure (I) with the important levels. If the coefficient of friction between dam and foundations is 0.75, is the dam safe against sliding ? Take unit weight of concrete as  $24 \text{ kN/m}^3$ . Assume Horizontal Earthquake coefficient as 0.05 g and there is no tail water. Neglect uplift. **6**

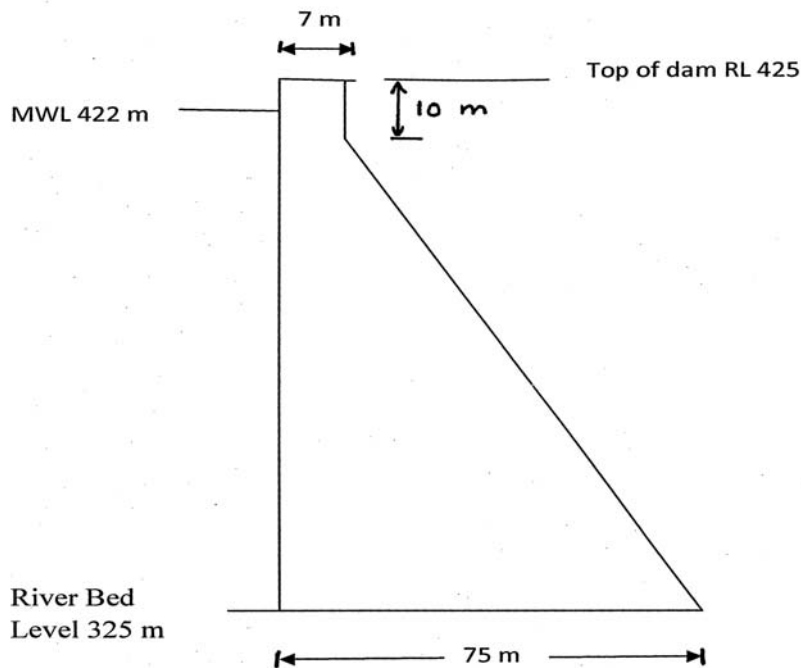


Figure – I



4. a) Write short note on : 4  
     i) Rock toe  
     ii) Design of drainage filters for earthen dams
- b) Draw a cross section of a 'Zoned Embankment type Earth Dam' and discuss the significance of each component. 5
5. a) Enumerate important types of spillway gates. Describe with a neat sketch the construction and working of 'Radial Gate'. 4
- b) What is meant by energy dissipater ? Discuss the various methods used for energy dissipation below spillways. 5

## SECTION – II

6. a) What are the main causes of failures of weirs on permeable foundations, and what remedies would you suggest to prevent them ? 4
- b) Write short notes on watershed canals and contour canals. 5
7. a) State under what circumstances you will recommend the use of the following cross drainage structures : 4  
     i) Syphon ii) Aqueduct
- b) Explain how do the following river training structures assist in river control.  
     i) Spurs ii) Revetment iii) Guide bunds 6
8. a) Discuss different types of drainage systems provided in irrigated tracts as precautions against water-logging. Give salient features of an open drain system. 4
- b) How will you justify economically the necessity of lining an existing canal ? What added benefits you will expect if the canal to be lined is new and yet to be constructed ? 5
9. a) Enlist different types of hydropower plants and discuss their suitability according to the site and hydrological conditions. Draw a neat sketch of Storage Type Hydropower plant and label the components. 4
- b) A runoff river plant is installed on a river having a minimum flow 15 cumec. Head available at the plant is 16 m and the plant efficiency may be assumed as 80%. If the plant is used as a peak load plant operating for 6 hours daily, compute the firm capacity of the plant :  
     i) Without pondage  
     ii) With pondage, but allowing 8% water to be lost in evaporation and other losses. 5



SLR-TJ – 56

Seat No.	
----------	--

Set **S**

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – II**

Day and Date : Wednesday, 6-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries 1 mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Draw neat labeled sketches **wherever** necessary.
  - 4) Assume suitable data if necessary and state it clearly.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

(14×1=14)

1. Choose the correct answer.

- 1) The type of canal alignment, which involves maximum cross-drainage works, is a  
a) ridge canal      b) contour canal      c) side slope canal      d) all of the above
- 2) The repelling groynes which are largely constructed projecting from river embankments as anti-erosion works, are  
a) pointing upstream      b) pointing downstream  
c) perpendicular to the bank      d) none of these
- 3) The river reach upstream of a newly built dam may behave, as  
a) aggrading      b) degrading      c) virgin      d) none of them
- 4) An irrigational canal, freely flowing under a drainage channel, is specifically called a  
a) canal junction      b) canal crossing      c) canal siphon      d) super passage
- 5) The only statement, which is incorrect in regard to hydropower, is  
a) the system efficiency of a hydropower plant is quite high  
b) the installation cost of a hydropower plant is very high  
c) the running cost of a hydro power plant is very low  
d) the hydraulic turbines takes a lot of time in being put off and on
- 6) The 'useful storage' in a dam reservoir is the volume of water stored between  
a) minimum and maximum reservoir levels  
b) minimum and normal reservoir levels  
c) normal and maximum reservoir levels  
d) none of the above
- 7) Trap efficiency of a storage reservoir is defined as  
a) (Total annual sediment inflow)/ (Reservoir capacity)  
b) (Total sediment deposited in a given period) / (Total sediment inflow in that period)  
c) (Total annual sediment deposited in the reservoir)/ (Dead storage capacity of the reservoir)  
d) None of the above

P.T.O.



- 8) A gravity dam is subjected to hydro dynamic pressure, caused by
- a) the rising waters of the reservoir when a flood wave enters into it
  - b) the rising waves in the reservoir due to high winds
  - c) the increase in water pressure, momentarily caused by the horizontal earthquake, acting towards the reservoir
  - d) the increase in water pressure, momentarily caused by the horizontal earthquake, acting towards the dam
- 9) The most preferred soil for the central impervious core of a zoned embankment type of an earthen dam, is
- a) highly impervious clay
  - b) highly pervious gravel
  - c) coarse sand
  - d) clay mixed with fine sand
- 10) The most preferred type of an earthen dam section is the one, in which the
- a) entire embankment is made of one type of soil
  - b) inner embankment is made of highly porous soil, surrounded by the outer shell of highly impervious soil, both separated by transition filter material of medium permeability
  - c) inner embankment is made of highly impervious soil surrounded by the outer shell of highly pervious soil, both separated by transition filter material of medium permeability
  - d) none of the above
- 11) When the crest of an ogee spillway is designed to be in accordance with the lower nappe of a free falling water jet over a duly ventilated sharp crested weir, then theoretically
- a) the pressure on the spillway crest will always be zero (i. e. atmospheric pressure)
  - b) the pressure on the spilway will be zero at design head only
  - c) the pressure on the spillway crest will always be negative
  - d) the pressure on the spillway crest will always be positive
- 12) In computing the spilling capacity of high ogee spillways, the velocity head is usually
- a) very small and hence neglected
  - b) very large and but can be neglected
  - c) very large and hence cannot be neglected
  - d) neither (a) nor (b)
- 13) Water-logging of cropped land leads to reduced crop yields, due to
- a) ill-aeration of root zone, causing lack of oxygen to plants
  - b) growth of water-loving plants interfering with the sown crop
  - c) surrounding of the root zone by the resultant saline water, which extracts the good water from plant roots by osmosis
  - d) all of the above
- 14) A recently reclaimed alkaline soil should preferably be sown with a salt resistant crop, like
- a) wheat
  - b) cotton
  - c) barseem
  - d) any of the above



Seat No.	
----------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
WATER RESOURCE ENGINEERING – II**

Day and Date : Wednesday, 6-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I (Questions 2, 3, 4, 5) and **any three** questions from Section II (Questions 6, 7, 8, 9).  
2) Draw neat labeled sketches **wherever** necessary.  
3) Assume suitable data if **necessary** and state it clearly.

SECTION – I

2. a) Enlist and discuss factors affecting silting in impounding reservoirs. Discuss the principal measures that should be undertaken to control the sediment inflow to an impounding reservoir. **4**
- b) Classify various types of dams according to construction materials used. Distinguish clearly between rigid and non rigid dams. **5**
3. a) What do you mean by elementary profile of a gravity dam ? What are its dimensions ? How the profile is modified into Practical Profile ? **4**
- b) A profile of a gravity dam is shown in figure (I) with the important levels. If the coefficient of friction between dam and foundations is 0.75, is the dam safe against sliding ? Take unit weight of concrete as  $24 \text{ kN/m}^3$ . Assume Horizontal Earthquake coefficient as 0.05 g and there is no tail water. Neglect uplift. **6**

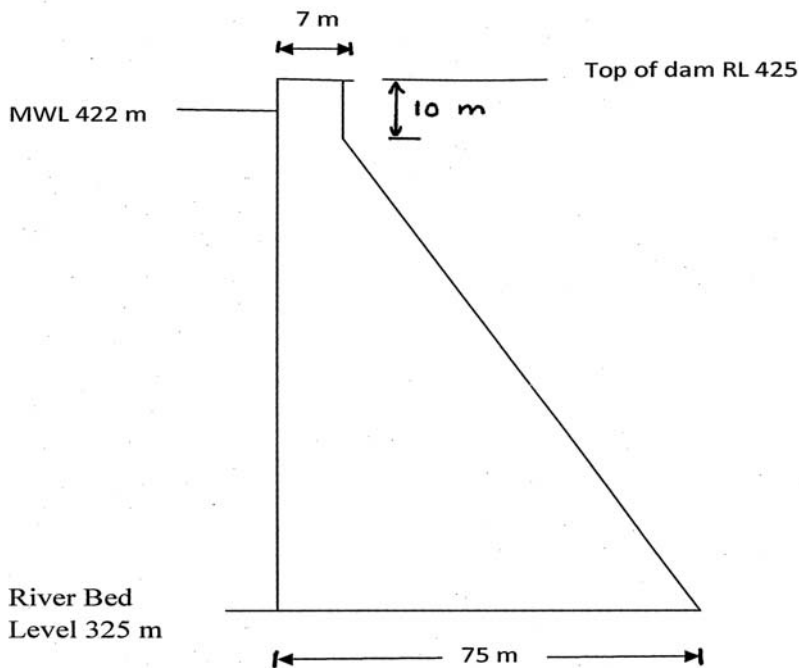


Figure – I



4. a) Write short note on : 4  
i) Rock toe  
ii) Design of drainage filters for earthen dams
- b) Draw a cross section of a 'Zoned Embankment type Earth Dam' and discuss the significance of each component. 5
5. a) Enumerate important types of spillway gates. Describe with a neat sketch the construction and working of 'Radial Gate'. 4
- b) What is meant by energy dissipater ? Discuss the various methods used for energy dissipation below spillways. 5

## SECTION – II

6. a) What are the main causes of failures of weirs on permeable foundations, and what remedies would you suggest to prevent them ? 4
- b) Write short notes on watershed canals and contour canals. 5
7. a) State under what circumstances you will recommend the use of the following cross drainage structures : 4  
i) Syphon ii) Aqueduct
- b) Explain how do the following river training structures assist in river control. 6  
i) Spurs ii) Revetment iii) Guide bunds
8. a) Discuss different types of drainage systems provided in irrigated tracts as precautions against water-logging. Give salient features of an open drain system. 4
- b) How will you justify economically the necessity of lining an existing canal ? What added benefits you will expect if the canal to be lined is new and yet to be constructed ? 5
9. a) Enlist different types of hydropower plants and discuss their suitability according to the site and hydrological conditions. Draw a neat sketch of Storage Type Hydropower plant and label the components. 4
- b) A runoff river plant is installed on a river having a minimum flow 15 cumec. Head available at the plant is 16 m and the plant efficiency may be assumed as 80%. If the plant is used as a peak load plant operating for 6 hours daily, compute the firm capacity of the plant : 5  
i) Without pondage  
ii) With pondage, but allowing 8% water to be lost in evaporation and other losses.



SLR-TJ – 57

Seat No.	
----------	--

Set	<b>P</b>
-----	----------

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I : OPEN CHANNEL AND RIVER HYDRAULICS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) **All questions are compulsory.**  
2) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.**  
3) **Use of non programmable calculator is permitted.**  
4) **Draw neat sketches wherever necessary.**  
5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) The water surface slope  $\frac{dy}{dx}$ , in case of uniform flow in channel, it is

equal to

- a) 0                                      b) 1                                      c) 1000                                      d)  $\infty$

2) The maximum velocity in open channel occurs

- a) Near bottom channel                                      b) At the free surface  
c) Little below the free surface                                      d) None

3) In rectangular channel, the critical depth is

- a)  $\left(\frac{q^2}{g}\right)^{\frac{1}{2}}$                                       b)  $\left(\frac{q^2}{g}\right)^{\frac{1}{3}}$   
c)  $\left(\frac{q^2}{g}\right)^{\frac{1}{4}}$                                       d)  $\left(\frac{q^3}{g}\right)^{\frac{1}{3}}$

4) For the best rectangular section

- a)  $y = \frac{b}{3}$                                       b)  $y = b$   
c)  $y = \frac{b}{2}$                                       d)  $y = \frac{b}{4}$

P.T.O.



- 5) The momentum correction factor 'β' is given as
- a)  $\frac{1}{V^3 A} \int V^3 dA$                       b)  $\frac{1}{VA^2} \int V^2 dA$
- c)  $\frac{1}{VA} \int V dA$                               d)  $\frac{1}{VA} \int V^2 dA$
- 6) The momentum equation in 'X' direction when the flow is steady is  $\sum F_x =$
- a)  $\rho Q(Vx_2 - Vx_1)$                       b)  $\rho Q^2(Vx_2 - Vx_1)$
- c)  $\frac{\rho}{Q}(Vx_2 - Vx_1)$                       d) None
- 7) Shield's diagram is a plot of non dimensional shear stress  $\tau_c$  against
- a) Relative depth                              b) Shear Reynold's number
- c) Hydraulic radius                              d) Reynold's number
- 8) The mean velocity in Lacey's regime channel is proportional to
- a)  $R^{1/3}$                       b)  $R^{2/3}$                       c)  $S_0^{1/2}$                       d)  $S_0^{1/3}$
- 9) Rivers generally forms meanders in
- a) Boulder stage                              b) Delta stage
- c) Trough stage                              d) None
- 10) Bed load is the term used to describe combination of
- a) Contact load and wash load
- b) Contact load and saltation load
- c) Contact load and suspended load
- d) Bed material load
- 11) Extreme condition of meanders is called as
- a) Leavee                      b) Spurs                      c) Cut-off                      d) Island
- 12) Silting of reservoirs
- a) Reduces efficiency of dam                      b) Reduces storage capacity
- c) Raises reservoir water level                      d) None
- 13) The scale effect in model can be
- a) Positive only                              b) Negative only
- c) Both positive and negative                      d) None
- 14) Dynamic similarity between model and prototype is the similarity of
- a) Forces                      b) Motion                      c) Length                      d) None





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I : OPEN CHANNEL AND RIVER HYDRAULICS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) *All questions are compulsory.*  
2) *Use of non programmable calculator is permitted.*  
3) *Draw neat sketches wherever necessary.*

2. Attempt **any two** : **(6×2=12)**

- a) What do you understand by most economical channel section ? And show that for trapezoidal section. Half of top width = length of one of sloping side and hydraulic mean depth = half the depth of flow.
- b) An overflow spillway 40.0 m high. At the design energy head of 3.0 m over the spillway. Find the sequent depths and energy loss in hydraulic jump formed on horizontal apron at the toe of spillway. Neglect energy loss due to flow over spillway face. (Assume  $C_d = 0.74$ )
- c) A rectangular channel carrying a discharge of  $30.0 \text{ m}^3/\text{sec}$  has a width of 10.0 m and bed slope 0.00017 and  $n = 0.020$ . At a particular section, the depth of flow is 1.60 m. Determine how far upstream or downstream of this section the depth of flow will be 2.0 m. (Use step method take two steps).

3. Attempt **any four** : **(4×4=16)**

- a) Derive the modified equation for GVF and also state the assumptions made for it.
- b) A 5.0 m wide trapezoidal channel having a side slope 1.5 H to 1.0 V is laid on a slope of 0.00035. The roughness coefficient  $n = 0.015$  find the normal depth of discharge of  $22 \text{ m}^3/\text{sec}$  through the channel.
- c) Derive the equation for energy loss through 'Hydraulic Jump'.
- d) Find the alternate depth  $y_1$  and  $y_2$  corresponding to specific energy of 2.0 m and discharge  $5.0 \text{ m}^3/\text{s}$  in a trapezoidal channel section where  $m = 1.50$  (Use trial and error method).
- e) Define kinetic energy correction factor ( $\alpha$ ) and momentum correction factor ( $\beta$ ) and derive their expressions.

**Set P**



4. Attempt **any two** : **(6×2=12)**
- a) Design a regime channel by using 'Lacey's theory' from the data, discharge =  $60 \text{ m}^3/\text{sec}$  and silt factor = 1.14.
  - b) i) Derive Reynold's model law and give the examples where it can be used ?  
ii) A model of water meter is tested in 100 mm diameter pipe. The discharge was 45 lit/sec and pressure difference is  $0.11 \text{ N/mm}^2$ . What will be the discharge in pipe of 500 mm diameter pipe and what will be the pressure ?
  - c) Write short notes on :
    - 1) Cut-off
    - 2) Spurs
    - 3) Meandering of river.
5. Attempt **any four** : **(4×4=16)**
- a) Differentiate between Kennedy's theory and Lacey's theory for channel design.
  - b) Define similitude. What are its types ? Also derive formula for 'Froude's number'.
  - c) What do you understand by 'river training works' ? Explain its types.
  - d) A 1 : 50 scale model of submarine was tested in wind-tunnel. If the velocity of the submarine in sea-water is 10 m/s. Find the corresponding velocity of air in wind tunnel. Take kinematic viscosity of air is 1.33 times of water. Also find the drag force on submarine if the force on model is 10.0 N also take specific weight of sea-water as  $10 \text{ kN/m}^3$  and of air  $10 \text{ N/m}^3$ .
  - e) Draw a neat sketch of 'current meter' and explain its working in detail.
-



SLR-TJ – 57

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I : OPEN CHANNEL AND RIVER HYDRAULICS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) **All questions are compulsory.**  
2) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.**  
3) **Use of non programmable calculator is permitted.**  
4) **Draw neat sketches wherever necessary.**  
5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(1×14=14)**

- 1) The mean velocity in Lacey's regime channel is proportional to
  - a)  $R^{1/3}$
  - b)  $R^{2/3}$
  - c)  $S_0^{1/2}$
  - d)  $S_0^{1/3}$
- 2) Rivers generally forms meanders in
  - a) Boulder stage
  - b) Delta stage
  - c) Trough stage
  - d) None
- 3) Bed load is the term used to describe combination of
  - a) Contact load and wash load
  - b) Contact load and saltation load
  - c) Contact load and suspended load
  - d) Bed material load
- 4) Extreme condition of meanders is called as
  - a) Leavee
  - b) Spurs
  - c) Cut-off
  - d) Island
- 5) Silting of reservoirs
  - a) Reduces efficiency of dam
  - b) Reduces storage capacity
  - c) Raises reservoir water level
  - d) None
- 6) The scale effect in model can be
  - a) Positive only
  - b) Negative only
  - c) Both positive and negative
  - d) None

P.T.O.



- 7) Dynamic similarity between model and prototype is the similarity of  
 a) Forces                      b) Motion                      c) Length                      d) None
- 8) The water surface slope  $\frac{dy}{dx}$ , in case of uniform flow in channel, it is equal to  
 a) 0                              b) 1                              c) 1000                      d)  $\infty$
- 9) The maximum velocity in open channel occurs  
 a) Near bottom channel                      b) At the free surface  
 c) Little below the free surface                      d) None
- 10) In rectangular channel, the critical depth is  
 a)  $\left(\frac{q^2}{g}\right)^{\frac{1}{2}}$                       b)  $\left(\frac{q^2}{g}\right)^{\frac{1}{3}}$   
 c)  $\left(\frac{q^2}{g}\right)^{\frac{1}{4}}$                       d)  $\left(\frac{q^3}{g}\right)^{\frac{1}{3}}$
- 11) For the best rectangular section  
 a)  $y = \frac{b}{3}$                       b)  $y = b$   
 c)  $y = \frac{b}{2}$                       d)  $y = \frac{b}{4}$
- 12) The momentum correction factor ' $\beta$ ' is given as  
 a)  $\frac{1}{V^3 A} \int V^3 dA$                       b)  $\frac{1}{VA^2} \int V^2 dA$   
 c)  $\frac{1}{VA} \int V dA$                       d)  $\frac{1}{VA} \int V^2 dA$
- 13) The momentum equation in 'X' direction when the flow is steady is  $\sum F_x =$   
 a)  $\rho Q(Vx_2 - Vx_1)$                       b)  $\rho Q^2(Vx_2 - Vx_1)$   
 c)  $\frac{\rho}{Q}(Vx_2 - Vx_1)$                       d) None
- 14) Shield's diagram is a plot of non dimensional shear stress  $\tau_c$  against  
 a) Relative depth                      b) Shear Reynold's number  
 c) Hydraulic radius                      d) Reynold's number



Seat No.	
----------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I : OPEN CHANNEL AND RIVER HYDRAULICS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) *All questions are compulsory.*  
2) *Use of non programmable calculator is permitted.*  
3) *Draw neat sketches wherever necessary.*

2. Attempt **any two** : **(6×2=12)**

- a) What do you understand by most economical channel section ? And show that for trapezoidal section. Half of top width = length of one of sloping side and hydraulic mean depth = half the depth of flow.
- b) An overflow spillway 40.0 m high. At the design energy head of 3.0 m over the spillway. Find the sequent depths and energy loss in hydraulic jump formed on horizontal apron at the toe of spillway. Neglect energy loss due to flow over spillway face. (Assume  $C_d = 0.74$ )
- c) A rectangular channel carrying a discharge of  $30.0 \text{ m}^3/\text{sec}$  has a width of 10.0 m and bed slope 0.00017 and  $n = 0.020$ . At a particular section, the depth of flow is 1.60 m. Determine how far upstream or downstream of this section the depth of flow will be 2.0 m. (Use step method take two steps).

3. Attempt **any four** : **(4×4=16)**

- a) Derive the modified equation for GVF and also state the assumptions made for it.
- b) A 5.0 m wide trapezoidal channel having a side slope 1.5 H to 1.0 V is laid on a slope of 0.00035. The roughness coefficient  $n = 0.015$  find the normal depth of discharge of  $22 \text{ m}^3/\text{sec}$  through the channel.
- c) Derive the equation for energy loss through 'Hydraulic Jump'.
- d) Find the alternate depth  $y_1$  and  $y_2$  corresponding to specific energy of 2.0 m and discharge  $5.0 \text{ m}^3/\text{s}$  in a trapezoidal channel section where  $m = 1.50$  (Use trial and error method).
- e) Define kinetic energy correction factor ( $\alpha$ ) and momentum correction factor ( $\beta$ ) and derive their expressions.

**Set Q**



4. Attempt **any two** : **(6×2=12)**
- a) Design a regime channel by using 'Lacey's theory' from the data, discharge =  $60 \text{ m}^3/\text{sec}$  and silt factor = 1.14.
  - b) i) Derive Reynold's model law and give the examples where it can be used ?  
ii) A model of water meter is tested in 100 mm diameter pipe. The discharge was 45 lit/sec and pressure difference is  $0.11 \text{ N/mm}^2$ . What will be the discharge in pipe of 500 mm diameter pipe and what will be the pressure ?
  - c) Write short notes on :
    - 1) Cut-off
    - 2) Spurs
    - 3) Meandering of river.
5. Attempt **any four** : **(4×4=16)**
- a) Differentiate between Kennedy's theory and Lacey's theory for channel design.
  - b) Define similitude. What are its types ? Also derive formula for 'Froude's number'.
  - c) What do you understand by 'river training works' ? Explain its types.
  - d) A 1 : 50 scale model of submarine was tested in wind-tunnel. If the velocity of the submarine in sea-water is 10 m/s. Find the corresponding velocity of air in wind tunnel. Take kinematic viscosity of air is 1.33 times of water. Also find the drag force on submarine if the force on model is 10.0 N also take specific weight of sea-water as  $10 \text{ kN/m}^3$  and of air  $10 \text{ N/m}^3$ .
  - e) Draw a neat sketch of 'current meter' and explain its working in detail.
-



SLR-TJ – 57

Seat No.	
----------	--

Set	R
-----	---

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I : OPEN CHANNEL AND RIVER HYDRAULICS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) **All questions are compulsory.**  
2) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.**  
3) **Use of non programmable calculator is permitted.**  
4) **Draw neat sketches wherever necessary.**  
5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(1×14=14)

- 1) The momentum correction factor 'β' is given as
- a)  $\frac{1}{V^3 A} \int V^3 dA$                       b)  $\frac{1}{VA^2} \int V^2 dA$
- c)  $\frac{1}{VA} \int V dA$                               d)  $\frac{1}{VA} \int V^2 dA$
- 2) The momentum equation in 'X' direction when the flow is steady is  $\sum F_x =$
- a)  $\rho Q(Vx_2 - Vx_1)$                       b)  $\rho Q^2(Vx_2 - Vx_1)$
- c)  $\frac{\rho}{Q}(Vx_2 - Vx_1)$                       d) None
- 3) Shield's diagram is a plot of non dimensional shear stress  $\tau_c$  against
- a) Relative depth                              b) Shear Reynold's number
- c) Hydraulic radius                              d) Reynold's number
- 4) The mean velocity in Lacey's regime channel is proportional to
- a)  $R^{1/3}$                               b)  $R^{2/3}$                               c)  $S_0^{1/2}$                               d)  $S_0^{1/3}$
- 5) Rivers generally forms meanders in
- a) Boulder stage                              b) Delta stage
- c) Trough stage                              d) None

P.T.O.



- 6) Bed load is the term used to describe combination of
- Contact load and wash load
  - Contact load and saltation load
  - Contact load and suspended load
  - Bed material load
- 7) Extreme condition of meanders is called as
- Leavee
  - Spurs
  - Cut-off
  - Island
- 8) Silting of reservoirs
- Reduces efficiency of dam
  - Reduces storage capacity
  - Raises reservoir water level
  - None
- 9) The scale effect in model can be
- Positive only
  - Negative only
  - Both positive and negative
  - None
- 10) Dynamic similarity between model and prototype is the similarity of
- Forces
  - Motion
  - Length
  - None
- 11) The water surface slope  $\frac{dy}{dx}$ , in case of uniform flow in channel, it is equal to
- 0
  - 1
  - 1000
  - $\infty$
- 12) The maximum velocity in open channel occurs
- Near bottom channel
  - At the free surface
  - Little below the free surface
  - None
- 13) In rectangular channel, the critical depth is
- $\left(\frac{q^2}{g}\right)^{\frac{1}{2}}$
  - $\left(\frac{q^2}{g}\right)^{\frac{1}{3}}$
  - $\left(\frac{q^2}{g}\right)^{\frac{1}{4}}$
  - $\left(\frac{q^3}{g}\right)^{\frac{1}{3}}$
- 14) For the best rectangular section
- $y = \frac{b}{3}$
  - $y = b$
  - $y = \frac{b}{2}$
  - $y = \frac{b}{4}$
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I : OPEN CHANNEL AND RIVER HYDRAULICS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) *All questions are compulsory.*  
2) *Use of non programmable calculator is permitted.*  
3) *Draw neat sketches wherever necessary.*

2. Attempt **any two** : **(6×2=12)**

- a) What do you understand by most economical channel section ? And show that for trapezoidal section. Half of top width = length of one of sloping side and hydraulic mean depth = half the depth of flow.
- b) An overflow spillway 40.0 m high. At the design energy head of 3.0 m over the spillway. Find the sequent depths and energy loss in hydraulic jump formed on horizontal apron at the toe of spillway. Neglect energy loss due to flow over spillway face. (Assume  $C_d = 0.74$ )
- c) A rectangular channel carrying a discharge of  $30.0 \text{ m}^3/\text{sec}$  has a width of 10.0 m and bed slope 0.00017 and  $n = 0.020$ . At a particular section, the depth of flow is 1.60 m. Determine how far upstream or downstream of this section the depth of flow will be 2.0 m. (Use step method take two steps).

3. Attempt **any four** : **(4×4=16)**

- a) Derive the modified equation for GVF and also state the assumptions made for it.
- b) A 5.0 m wide trapezoidal channel having a side slope 1.5 H to 1.0 V is laid on a slope of 0.00035. The roughness coefficient  $n = 0.015$  find the normal depth of discharge of  $22 \text{ m}^3/\text{sec}$  through the channel.
- c) Derive the equation for energy loss through 'Hydraulic Jump'.
- d) Find the alternate depth  $y_1$  and  $y_2$  corresponding to specific energy of 2.0 m and discharge  $5.0 \text{ m}^3/\text{s}$  in a trapezoidal channel section where  $m = 1.50$  (Use trial and error method).
- e) Define kinetic energy correction factor ( $\alpha$ ) and momentum correction factor ( $\beta$ ) and derive their expressions.

**Set R**



4. Attempt **any two** : **(6×2=12)**
- a) Design a regime channel by using 'Lacey's theory' from the data, discharge =  $60 \text{ m}^3/\text{sec}$  and silt factor = 1.14.
  - b) i) Derive Reynold's model law and give the examples where it can be used ?  
ii) A model of water meter is tested in 100 mm diameter pipe. The discharge was 45 lit/sec and pressure difference is  $0.11 \text{ N/mm}^2$ . What will be the discharge in pipe of 500 mm diameter pipe and what will be the pressure ?
  - c) Write short notes on :
    - 1) Cut-off
    - 2) Spurs
    - 3) Meandering of river.
5. Attempt **any four** : **(4×4=16)**
- a) Differentiate between Kennedy's theory and Lacey's theory for channel design.
  - b) Define similitude. What are its types ? Also derive formula for 'Froude's number'.
  - c) What do you understand by 'river training works' ? Explain its types.
  - d) A 1 : 50 scale model of submarine was tested in wind-tunnel. If the velocity of the submarine in sea-water is 10 m/s. Find the corresponding velocity of air in wind tunnel. Take kinematic viscosity of air is 1.33 times of water. Also find the drag force on submarine if the force on model is 10.0 N also take specific weight of sea-water as  $10 \text{ kN/m}^3$  and of air  $10 \text{ N/m}^3$ .
  - e) Draw a neat sketch of 'current meter' and explain its working in detail.
-



SLR-TJ – 57

Seat No.	
----------	--

Set	S
-----	---

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I : OPEN CHANNEL AND RIVER HYDRAULICS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:**
- 1) **All questions are compulsory.**
  - 2) **Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.**
  - 3) **Use of non programmable calculator is permitted.**
  - 4) **Draw neat sketches wherever necessary.**
  - 5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(1×14=14)**
- 1) Bed load is the term used to describe combination of
    - a) Contact load and wash load
    - b) Contact load and saltation load
    - c) Contact load and suspended load
    - d) Bed material load
  - 2) Extreme condition of meanders is called as
    - a) Leavee
    - b) Spurs
    - c) Cut-off
    - d) Island
  - 3) Silting of reservoirs
    - a) Reduces efficiency of dam
    - b) Reduces storage capacity
    - c) Raises reservoir water level
    - d) None
  - 4) The scale effect in model can be
    - a) Positive only
    - b) Negative only
    - c) Both positive and negative
    - d) None
  - 5) Dynamic similarity between model and prototype is the similarity of
    - a) Forces
    - b) Motion
    - c) Length
    - d) None
  - 6) The water surface slope  $\frac{dy}{dx}$ , in case of uniform flow in channel, it is equal to
    - a) 0
    - b) 1
    - c) 1000
    - d)  $\infty$

P.T.O.



- 7) The maximum velocity in open channel occurs
- a) Near bottom channel                      b) At the free surface  
c) Little below the free surface            d) None
- 8) In rectangular channel, the critical depth is
- a)  $\left(\frac{q^2}{g}\right)^{1/2}$                                       b)  $\left(\frac{q^2}{g}\right)^{1/3}$   
c)  $\left(\frac{q^2}{g}\right)^{1/4}$                                       d)  $\left(\frac{q^3}{g}\right)^{1/3}$
- 9) For the best rectangular section
- a)  $y = b/3$     b)  $y = b$   
c)  $y = b/2$     d)  $y = b/4$
- 10) The momentum correction factor 'β' is given as
- a)  $\frac{1}{V^3 A} \int V^3 dA$                                       b)  $\frac{1}{VA^2} \int V^2 dA$   
c)  $\frac{1}{VA} \int V dA$                                         d)  $\frac{1}{VA} \int V^2 dA$
- 11) The momentum equation in 'X' direction when the flow is steady is  $\sum F_x =$
- a)  $\rho Q(Vx_2 - Vx_1)$                                       b)  $\rho Q^2(Vx_2 - Vx_1)$   
c)  $\frac{\rho}{Q}(Vx_2 - Vx_1)$                                       d) None
- 12) Shield's diagram is a plot of non dimensional shear stress  $\tau_c$  against
- a) Relative depth                                      b) Shear Reynold's number  
c) Hydraulic radius                                      d) Reynold's number
- 13) The mean velocity in Lacey's regime channel is proportional to
- a)  $R^{1/3}$                                       b)  $R^{2/3}$                                       c)  $S_0^{1/2}$                                       d)  $S_0^{1/3}$
- 14) Rivers generally forms meanders in
- a) Boulder stage    b) Delta stage  
c) Trough stage    d) None



Seat No.	
----------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I : OPEN CHANNEL AND RIVER HYDRAULICS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) *All questions are compulsory.*  
2) *Use of non programmable calculator is permitted.*  
3) *Draw neat sketches wherever necessary.*

2. Attempt **any two** : **(6×2=12)**

- a) What do you understand by most economical channel section ? And show that for trapezoidal section. Half of top width = length of one of sloping side and hydraulic mean depth = half the depth of flow.
- b) An overflow spillway 40.0 m high. At the design energy head of 3.0 m over the spillway. Find the sequent depths and energy loss in hydraulic jump formed on horizontal apron at the toe of spillway. Neglect energy loss due to flow over spillway face. (Assume  $C_d = 0.74$ )
- c) A rectangular channel carrying a discharge of  $30.0 \text{ m}^3/\text{sec}$  has a width of 10.0 m and bed slope 0.00017 and  $n = 0.020$ . At a particular section, the depth of flow is 1.60 m. Determine how far upstream or downstream of this section the depth of flow will be 2.0 m. (Use step method take two steps).

3. Attempt **any four** : **(4×4=16)**

- a) Derive the modified equation for GVF and also state the assumptions made for it.
- b) A 5.0 m wide trapezoidal channel having a side slope 1.5 H to 1.0 V is laid on a slope of 0.00035. The roughness coefficient  $n = 0.015$  find the normal depth of discharge of  $22 \text{ m}^3/\text{sec}$  through the channel.
- c) Derive the equation for energy loss through 'Hydraulic Jump'.
- d) Find the alternate depth  $y_1$  and  $y_2$  corresponding to specific energy of 2.0 m and discharge  $5.0 \text{ m}^3/\text{s}$  in a trapezoidal channel section where  $m = 1.50$  (Use trial and error method).
- e) Define kinetic energy correction factor ( $\alpha$ ) and momentum correction factor ( $\beta$ ) and derive their expressions.

**Set S**



4. Attempt **any two** : **(6×2=12)**
- a) Design a regime channel by using 'Lacey's theory' from the data, discharge =  $60 \text{ m}^3/\text{sec}$  and silt factor = 1.14.
  - b) i) Derive Reynold's model law and give the examples where it can be used ?  
ii) A model of water meter is tested in 100 mm diameter pipe. The discharge was 45 lit/sec and pressure difference is  $0.11 \text{ N/mm}^2$ . What will be the discharge in pipe of 500 mm diameter pipe and what will be the pressure ?
  - c) Write short notes on :
    - 1) Cut-off
    - 2) Spurs
    - 3) Meandering of river.
5. Attempt **any four** : **(4×4=16)**
- a) Differentiate between Kennedy's theory and Lacey's theory for channel design.
  - b) Define similitude. What are its types ? Also derive formula for 'Froude's number'.
  - c) What do you understand by 'river training works' ? Explain its types.
  - d) A 1 : 50 scale model of submarine was tested in wind-tunnel. If the velocity of the submarine in sea-water is 10 m/s. Find the corresponding velocity of air in wind tunnel. Take kinematic viscosity of air is 1.33 times of water. Also find the drag force on submarine if the force on model is 10.0 N also take specific weight of sea-water as  $10 \text{ kN/m}^3$  and of air  $10 \text{ N/m}^3$ .
  - e) Draw a neat sketch of 'current meter' and explain its working in detail.
-



SLR-TJ – 58

Seat No.	
-------------	--

Set **P**

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I : AIR POLLUTION AND CONTROL**

Day and Date : Friday, 8-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I and **any three** questions from Section II.  
2) Assume suitable data **whenever** required.  
3) Figures to the **right** indicate **full** marks.  
4) **Use** of non-programmable calculator is **allowed**.  
5) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Write the correct option in your answerbook : **(1×14=14)**
- \_\_\_\_\_ reduces visibility considerably.  
a) Photochemical smog                      b) Lapse rate  
c) Odour pollution                              d) Indoor pollution
  - In cyclone particulates are separated by virtue of \_\_\_\_\_ action.  
a) Gravitational acceleration              b) Centrifugal  
c) Inertial impaction                          d) Diffusion
  - Wet collectors can remove  
a) Water soluble gases                      b) Particulates  
c) Both a) and b)                              d) Mercury
  - Velocity of gas flow in gravity settler should be less than \_\_\_\_\_ m/s.  
a) 0.3                      b) 0.5                      c) 3.1                      d) 10

P.T.O.



- 5) First step in removal of particles in ESP is
- a) Ionization of gas
  - b) Charging of particles
  - c) Collection of particles
  - d) Charge neutralization
- 6) If stack is having cross sectional area of 14 sq. m. then no of traverse points shall be equal to
- a) 4
  - b) 12
  - c) 20
  - d) 30
- 7) Radon is commonly found carcinogenic and
- a) Outdoor air pollutant
  - b) Indoor air pollutant
  - c) Both a) and b)
  - d) None of these
- 8) ESP can give particulate removal efficiency upto \_\_\_\_\_%.
- a) 99.99
  - b) 95
  - c) 97
  - d) 90
- 9) Venturi scrubber is a type of
- a) Stack monitoring kit
  - b) Dry collector
  - c) Wet collector
  - d) Bag house filter
- 10) For sampling of ambient air \_\_\_\_\_ instrument is used.
- a) Stack monitoring kit
  - b) Auto exhaust analyzer
  - c) High volume sampler or respirable dust sampler
  - d) All of the above
- 11) Consider four pollutants  $\text{SO}_2$ ,  $\text{NO}_2$ , PBN and  $\text{H}_2\text{S}$ . Out of these pollutants \_\_\_\_\_ is a secondary pollutant.
- a)  $\text{SO}_2$
  - b)  $\text{NO}_2$
  - c) PBN
  - d) None of these
- 12) Molecular mass of ozone is \_\_\_\_\_ grams/mole.
- a) 44
  - b) 48
  - c) 34
  - d) 28
- 13) \_\_\_\_\_ are categorized under wet collectors.
- a) Venturi scrubber
  - b) Spray tower
  - c) Cyclonic scrubber
  - d) All of above
- 14) Thickness of \_\_\_\_\_ is approximately 500 km.
- a) Hydrosphere
  - b) Lithosphere
  - c) Biosphere
  - d) Atmosphere





<b>Seat No.</b>	
-----------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I : AIR POLLUTION AND CONTROL**

Day and Date : Friday, 8-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I and **any three** questions from Section II.  
 2) Assume suitable data **whenever** required.  
 3) Figures to the **right** indicate **full** marks.  
 4) **Use** of non-programmable calculator is **allowed**.

SECTION – I

2. a) Define air pollution as per IS code. 3  
 b) Give detailed classification of air pollutants. 6
3. a) Define the following : 4  
 i) Epinasty ii) Chlorosis  
 iii) Necrosis iv) Abscission.
- b) Ground level temperature is of an air parcel is 30° C. Classify the stability class by determining dT/dZ for following cases : 6

Case	T (°C)	Z (m.)
I	30	600
II	11	750
III	34	500

4. a) A one cubic meter of air was found to contain 450 μg/m<sup>3</sup> of SO<sub>2</sub>. The temperature and pressure were 25° C and 1 atmospheric pressure when the sample was taken. What was SO<sub>2</sub> concentration in ppm (parts per million) ? 3
- b) It has been estimated that the emission of SO<sub>2</sub> from a coal fired power plant is 1656.2 gm/sec. At 3 km downwind on an overcast summer afternoon, what is the centerline concentration of SO<sub>2</sub> if the wind speed is 4.5 m/sec at the stack top ? (Note that centerline implies y = 0). 6
- Stack parameters :  
 Physical stack height (h) = 120.0 m  
 Plume rise (Δh) = 8.0 m  
 Assume, σ<sub>y</sub> = 181.5 m and σ<sub>z</sub> = 65.4 m.

**Set P**



5. Write short notes on **any three** of the following : 9
- i) Plume behaviour
  - ii) Stability classes
  - iii) Ozone depletion
  - iv) Scales of air pollution (Micro, Meso and Macro).

### SECTION – II

6. a) Give national ambient air quality standards (2009) for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, CO and NO<sub>2</sub>. 5
- b) Two air pollution control equipments (Gravity settling chamber and Cyclone) are connected in series. Efficiencies of settling chamber and cyclone are 75% and 90% respectively. Determine overall efficiency of the system. 4
7. a) Explain working of Gravity settling chamber with neat sketch. Also write advantages and disadvantages. 4
- b) An ESP is to be constructed to remove fly ash particles from stack gases flowing at 10 m<sup>3</sup>/sec. Analysis of a similar system shows that the drift velocity can be taken as  $w = 3 \times 10^{-5} d_p$  m/sec. 6
- Determine plate area required to collect 0.5 μm particle with
- a) 90% efficiency
  - b) 99% efficiency.
8. a) List out various methods used in gaseous pollution control. Explain Recuperation with neat sketch. 4
- b) What is photochemical smog ? Explain photochemical reactions with the help of chemical equations. What are effects of photochemical smog ? 5
9. Write short notes on **any three** of the following : 9
- 1) Standard cyclone.
  - 2) Functions of central and state pollution control board.
  - 3) ESP.
  - 4) Determination of SPM by using high volume sampler.







<b>Seat No.</b>	
-----------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I : AIR POLLUTION AND CONTROL**

Day and Date : Friday, 8-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I and **any three** questions from Section II.  
 2) Assume suitable data **whenever** required.  
 3) Figures to the **right** indicate **full** marks.  
 4) **Use** of non-programmable calculator is **allowed**.

SECTION – I

2. a) Define air pollution as per IS code. 3  
 b) Give detailed classification of air pollutants. 6
3. a) Define the following : 4  
 i) Epinasty ii) Chlorosis  
 iii) Necrosis iv) Abscission.
- b) Ground level temperature is of an air parcel is 30° C. Classify the stability class by determining dT/dZ for following cases : 6

Case	T (°C)	Z (m.)
I	30	600
II	11	750
III	34	500

4. a) A one cubic meter of air was found to contain 450 μg/m<sup>3</sup> of SO<sub>2</sub>. The temperature and pressure were 25° C and 1 atmospheric pressure when the sample was taken. What was SO<sub>2</sub> concentration in ppm (parts per million) ? 3
- b) It has been estimated that the emission of SO<sub>2</sub> from a coal fired power plant is 1656.2 gm/sec. At 3 km downwind on an overcast summer afternoon, what is the centerline concentration of SO<sub>2</sub> if the wind speed is 4.5 m/sec at the stack top ? (Note that centerline implies y = 0). 6
- Stack parameters :  
 Physical stack height (h) = 120.0 m  
 Plume rise (Δh) = 8.0 m  
 Assume, σ<sub>y</sub> = 181.5 m and σ<sub>z</sub> = 65.4 m.

**Set Q**



5. Write short notes on **any three** of the following : 9
- i) Plume behaviour
  - ii) Stability classes
  - iii) Ozone depletion
  - iv) Scales of air pollution (Micro, Meso and Macro).

### SECTION – II

6. a) Give national ambient air quality standards (2009) for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, CO and NO<sub>2</sub>. 5
- b) Two air pollution control equipments (Gravity settling chamber and Cyclone) are connected in series. Efficiencies of settling chamber and cyclone are 75% and 90% respectively. Determine overall efficiency of the system. 4
7. a) Explain working of Gravity settling chamber with neat sketch. Also write advantages and disadvantages. 4
- b) An ESP is to be constructed to remove fly ash particles from stack gases flowing at 10 m<sup>3</sup>/sec. Analysis of a similar system shows that the drift velocity can be taken as  $w = 3 \times 10^{-5} d_p$  m/sec. 6
- Determine plate area required to collect 0.5 μm particle with
- a) 90% efficiency
  - b) 99% efficiency.
8. a) List out various methods used in gaseous pollution control. Explain Recuperation with neat sketch. 4
- b) What is photochemical smog ? Explain photochemical reactions with the help of chemical equations. What are effects of photochemical smog ? 5
9. Write short notes on **any three** of the following : 9
- 1) Standard cyclone.
  - 2) Functions of central and state pollution control board.
  - 3) ESP.
  - 4) Determination of SPM by using high volume sampler.



SLR-TJ – 58

Seat No.	
----------	--

Set **R**

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I : AIR POLLUTION AND CONTROL**

Day and Date : Friday, 8-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I and **any three** questions from Section II.  
2) Assume suitable data **whenever** required.  
3) Figures to the **right** indicate **full** marks.  
4) **Use** of non-programmable calculator is **allowed**.  
5) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Write the correct option in your answerbook : **(1×14=14)**
- 1) First step in removal of particles in ESP is
    - a) Ionization of gas
    - b) Charging of particles
    - c) Collection of particles
    - d) Charge neutralization
  - 2) If stack is having cross sectional area of 14 sq. m. then no of traverse points shall be equal to
    - a) 4
    - b) 12
    - c) 20
    - d) 30
  - 3) Radon is commonly found carcinogenic and
    - a) Outdoor air pollutant
    - b) Indoor air pollutant
    - c) Both a) and b)
    - d) None of these
  - 4) ESP can give particulate removal efficiency upto \_\_\_\_\_%.
    - a) 99.99
    - b) 95
    - c) 97
    - d) 90

P.T.O.



- 5) Venturi scrubber is a type of
- a) Stack monitoring kit
  - b) Dry collector
  - c) Wet collector
  - d) Bag house filter
- 6) For sampling of ambient air \_\_\_\_\_ instrument is used.
- a) Stack monitoring kit
  - b) Auto exhaust analyzer
  - c) High volume sampler or respirable dust sampler
  - d) All of the above
- 7) Consider four pollutants  $\text{SO}_2$ ,  $\text{NO}_2$ , PBN and  $\text{H}_2\text{S}$ . Out of these pollutants \_\_\_\_\_ is a secondary pollutant.
- a)  $\text{SO}_2$
  - b)  $\text{NO}_2$
  - c) PBN
  - d) None of these
- 8) Molecular mass of ozone is \_\_\_\_\_ grams/mole.
- a) 44
  - b) 48
  - c) 34
  - d) 28
- 9) \_\_\_\_\_ are categorized under wet collectors.
- a) Venturi scrubber
  - b) Spray tower
  - c) Cyclonic scrubber
  - d) All of above
- 10) Thickness of \_\_\_\_\_ is approximately 500 km.
- a) Hydrosphere
  - b) Lithosphere
  - c) Biosphere
  - d) Atmosphere
- 11) \_\_\_\_\_ reduces visibility considerably.
- a) Photochemical smog
  - b) Lapse rate
  - c) Odour pollution
  - d) Indoor pollution
- 12) In cyclone particulates are separated by virtue of \_\_\_\_\_ action.
- a) Gravitational acceleration
  - b) Centrifugal
  - c) Inertial impaction
  - d) Diffusion
- 13) Wet collectors can remove
- a) Water soluble gases
  - b) Particulates
  - c) Both a) and b)
  - d) Mercury
- 14) Velocity of gas flow in gravity settler should be less than \_\_\_\_\_ m/s.
- a) 0.3
  - b) 0.5
  - c) 3.1
  - d) 10





<b>Seat No.</b>	
-----------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I : AIR POLLUTION AND CONTROL**

Day and Date : Friday, 8-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I and **any three** questions from Section II.  
 2) Assume suitable data **whenever** required.  
 3) Figures to the **right** indicate **full** marks.  
 4) **Use** of non-programmable calculator is **allowed**.

SECTION – I

2. a) Define air pollution as per IS code. 3  
 b) Give detailed classification of air pollutants. 6
3. a) Define the following : 4  
 i) Epinasty ii) Chlorosis  
 iii) Necrosis iv) Abscission.
- b) Ground level temperature is of an air parcel is 30° C. Classify the stability class by determining dT/dZ for following cases : 6

Case	T (°C)	Z (m.)
I	30	600
II	11	750
III	34	500

4. a) A one cubic meter of air was found to contain 450 μg/m<sup>3</sup> of SO<sub>2</sub>. The temperature and pressure were 25° C and 1 atmospheric pressure when the sample was taken. What was SO<sub>2</sub> concentration in ppm (parts per million) ? 3
- b) It has been estimated that the emission of SO<sub>2</sub> from a coal fired power plant is 1656.2 gm/sec. At 3 km downwind on an overcast summer afternoon, what is the centerline concentration of SO<sub>2</sub> if the wind speed is 4.5 m/sec at the stack top ? (Note that centerline implies y = 0). 6
- Stack parameters :  
 Physical stack height (h) = 120.0 m  
 Plume rise (Δh) = 8.0 m  
 Assume, σ<sub>y</sub> = 181.5 m and σ<sub>z</sub> = 65.4 m.

**Set R**



5. Write short notes on **any three** of the following : 9
- i) Plume behaviour
  - ii) Stability classes
  - iii) Ozone depletion
  - iv) Scales of air pollution (Micro, Meso and Macro).

### SECTION – II

6. a) Give national ambient air quality standards (2009) for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, CO and NO<sub>2</sub>. 5
- b) Two air pollution control equipments (Gravity settling chamber and Cyclone) are connected in series. Efficiencies of settling chamber and cyclone are 75% and 90% respectively. Determine overall efficiency of the system. 4
7. a) Explain working of Gravity settling chamber with neat sketch. Also write advantages and disadvantages. 4
- b) An ESP is to be constructed to remove fly ash particles from stack gases flowing at 10 m<sup>3</sup>/sec. Analysis of a similar system shows that the drift velocity can be taken as  $w = 3 \times 10^{-5} d_p$  m/sec. 6
- Determine plate area required to collect 0.5 μm particle with
- a) 90% efficiency
  - b) 99% efficiency.
8. a) List out various methods used in gaseous pollution control. Explain Recuperation with neat sketch. 4
- b) What is photochemical smog ? Explain photochemical reactions with the help of chemical equations. What are effects of photochemical smog ? 5
9. Write short notes on **any three** of the following : 9
- 1) Standard cyclone.
  - 2) Functions of central and state pollution control board.
  - 3) ESP.
  - 4) Determination of SPM by using high volume sampler.



SLR-TJ – 58

Seat No.	
-------------	--

Set **S**

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I : AIR POLLUTION AND CONTROL**

Day and Date : Friday, 8-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :**
- 1) Solve **any three** questions from Section I and **any three** questions from Section II.
  - 2) Assume suitable data **whenever** required.
  - 3) Figures to the **right** indicate **full** marks.
  - 4) **Use** of non-programmable calculator is **allowed**.
  - 5) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Write the correct option in your answerbook : **(1×14=14)**
- 1) For sampling of ambient air \_\_\_\_\_ instrument is used.
    - a) Stack monitoring kit
    - b) Auto exhaust analyzer
    - c) High volume sampler or respirable dust sampler
    - d) All of the above
  - 2) Consider four pollutants SO<sub>2</sub>, NO<sub>2</sub>, PBN and H<sub>2</sub>S. Out of these pollutants \_\_\_\_\_ is a secondary pollutant.
    - a) SO<sub>2</sub>
    - b) NO<sub>2</sub>
    - c) PBN
    - d) None of these
  - 3) Molecular mass of ozone is \_\_\_\_\_ grams/mole.
    - a) 44
    - b) 48
    - c) 34
    - d) 28

P.T.O.



- 4) \_\_\_\_\_ are categorized under wet collectors.
- a) Venturi scrubber                      b) Spray tower  
c) Cyclonic scrubber                      d) All of above
- 5) Thickness of \_\_\_\_\_ is approximately 500 km.
- a) Hydrosphere                              b) Lithosphere  
c) Biosphere                                 d) Atmosphere
- 6) \_\_\_\_\_ reduces visibility considerably.
- a) Photochemical smog                      b) Lapse rate  
c) Odour pollution                         d) Indoor pollution
- 7) In cyclone particulates are separated by virtue of \_\_\_\_\_ action.
- a) Gravitational acceleration              b) Centrifugal  
c) Inertial impaction                        d) Diffusion
- 8) Wet collectors can remove
- a) Water soluble gases                      b) Particulates  
c) Both a) and b)                            d) Mercury
- 9) Velocity of gas flow in gravity settler should be less than \_\_\_\_\_ m/s.
- a) 0.3                      b) 0.5                      c) 3.1                      d) 10
- 10) First step in removal of particles in ESP is
- a) Ionization of gas                         b) Charging of particles  
c) Collection of particles                    d) Charge neutralization
- 11) If stack is having cross sectional area of 14 sq. m. then no of traverse points shall be equal to
- a) 4                      b) 12                      c) 20                      d) 30
- 12) Radon is commonly found carcinogenic and
- a) Outdoor air pollutant                      b) Indoor air pollutant  
c) Both a) and b)                            d) None of these
- 13) ESP can give particulate removal efficiency upto \_\_\_\_\_ %.
- a) 99.99                                        b) 95  
c) 97    d) 90
- 14) Venturi scrubber is a type of
- a) Stack monitoring kit                      b) Dry collector  
c) Wet collector                              d) Bag house filter
-



<b>Seat No.</b>	
-----------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I : AIR POLLUTION AND CONTROL**

Day and Date : Friday, 8-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I and **any three** questions from Section II.  
 2) Assume suitable data **whenever** required.  
 3) Figures to the **right** indicate **full** marks.  
 4) **Use** of non-programmable calculator is **allowed**.

SECTION – I

2. a) Define air pollution as per IS code. **3**  
 b) Give detailed classification of air pollutants. **6**
3. a) Define the following : **4**  
 i) Epinasty ii) Chlorosis  
 iii) Necrosis iv) Abscission.
- b) Ground level temperature is of an air parcel is 30° C. Classify the stability class by determining dT/dZ for following cases : **6**

Case	T (°C)	Z (m.)
I	30	600
II	11	750
III	34	500

4. a) A one cubic meter of air was found to contain 450 μg/m<sup>3</sup> of SO<sub>2</sub>. The temperature and pressure were 25° C and 1 atmospheric pressure when the sample was taken. What was SO<sub>2</sub> concentration in ppm (parts per million) ? **3**
- b) It has been estimated that the emission of SO<sub>2</sub> from a coal fired power plant is 1656.2 gm/sec. At 3 km downwind on an overcast summer afternoon, what is the centerline concentration of SO<sub>2</sub> if the wind speed is 4.5 m/sec at the stack top ? (Note that centerline implies y = 0). **6**  
 Stack parameters :  
 Physical stack height (h) = 120.0 m  
 Plume rise (Δh) = 8.0 m  
 Assume, σ<sub>y</sub> = 181.5 m and σ<sub>z</sub> = 65.4 m.

**Set S**



5. Write short notes on **any three** of the following : 9
- i) Plume behaviour
  - ii) Stability classes
  - iii) Ozone depletion
  - iv) Scales of air pollution (Micro, Meso and Macro).

### SECTION – II

6. a) Give national ambient air quality standards (2009) for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, CO and NO<sub>2</sub>. 5
- b) Two air pollution control equipments (Gravity settling chamber and Cyclone) are connected in series. Efficiencies of settling chamber and cyclone are 75% and 90% respectively. Determine overall efficiency of the system. 4
7. a) Explain working of Gravity settling chamber with neat sketch. Also write advantages and disadvantages. 4
- b) An ESP is to be constructed to remove fly ash particles from stack gases flowing at 10 m<sup>3</sup>/sec. Analysis of a similar system shows that the drift velocity can be taken as  $w = 3 \times 10^5 d_p$  m/sec. 6
- Determine plate area required to collect 0.5 μm particle with
- a) 90% efficiency
  - b) 99% efficiency.
8. a) List out various methods used in gaseous pollution control. Explain Recuperation with neat sketch. 4
- b) What is photochemical smog ? Explain photochemical reactions with the help of chemical equations. What are effects of photochemical smog ? 5
9. Write short notes on **any three** of the following : 9
- 1) Standard cyclone.
  - 2) Functions of central and state pollution control board.
  - 3) ESP.
  - 4) Determination of SPM by using high volume sampler.



SLR-TJ – 59

Seat No.	
----------	--

Set **P**

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I**  
**DESIGN OF FOUNDATIONS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Answer **any three** questions in **each** Section I and Section II.
  - 5) Assume additional data **if required** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(14×1=14)**
- 1) The standard penetration test is useful to measure **1**
    - a) Shear strength of soft clays
    - b) Shear strength of sands
    - c) Consistency of clays
    - d) None of the above
  - 2) The seismic refraction method cannot be used if the wave velocity in the lower layer is \_\_\_\_\_ that in the upper layer. **1**
    - a) Greater than
    - b) Less than
    - c) More than 4 times
    - d) Less than 4 times
  - 3) The bearing capacity of soil supporting a footing of size 2m × 2m will not be affected by the presence of water table located at a depth \_\_\_\_\_ below base of footing. **1**
    - a) 0.5 m
    - b) 1.0 m
    - c) 1.5 m
    - d) 2.0 m
  - 4) Gross and net bearing capacities will be the same when the structure is founded at **1**
    - a) Ground Level
    - b) At a depth 2 m below GL
    - c) At a depth 4 m below GL
    - d) It is not possible
  - 5) In case of sandy soil \_\_\_\_\_ settlement is predominant. **1**
    - a) Immediate settlement
    - b) Consolidation settlement
    - c) Secondary consolidation settlement
    - d) Both b) and c)

P.T.O.



- 6) When the area of all the footings covers more than 50% of the area of the structure, which foundation is considered more suitable ? **1**  
a) Raft b) Pile  
c) Caisson d) Well Foundation
- 7) Angle of internal friction is least for **1**  
a) Angular grained loose sand b) Angular grained dense sand  
c) Round grained loose sand d) Clays
- 8) 4 piles arranged in square form, what is the efficiency of pile group based on Feld's rule ? **1**  
a) 71.25% b) 81.25% c) 91.25% d) 100%
- 9) Due to negative skin friction, the load carrying capacity of piles **1**  
a) Increases b) Decreases  
c) Remains same d) Increase double
- 10) A well foundation is a type of **1**  
a) Open caisson b) Pneumatic caisson  
c) Floating caisson d) Drilled Pier
- 11) In case of well foundation, grip length is defined as the **1**  
a) Length below the top of well cap to the cutting edge  
b) Length between bottom of the well cap to the cutting edge  
c) Length between minimum scour level and bottom of the well  
d) Length between maximum scour level and bottom of the well
- 12) The scour depth as per Lacey's formulae is given by **1**  
a)  $0.473 (Q/f)^{1/3}$  b)  $0.573 (Q/f)^{1/3}$  c)  $0.673 (Q/f)^{1/3}$  d)  $0.773 (Q/f)^{1/3}$
- 13) What is the angular frequency of machine foundation having a base area  $2\text{ m} \times 2\text{ m}$  and mass 15000 kg (including mass of Machine),  $C_u = 4 \times 10^4\text{ kN/m}^3$  ? **1**  
a) 101.25 b) 103.28 c) 106.15 d) 108.22
- 14) When the frequency of the exciting force in a forced vibration of a body or a system equals one of the natural frequencies of the body or system, the amplitude of motion tends to become excessively large. This condition or phenomenon is called **1**  
a) Resonance b) Damping  
c) Negative damping d) Free Vibration
-





Seat No.	
----------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I**  
**DESIGN OF FOUNDATIONS**

Day and Date : Friday, 8-12-2017  
 Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) Figures to the **right** indicate **full** marks.  
 2) Answer **any three** questions in **each** Section I and Section II.  
 3) Assume additional data **if required** and mention it **clearly**.

SECTION – I

2. A) Discuss the depth of explorations necessary for various types of foundations. **3**  
 B) Explain Geophysical Exploration with neat sketches. **6**
3. A) A purely cohesive soil has a unit weight of  $20 \text{ kN/m}^3$  and cohesion of  $150 \text{ kN/m}^2$ . Determine the safe bearing capacity for a rectangular footing  $8 \text{ m} \times 2 \text{ m}$  founded at a depth of  $4 \text{ m}$  in clay. Use FOS 3 and adopt Terzaghi's bearing capacity analysis. **4**  
 B) Write short notes on Hansen's bearing capacity theory. **5**
4. A) What are the different types of Raft foundations ? Explain with neat sketches. **4**  
 B) As per IS code rigid method analysis, analyze and find the maximum stresses at the corners of the Raft foundation shown below in fig. 1. All columns are in square shape of size  $400 \times 400 \text{ mm}$ . **6**

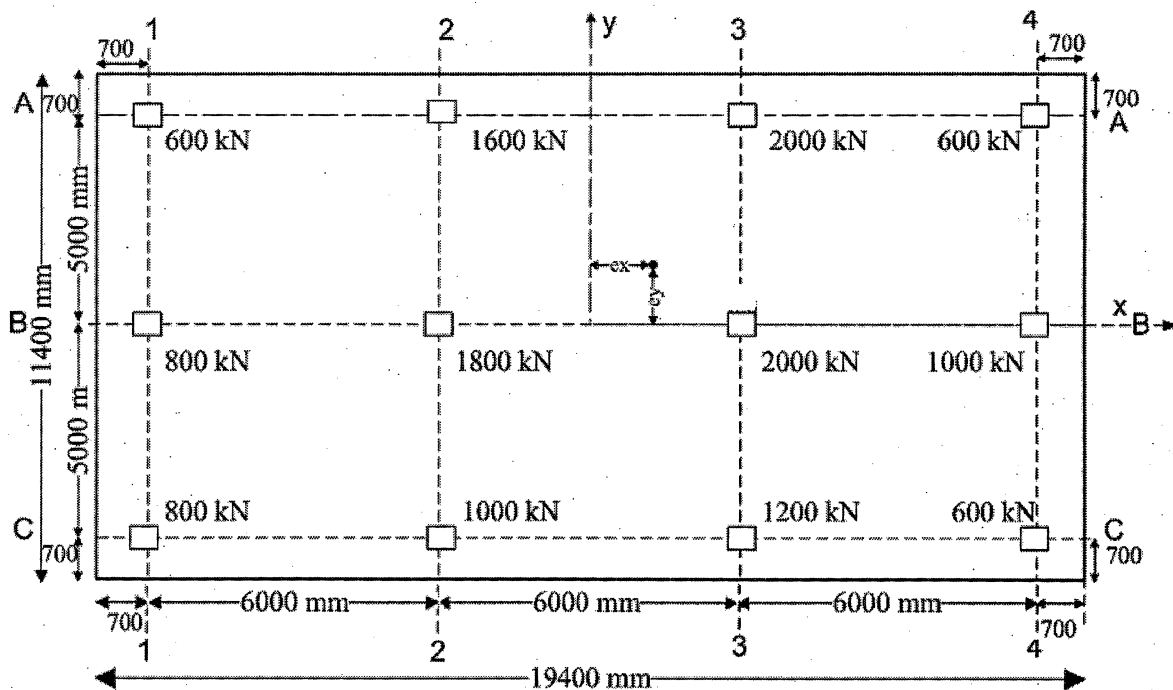


Fig. 1

Set P



5. A) Discuss the characteristics of Black Cotton Soil. 3  
 B) Explain in detail, any two foundations used in Black Cotton Soil. 6

## SECTION – II

6. A) Classify and explain pile foundations based on its functions. 3  
 B) Find the allowable bearing capacity of the pile group given below in fig. 2, by using : (Diameter : 0.4 m,  $C_u = 50$  kPa, unit weight of soil =  $18 \text{ kN/m}^3$  and use F.S. = 2.5)  
 Also find the efficiency of pile group by Converse-Labarre Formula. 6

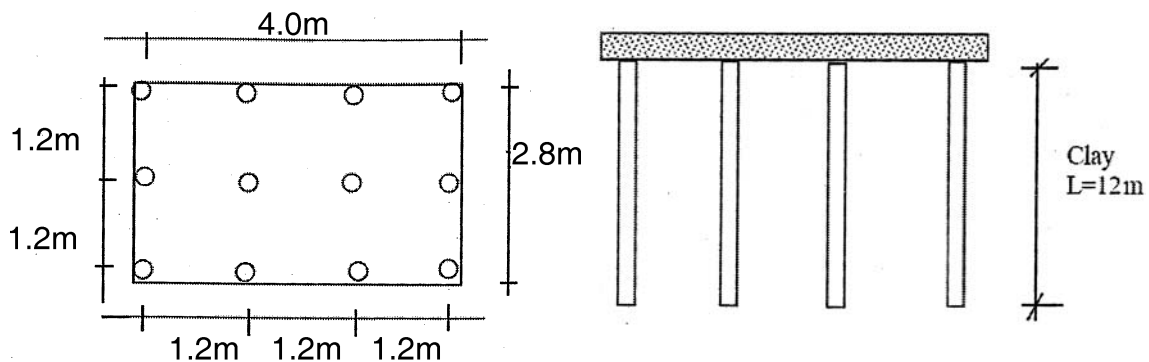


Fig. 2

7. Explain different methods of underpinning with neat sketches. 9
8. A) Explain Pneumatic caisson with neat sketch. 4  
 B) What are the various components of well foundation ? Explain the design of individual component of the Well Foundation. 6
9. A) Discuss criteria for satisfactory performance of Machine foundation. 4  
 B) In a test block of the size  $1.5 \text{ m} \times 1.0 \text{ m} \times 0.75 \text{ m}$ , resonance occurs at a frequency of 20 cps in the vertical vibration. Determine the co-efficient of elastic uniform compression ( $C_u$ ) if the mass of oscillator is 70 kg and force produced by it at 15 cps is 1000 N. Compute the maximum amplitude at 15 cps. (cps – cycles per second). 5



SLR-TJ – 59

Seat No.	
----------	--

Set **Q**

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I**  
**DESIGN OF FOUNDATIONS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Answer **any three** questions in **each** Section I and Section II.
  - 5) Assume additional data **if required** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(14×1=14)**
- 1) 4 piles arranged in square form, what is the efficiency of pile group based on Feld's rule ? **1**  
a) 71.25%                      b) 81.25%                      c) 91.25%                      d) 100%
  - 2) Due to negative skin friction, the load carrying capacity of piles **1**  
a) Increases    b) Decreases  
c) Remains same    d) Increase double
  - 3) A well foundation is a type of **1**  
a) Open caisson    b) Pneumatic caisson  
c) Floating caisson    d) Drilled Pier
  - 4) In case of well foundation, grip length is defined as the **1**  
a) Length below the top of well cap to the cutting edge  
b) Length between bottom of the well cap to the cutting edge  
c) Length between minimum scour level and bottom of the well  
d) Length between maximum scour level and bottom of the well
  - 5) The scour depth as per Lacey's formulae is given by **1**  
a)  $0.473 (Q/f)^{1/3}$     b)  $0.573 (Q/f)^{1/3}$   
c)  $0.673 (Q/f)^{1/3}$     d)  $0.773 (Q/f)^{1/3}$

P.T.O.



- 6) What is the angular frequency of machine foundation having a base area  $2\text{ m} \times 2\text{ m}$  and mass  $15000\text{ kg}$  (including mass of Machine),  $C_u = 4 \times 10^4\text{ kN/m}^3$  ? 1
- a) 101.25                      b) 103.28                      c) 106.15                      d) 108.22
- 7) When the frequency of the exciting force in a forced vibration of a body or a system equals one of the natural frequencies of the body or system, the amplitude of motion tends to become excessively large. This condition or phenomenon is called 1
- a) Resonance                                      b) Damping  
c) Negative damping                              d) Free Vibration
- 8) The standard penetration test is useful to measure 1
- a) Shear strength of soft clays                      b) Shear strength of sands  
c) Consistency of clays                              d) None of the above
- 9) The seismic refraction method cannot be used if the wave velocity in the lower layer is \_\_\_\_\_ that in the upper layer. 1
- a) Greater than                                      b) Less than  
c) More than 4 times                              d) Less than 4 times
- 10) The bearing capacity of soil supporting a footing of size  $2\text{ m} \times 2\text{ m}$  will not be affected by the presence of water table located at a depth \_\_\_\_\_ below base of footing. 1
- a) 0.5 m                      b) 1.0 m                      c) 1.5 m                      d) 2.0 m
- 11) Gross and net bearing capacities will be the same when the structure is founded at 1
- a) Ground Level                                      b) At a depth 2 m below GL  
c) At a depth 4 m below GL                              d) It is not possible
- 12) In case of sandy soil \_\_\_\_\_ settlement is predominant. 1
- a) Immediate settlement                              b) Consolidation settlement  
c) Secondary consolidation settlement                              d) Both b) and c)
- 13) When the area of all the footings covers more than 50% of the area of the structure, which foundation is considered more suitable ? 1
- a) Raft                                      b) Pile  
c) Caisson                                      d) Well Foundation
- 14) Angle of internal friction is least for 1
- a) Angular grained loose sand                              b) Angular grained dense sand  
c) Round grained loose sand                              d) Clays
-



Seat No.	
----------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I**  
**DESIGN OF FOUNDATIONS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) Figures to the **right** indicate **full** marks.  
2) Answer **any three** questions in **each** Section I and Section II.  
3) Assume additional data **if required** and mention it **clearly**.

SECTION – I

- 2. A) Discuss the depth of explorations necessary for various types of foundations. **3**
- B) Explain Geophysical Exploration with neat sketches. **6**
- 3. A) A purely cohesive soil has a unit weight of  $20 \text{ kN/m}^3$  and cohesion of  $150 \text{ kN/m}^2$ . Determine the safe bearing capacity for a rectangular footing  $8 \text{ m} \times 2 \text{ m}$  founded at a depth of  $4 \text{ m}$  in clay. Use FOS 3 and adopt Terzaghi's bearing capacity analysis. **4**
- B) Write short notes on Hansen's bearing capacity theory. **5**
- 4. A) What are the different types of Raft foundations ? Explain with neat sketches. **4**
- B) As per IS code rigid method analysis, analyze and find the maximum stresses at the corners of the Raft foundation shown below in fig. 1. All columns are in square shape of size  $400 \times 400 \text{ mm}$ . **6**

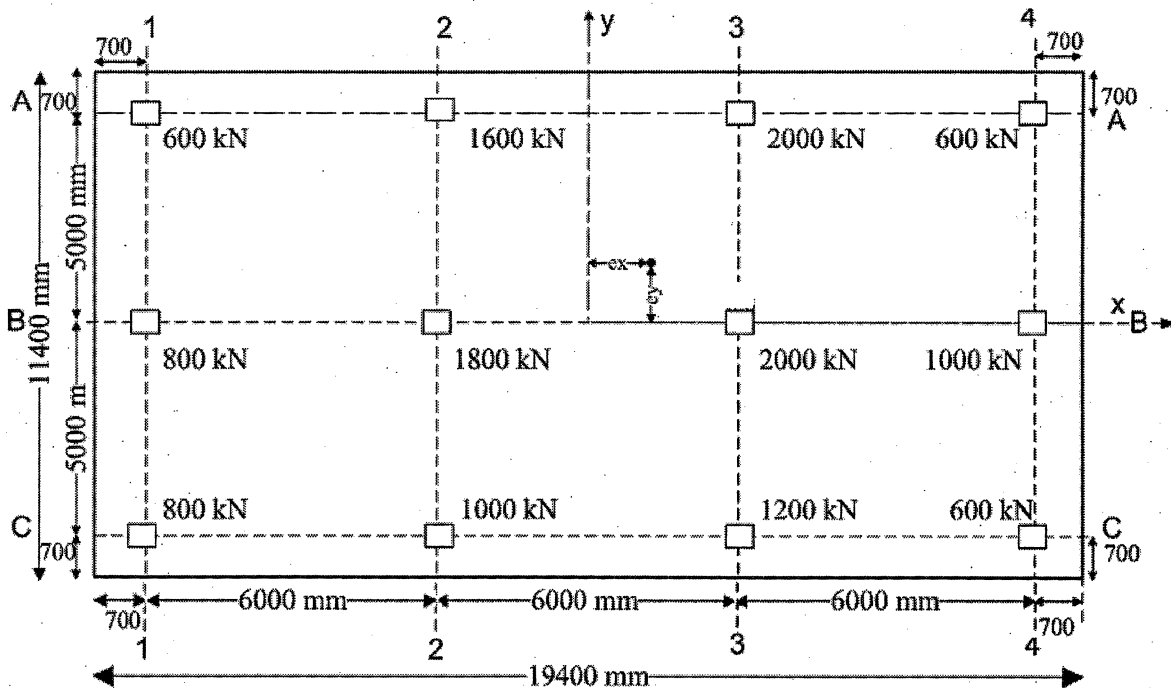


Fig. 1

Set Q



5. A) Discuss the characteristics of Black Cotton Soil. 3  
 B) Explain in detail, any two foundations used in Black Cotton Soil. 6

## SECTION – II

6. A) Classify and explain pile foundations based on its functions. 3  
 B) Find the allowable bearing capacity of the pile group given below in fig. 2, by using : (Diameter : 0.4 m,  $C_u = 50$  kPa, unit weight of soil =  $18 \text{ kN/m}^3$  and use F.S. = 2.5)  
 Also find the efficiency of pile group by Converse-Labarre Formula. 6

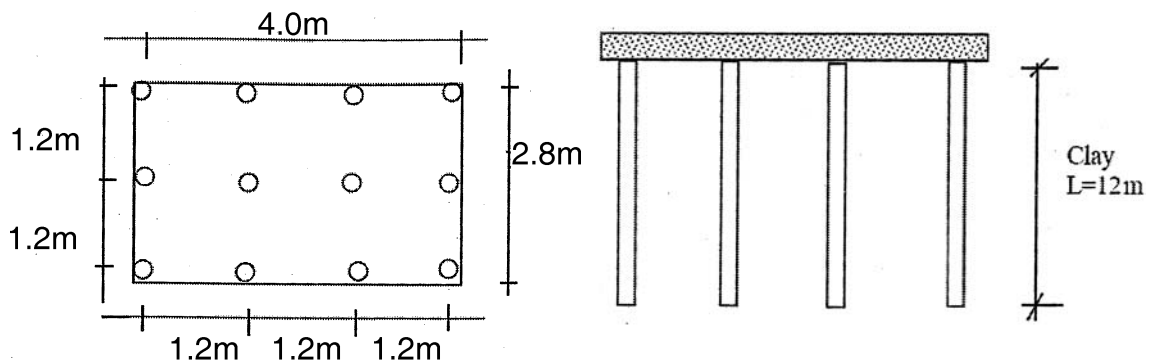


Fig. 2

7. Explain different methods of underpinning with neat sketches. 9
8. A) Explain Pneumatic caisson with neat sketch. 4  
 B) What are the various components of well foundation ? Explain the design of individual component of the Well Foundation. 6
9. A) Discuss criteria for satisfactory performance of Machine foundation. 4  
 B) In a test block of the size  $1.5 \text{ m} \times 1.0 \text{ m} \times 0.75 \text{ m}$ , resonance occurs at a frequency of 20 cps in the vertical vibration. Determine the co-efficient of elastic uniform compression ( $C_u$ ) if the mass of oscillator is 70 kg and force produced by it at 15 cps is 1000 N. Compute the maximum amplitude at 15 cps. (cps – cycles per second). 5



SLR-TJ – 59

Seat No.	
----------	--

Set **R**

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I**  
**DESIGN OF FOUNDATIONS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Figures to the **right** indicate **full** marks.
  - 4) Answer **any three** questions in **each** Section I and Section II.
  - 5) Assume additional data **if required** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(14×1=14)**
- 1) In case of sandy soil \_\_\_\_\_ settlement is predominant. **1**  
a) Immediate settlement                      b) Consolidation settlement  
c) Secondary consolidation settlement      d) Both b) and c)
  - 2) When the area of all the footings covers more than 50% of the area of the structure, which foundation is considered more suitable ? **1**  
a) Raft    b) Pile  
c) Caisson    d) Well Foundation
  - 3) Angle of internal friction is least for **1**  
a) Angular grained loose sand                  b) Angular grained dense sand  
c) Round grained loose sand                    d) Clays
  - 4) 4 piles arranged in square form, what is the efficiency of pile group based on Feld's rule ? **1**  
a) 71.25%                      b) 81.25%                      c) 91.25%                      d) 100%
  - 5) Due to negative skin friction, the load carrying capacity of piles **1**  
a) Increases    b) Decreases  
c) Remains same                                        d) Increase double

P.T.O.



- 6) A well foundation is a type of 1  
a) Open caisson b) Pneumatic caisson  
c) Floating caisson d) Drilled Pier
- 7) In case of well foundation, grip length is defined as the 1  
a) Length below the top of well cap to the cutting edge  
b) Length between bottom of the well cap to the cutting edge  
c) Length between minimum scour level and bottom of the well  
d) Length between maximum scour level and bottom of the well
- 8) The scour depth as per Lacey's formulae is given by 1  
a)  $0.473 (Q/f)^{1/3}$  b)  $0.573 (Q/f)^{1/3}$  c)  $0.673 (Q/f)^{1/3}$  d)  $0.773 (Q/f)^{1/3}$
- 9) What is the angular frequency of machine foundation having a base area  $2\text{ m} \times 2\text{ m}$  and mass  $15000\text{ kg}$  (including mass of Machine),  $C_u = 4 \times 10^4\text{ kN/m}^3$ ? 1  
a) 101.25 b) 103.28 c) 106.15 d) 108.22
- 10) When the frequency of the exciting force in a forced vibration of a body or a system equals one of the natural frequencies of the body or system, the amplitude of motion tends to become excessively large. This condition or phenomenon is called 1  
a) Resonance b) Damping  
c) Negative damping d) Free Vibration
- 11) The standard penetration test is useful to measure 1  
a) Shear strength of soft clays b) Shear strength of sands  
c) Consistency of clays d) None of the above
- 12) The seismic refraction method cannot be used if the wave velocity in the lower layer is \_\_\_\_\_ that in the upper layer. 1  
a) Greater than b) Less than  
c) More than 4 times d) Less than 4 times
- 13) The bearing capacity of soil supporting a footing of size  $2\text{ m} \times 2\text{ m}$  will not be affected by the presence of water table located at a depth \_\_\_\_\_ below base of footing. 1  
a) 0.5 m b) 1.0 m c) 1.5 m d) 2.0 m
- 14) Gross and net bearing capacities will be the same when the structure is founded at 1  
a) Ground Level b) At a depth 2 m below GL  
c) At a depth 4 m below GL d) It is not possible





Seat No.	
----------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I  
DESIGN OF FOUNDATIONS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) Figures to the **right** indicate **full** marks.  
2) Answer **any three** questions in **each** Section I and Section II.  
3) Assume additional data **if required** and mention it **clearly**.

SECTION – I

2. A) Discuss the depth of explorations necessary for various types of foundations. **3**  
B) Explain Geophysical Exploration with neat sketches. **6**
3. A) A purely cohesive soil has a unit weight of  $20 \text{ kN/m}^3$  and cohesion of  $150 \text{ kN/m}^2$ . Determine the safe bearing capacity for a rectangular footing  $8 \text{ m} \times 2 \text{ m}$  founded at a depth of  $4 \text{ m}$  in clay. Use FOS 3 and adopt Terzaghi's bearing capacity analysis. **4**  
B) Write short notes on Hansen's bearing capacity theory. **5**
4. A) What are the different types of Raft foundations ? Explain with neat sketches. **4**  
B) As per IS code rigid method analysis, analyze and find the maximum stresses at the corners of the Raft foundation shown below in fig. 1. All columns are in square shape of size  $400 \times 400 \text{ mm}$ . **6**

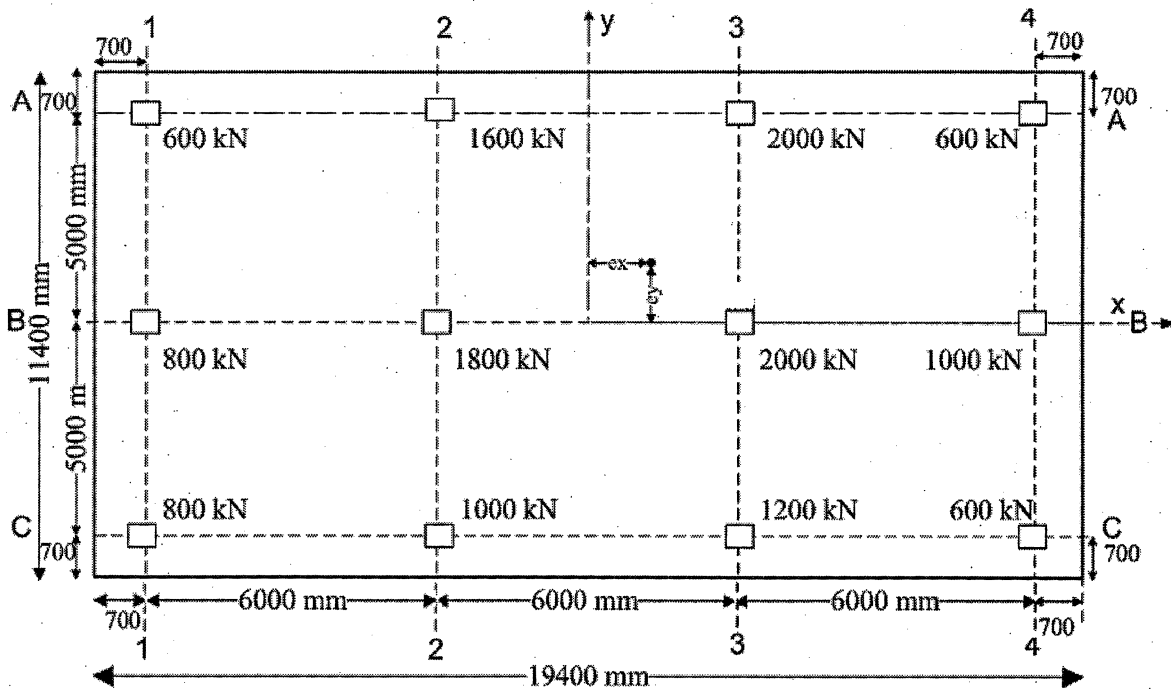


Fig. 1

Set R



5. A) Discuss the characteristics of Black Cotton Soil. 3  
 B) Explain in detail, any two foundations used in Black Cotton Soil. 6

## SECTION – II

6. A) Classify and explain pile foundations based on its functions. 3  
 B) Find the allowable bearing capacity of the pile group given below in fig. 2, by using : (Diameter : 0.4 m,  $C_u = 50$  kPa, unit weight of soil =  $18 \text{ kN/m}^3$  and use F.S. = 2.5)  
 Also find the efficiency of pile group by Converse-Labarre Formula. 6

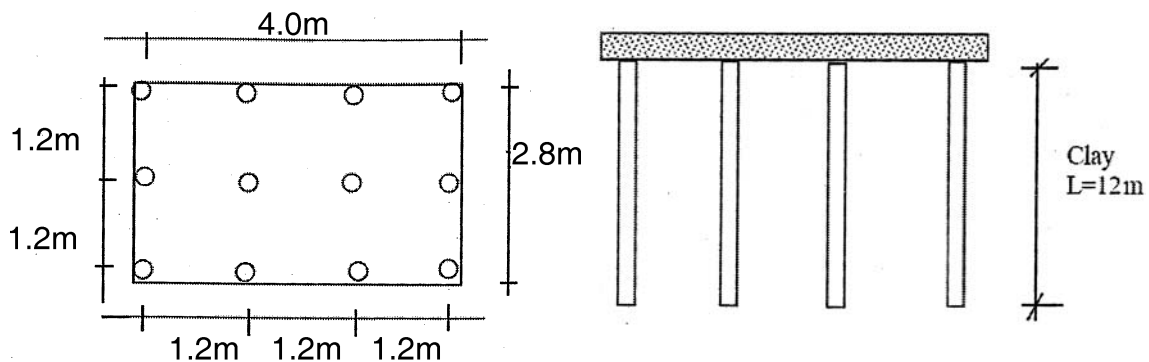


Fig. 2

7. Explain different methods of underpinning with neat sketches. 9
8. A) Explain Pneumatic caisson with neat sketch. 4  
 B) What are the various components of well foundation ? Explain the design of individual component of the Well Foundation. 6
9. A) Discuss criteria for satisfactory performance of Machine foundation. 4  
 B) In a test block of the size  $1.5 \text{ m} \times 1.0 \text{ m} \times 0.75 \text{ m}$ , resonance occurs at a frequency of 20 cps in the vertical vibration. Determine the co-efficient of elastic uniform compression ( $C_u$ ) if the mass of oscillator is 70 kg and force produced by it at 15 cps is 1000 N. Compute the maximum amplitude at 15 cps. (cps – cycles per second). 5



SLR-TJ – 59

Seat No.	
----------	--

Set **S**

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I**  
**DESIGN OF FOUNDATIONS**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Figures to the **right** indicate **full** marks.  
4) Answer **any three** questions in **each** Section I and Section II.  
5) Assume additional data **if required** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

(14×1=14)

- 1) A well foundation is a type of 1  
a) Open caisson b) Pneumatic caisson  
c) Floating caisson d) Drilled Pier
- 2) In case of well foundation, grip length is defined as the 1  
a) Length below the top of well cap to the cutting edge  
b) Length between bottom of the well cap to the cutting edge  
c) Length between minimum scour level and bottom of the well  
d) Length between maximum scour level and bottom of the well
- 3) The scour depth as per Lacey's formulae is given by 1  
a)  $0.473 (Q/f)^{1/3}$  b)  $0.573 (Q/f)^{1/3}$  c)  $0.673 (Q/f)^{1/3}$  d)  $0.773 (Q/f)^{1/3}$
- 4) What is the angular frequency of machine foundation having a base area  $2\text{ m} \times 2\text{ m}$  and mass 15000 kg (including mass of Machine),  $C_u = 4 \times 10^4 \text{ kN/m}^3$ ? 1  
a) 101.25 b) 103.28 c) 106.15 d) 108.22
- 5) When the frequency of the exciting force in a forced vibration of a body or a system equals one of the natural frequencies of the body or system, the amplitude of motion tends to become excessively large. This condition or phenomenon is called 1  
a) Resonance b) Damping  
c) Negative damping d) Free Vibration

P.T.O.



- 6) The standard penetration test is useful to measure 1  
a) Shear strength of soft clays                      b) Shear strength of sands  
c) Consistency of clays                                      d) None of the above
- 7) The seismic refraction method cannot be used if the wave velocity in the lower layer is \_\_\_\_\_ that in the upper layer. 1  
a) Greater than    b) Less than  
c) More than 4 times    d) Less than 4 times
- 8) The bearing capacity of soil supporting a footing of size 2m × 2m will not be affected by the presence of water table located at a depth \_\_\_\_\_ below base of footing. 1  
a) 0.5 m                      b) 1.0 m                      c) 1.5 m                      d) 2.0 m
- 9) Gross and net bearing capacities will be the same when the structure is founded at 1  
a) Ground Level    b) At a depth 2 m below GL  
c) At a depth 4 m below GL    d) It is not possible
- 10) In case of sandy soil \_\_\_\_\_ settlement is predominant. 1  
a) Immediate settlement    b) Consolidation settlement  
c) Secondary consolidation settlement    d) Both b) and c)
- 11) When the area of all the footings covers more than 50% of the area of the structure, which foundation is considered more suitable ? 1  
a) Raft    b) Pile  
c) Caisson    d) Well Foundation
- 12) Angle of internal friction is least for 1  
a) Angular grained loose sand    b) Angular grained dense sand  
c) Round grained loose sand    d) Clays
- 13) 4 piles arranged in square form, what is the efficiency of pile group based on Feld's rule ? 1  
a) 71.25%                      b) 81.25%                      c) 91.25%                      d) 100%
- 14) Due to negative skin friction, the load carrying capacity of piles 1  
a) Increases    b) Decreases  
c) Remains same    d) Increase double
-



Seat No.	
----------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017**  
**Elective – I**  
**DESIGN OF FOUNDATIONS**

Day and Date : Friday, 8-12-2017  
 Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

- Instructions :** 1) Figures to the **right** indicate **full** marks.  
 2) Answer **any three** questions in **each** Section I and Section II.  
 3) Assume additional data **if required** and mention it **clearly**.

SECTION – I

2. A) Discuss the depth of explorations necessary for various types of foundations. **3**  
 B) Explain Geophysical Exploration with neat sketches. **6**
3. A) A purely cohesive soil has a unit weight of  $20 \text{ kN/m}^3$  and cohesion of  $150 \text{ kN/m}^2$ . Determine the safe bearing capacity for a rectangular footing  $8 \text{ m} \times 2 \text{ m}$  founded at a depth of  $4 \text{ m}$  in clay. Use FOS 3 and adopt Terzaghi's bearing capacity analysis. **4**  
 B) Write short notes on Hansen's bearing capacity theory. **5**
4. A) What are the different types of Raft foundations ? Explain with neat sketches. **4**  
 B) As per IS code rigid method analysis, analyze and find the maximum stresses at the corners of the Raft foundation shown below in fig. 1. All columns are in square shape of size  $400 \times 400 \text{ mm}$ . **6**

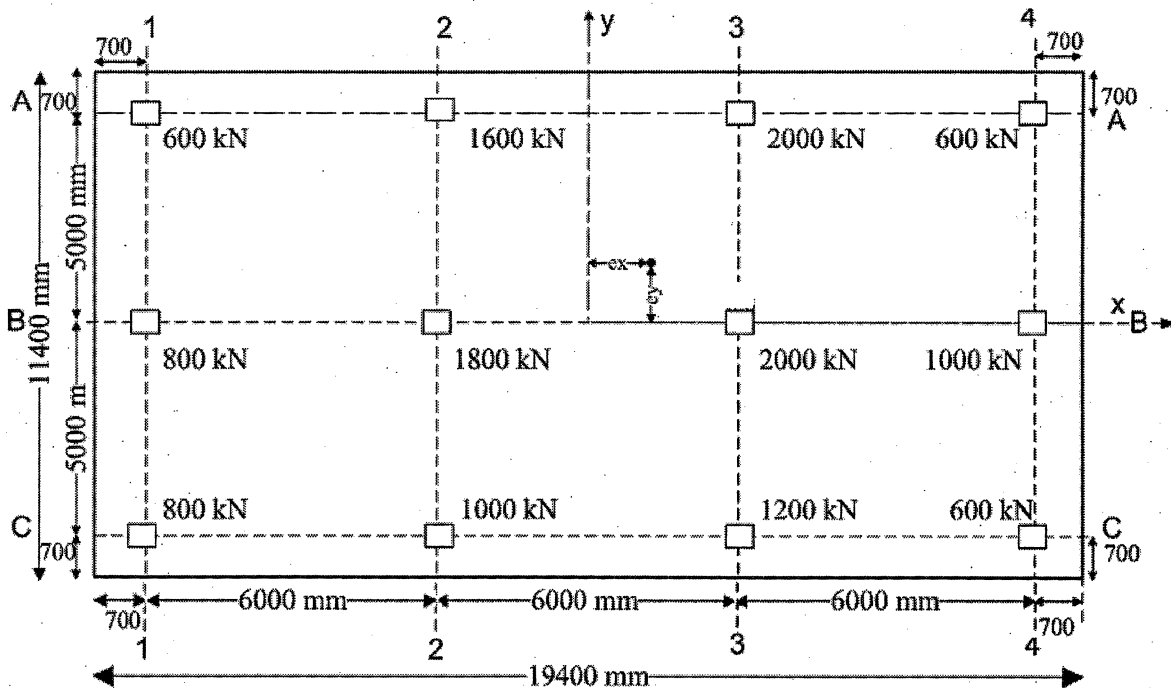


Fig. 1

Set S



5. A) Discuss the characteristics of Black Cotton Soil. 3  
 B) Explain in detail, any two foundations used in Black Cotton Soil. 6

## SECTION – II

6. A) Classify and explain pile foundations based on its functions. 3  
 B) Find the allowable bearing capacity of the pile group given below in fig. 2, by using : (Diameter : 0.4 m,  $C_u = 50$  kPa, unit weight of soil =  $18 \text{ kN/m}^3$  and use F.S. = 2.5)  
 Also find the efficiency of pile group by Converse-Labarre Formula. 6

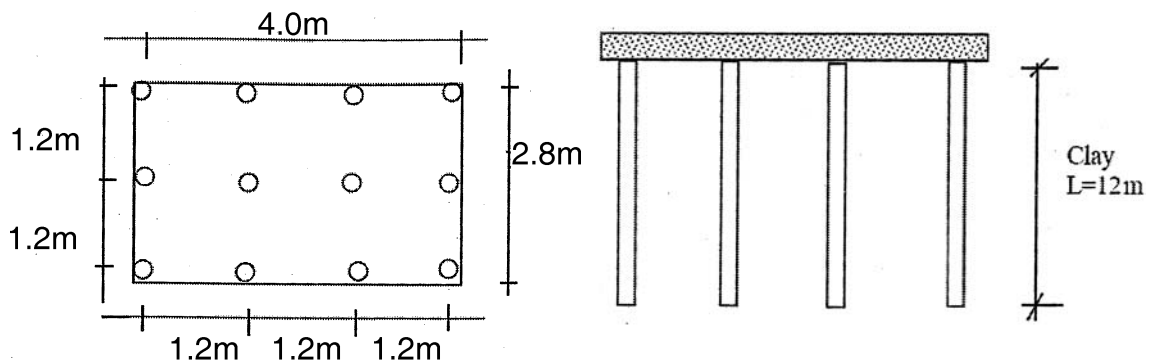


Fig. 2

7. Explain different methods of underpinning with neat sketches. 9
8. A) Explain Pneumatic caisson with neat sketch. 4  
 B) What are the various components of well foundation ? Explain the design of individual component of the Well Foundation. 6
9. A) Discuss criteria for satisfactory performance of Machine foundation. 4  
 B) In a test block of the size  $1.5 \text{ m} \times 1.0 \text{ m} \times 0.75 \text{ m}$ , resonance occurs at a frequency of 20 cps in the vertical vibration. Determine the co-efficient of elastic uniform compression ( $C_u$ ) if the mass of oscillator is 70 kg and force produced by it at 15 cps is 1000 N. Compute the maximum amplitude at 15 cps. (cps – cycles per second). 5



SLR-TJ – 60

Seat No.	
----------	--

Set 

P
---

**B.E. (Civil) (Part – I) Examination, 2017  
(New-CGPA)**

**ADVANCED DESIGN OF CONCRETE STRUCTURES (Elective – I)**

Day and Date : Friday, 8-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) **Use of IS 456 and IS 3370 is allowed.**  
4) Assume suitable data **if** necessary.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(14×1=14)**

- 1) In case of water tanks the permissible shear stress for M 20 grade concrete is \_\_\_\_\_ N/mm<sup>2</sup>.  
a) 1                      b) 1.67                      c) 1.25                      d) 1.7
- 2) Thickened part of a flat slab over its supporting column, is technically known as  
a) Drop panel              b) Capital              c) Column head              d) None of these
- 3) In-situ ribs shall be spaced at centres not greater than \_\_\_\_\_ m apart.  
a) 1.5 m                      b) 1.35 m                      c) 2.5 m                      d) 1.25 m
- 4) The effective width of a column strip of a flat slab is  
a) one-fourth the width of the panel              b) radius/width of the column  
c) half the width of the panel                      d) none of these
- 5) At an interior support, the column strip shall be designed to resist \_\_\_\_\_ % of the total negative moment in the panel at that support.  
a) 65                      b) 35                      c) 25                      d) 75

P.T.O.



- 6) The minimum longitudinal reinforcement in pile should not be less than \_\_\_\_\_ % of c/s area of pile for piles having length 30 to 40 times their least lateral dimension.
- a) 1                      b) 2.5                      c) 1.25                      d) 1.5
- 7) The minimum spacing of piles shall be \_\_\_\_\_ to \_\_\_\_\_ times diameter of the pile.
- a) 2 to 3                      b) 2.5 to 3                      c) 1.5 to 2                      d) 1 to 1.5
- 8) The floor of the underground water tanks is designed for \_\_\_\_\_ pressure, for the empty tank condition.
- a) Uplift                      b) Water                      c) Earth                      d) All of these
- 9) The minimum reinforcement in walls, floors and roofs in each of two directions at right angles shall have an area of \_\_\_\_\_ % of the concrete section in that direction for sections of thickness greater than 450 mm.
- a) 0.2                      b) 0.3                      c) 0.5                      d) 0.1
- 10) For design of water tanks the permissible Tensile stress in members under direct tension for Plain Round Mild Steel bars is \_\_\_\_\_ N/mm<sup>2</sup>.
- a) 115                      b) 125                      c) 175                      d) 150
- 11) For design of water tanks the permissible stress in bending tension in HYSD bars is for is \_\_\_\_\_ N/mm<sup>2</sup> for thickness less than 225 mm.
- a) 115                      b) 140                      c) 150                      d) 230
- 12) In case of water tanks the permissible shear stress for M 30 grade concrete is \_\_\_\_\_ N/mm<sup>2</sup>.
- a) 1                      b) 2.2                      c) 1.2                      d) 1.7
- 13) The rectangular combined footing is required in following situations.
- a) If loaded footing of columns overlap  
b) Columns may be near to property line  
c) S.B.C. of soil being less  
d) All a, b and c
- 14) A raft foundation is provided if its area exceeds the plan area of the building by \_\_\_\_\_
- a) 10%                      b) 35%                      c) 40%                      d) 50%





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) Examination, 2017  
(New-CGPA)**

**ADVANCED DESIGN OF CONCRETE STRUCTURES (Elective – I)**

Day and Date : Friday, 8-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions:** 1) Answer **any two** questions from **each** Section.  
2) **Use of IS 456 and IS 3370 is allowed.**  
3) Assume suitable data **if** necessary.

SECTION – I

2. Design interior panel of flat slab 4.5 m × 4.5 m in size for super imposed load of 6 kN/m<sup>2</sup>, column size 500 mm × 500 mm. Provide with drop. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**
3. Design a reinforced concrete combined rectangular footing for two columns A and B located 4.5 m apart. The sizes of columns are 400 mm × 400 mm and 500 mm × 500 mm and the loads on them are 1000 kN and 1600 kN respectively. The projection of the footing beyond the axis of column A is limited to 0.75 m. The safe bearing capacity of the soil is 275 kN/m<sup>2</sup>. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**
4. An R.C. column of 450 mm × 450 mm carrying a load of 750 kN is supported on three piles 450 mm × 450 mm in section. The centre to centre distance between the piles is 1.5 m. Design a suitable pile cap. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**

SECTION – II

5. Design a circular tank resting on firm ground to the following requirements.
- i) Capacity of tank = 6 lakh lit.
  - ii) Depth of water = 3.75 m including a free board of 250 mm.
  - iii) The wall and base slab are not monolithic with each other.
  - iv) Specific weight of water = 9810N/m<sup>3</sup>. Use M-20 concrete and Fe 415 steel. Take  $m = 13.33$ , use approximate method. Draw reinforcement details. **14**

**Set P**



6. A rectangular water tank 4.5 m long 2.5 m wide 2.5 m high has its walls rigidly jointed at the critical edges. Design the tank, it is supported on all sides under the wall. Use M-25 concrete and Fe 415 steel. Draw reinforcement. details. **14**
7. Design long wall and short wall of underground water tank 4.5 m × 8 m × 3 m deep. The sub soil consists of sand having angle of repose  $30^\circ$  and saturated unit weight  $18 \text{ kN/m}^3$ . The water table is likely to rise up to ground level. Use M-25 concrete and Fe 415 steel. Take unit weight of water as  $9.81 \text{ kN/m}^3$ . **14**
-



SLR-TJ – 60

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) (Part – I) Examination, 2017  
(New-CGPA)**

**ADVANCED DESIGN OF CONCRETE STRUCTURES (Elective – I)**

Day and Date : Friday, 8-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) **Use of IS 456 and IS 3370 is allowed.**  
4) Assume suitable data **if** necessary.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(14×1=14)**

- 1) The floor of the underground water tanks is designed for \_\_\_\_\_ pressure, for the empty tank condition.  
a) Uplift                      b) Water                      c) Earth                      d) All of these
- 2) The minimum reinforcement in walls, floors and roofs in each of two directions at right angles shall have an area of \_\_\_\_\_ % of the concrete section in that direction for sections of thickness greater than 450 mm.  
a) 0.2                      b) 0.3                      c) 0.5                      d) 0.1
- 3) For design of water tanks the permissible Tensile stress in members under direct tension for Plain Round Mild Steel bars is \_\_\_\_\_ N/mm<sup>2</sup>.  
a) 115                      b) 125                      c) 175                      d) 150
- 4) For design of water tanks the permissible stress in bending tension in HYSD bars is for is \_\_\_\_\_ N/mm<sup>2</sup> for thickness less than 225 mm.  
a) 115                      b) 140                      c) 150                      d) 230
- 5) In case of water tanks the permissible shear stress for M 30 grade concrete is \_\_\_\_\_ N/mm<sup>2</sup>.  
a) 1                      b) 2.2                      c) 1.2                      d) 1.7

P.T.O.



- 6) The rectangular combined footing is required in following situations.
- a) If loaded footing of columns overlap
  - b) Columns may be near to property line
  - c) S.B.C. of soil being less
  - d) All a, b and c
- 7) A raft foundation is provided if its area exceeds the plan area of the building by
- a) 10%
  - b) 35%
  - c) 40%
  - d) 50%
- 8) In case of water tanks the permissible shear stress for M 20 grade concrete is \_\_\_\_\_ N/mm<sup>2</sup>.
- a) 1
  - b) 1.67
  - c) 1.25
  - d) 1.7
- 9) Thickened part of a flat slab over its supporting column, is technically known as
- a) Drop panel
  - b) Capital
  - c) Column head
  - d) None of these
- 10) In-situ ribs shall be spaced at centres not greater than \_\_\_\_\_ m apart.
- a) 1.5 m
  - b) 1.35 m
  - c) 2.5 m
  - d) 1.25 m
- 11) The effective width of a column strip of a flat slab is
- a) one-fourth the width of the panel
  - b) radius/width of the column
  - c) half the width of the panel
  - d) none of these
- 12) At an interior support, the column strip shall be designed to resist \_\_\_\_\_ % of the total negative moment in the panel at that support.
- a) 65
  - b) 35
  - c) 25
  - d) 75
- 13) The minimum longitudinal reinforcement in pile should not be less than \_\_\_\_\_ % of c/s area of pile for piles having length 30 to 40 times their least lateral dimension.
- a) 1
  - b) 2.5
  - c) 1.25
  - d) 1.5
- 14) The minimum spacing of piles shall be \_\_\_\_\_ to \_\_\_\_\_ times diameter of the pile.
- a) 2 to 3
  - b) 2.5 to 3
  - c) 1.5 to 2
  - d) 1 to 1.5
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – I) Examination, 2017  
(New-CGPA)**

**ADVANCED DESIGN OF CONCRETE STRUCTURES (Elective – I)**

Day and Date : Friday, 8-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Answer **any two** questions from **each** Section.  
2) **Use of IS 456 and IS 3370 is allowed.**  
3) Assume suitable data **if** necessary.

SECTION – I

2. Design interior panel of flat slab 4.5 m × 4.5 m in size for super imposed load of 6 kN/m<sup>2</sup>, column size 500 mm × 500 mm. Provide with drop. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**
3. Design a reinforced concrete combined rectangular footing for two columns A and B located 4.5 m apart. The sizes of columns are 400 mm × 400 mm and 500 mm × 500 mm and the loads on them are 1000 kN and 1600 kN respectively. The projection of the footing beyond the axis of column A is limited to 0.75 m. The safe bearing capacity of the soil is 275 kN/m<sup>2</sup>. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**
4. An R.C. column of 450 mm × 450 mm carrying a load of 750 kN is supported on three piles 450 mm × 450 mm in section. The centre to centre distance between the piles is 1.5 m. Design a suitable pile cap. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**

SECTION – II

5. Design a circular tank resting on firm ground to the following requirements.
- i) Capacity of tank = 6 lakh lit.
  - ii) Depth of water = 3.75 m including a free board of 250 mm.
  - iii) The wall and base slab are not monolithic with each other.
  - iv) Specific weight of water = 9810N/m<sup>3</sup>. Use M-20 concrete and Fe 415 steel. Take  $m = 13.33$ , use approximate method. Draw reinforcement details. **14**

**Set Q**



6. A rectangular water tank 4.5 m long 2.5 m wide 2.5 m high has its walls rigidly jointed at the critical edges. Design the tank, it is supported on all sides under the wall. Use M-25 concrete and Fe 415 steel. Draw reinforcement. details. **14**
7. Design long wall and short wall of underground water tank 4.5 m × 8 m × 3 m deep. The sub soil consists of sand having angle of repose  $30^\circ$  and saturated unit weight  $18 \text{ kN/m}^3$ . The water table is likely to rise up to ground level. Use M-25 concrete and Fe 415 steel. Take unit weight of water as  $9.81 \text{ kN/m}^3$ . **14**
-



SLR-TJ – 60

Seat No.	
----------	--

Set 

R
---

**B.E. (Civil) (Part – I) Examination, 2017  
(New-CGPA)**

**ADVANCED DESIGN OF CONCRETE STRUCTURES (Elective – I)**

Day and Date : Friday, 8-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) **Use of IS 456 and IS 3370 is allowed.**  
4) Assume suitable data **if** necessary.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : **(14×1=14)**

- 1) At an interior support, the column strip shall be designed to resist \_\_\_\_\_ % of the total negative moment in the panel at that support.  
a) 65                      b) 35                      c) 25                      d) 75
- 2) The minimum longitudinal reinforcement in pile should not be less than \_\_\_\_\_ % of c/s area of pile for piles having length 30 to 40 times their least lateral dimension.  
a) 1                      b) 2.5                      c) 1.25                      d) 1.5
- 3) The minimum spacing of piles shall be \_\_\_\_\_ to \_\_\_\_\_ times diameter of the pile.  
a) 2 to 3                      b) 2.5 to 3                      c) 1.5 to 2                      d) 1 to 1.5
- 4) The floor of the underground water tanks is designed for \_\_\_\_\_ pressure, for the empty tank condition.  
a) Uplift                      b) Water                      c) Earth                      d) All of these
- 5) The minimum reinforcement in walls, floors and roofs in each of two directions at right angles shall have an area of \_\_\_\_\_ % of the concrete section in that direction for sections of thickness greater than 450 mm.  
a) 0.2                      b) 0.3                      c) 0.5                      d) 0.1

P.T.O.



- 6) For design of water tanks the permissible Tensile stress in members under direct tension for Plain Round Mild Steel bars is \_\_\_\_\_ N/mm<sup>2</sup>.  
a) 115                      b) 125                      c) 175                      d) 150
- 7) For design of water tanks the permissible stress in bending tension in HYSD bars is for is \_\_\_\_\_ N/mm<sup>2</sup> for thickness less than 225 mm.  
a) 115                      b) 140                      c) 150                      d) 230
- 8) In case of water tanks the permissible shear stress for M 30 grade concrete is \_\_\_\_\_ N/mm<sup>2</sup>.  
a) 1                      b) 2.2                      c) 1.2                      d) 1.7
- 9) The rectangular combined footing is required in following situations.  
a) If loaded footing of columns overlap  
b) Columns may be near to property line  
c) S.B.C. of soil being less  
d) All a, b and c
- 10) A raft foundation is provided if its area exceeds the plan area of the building by  
a) 10%                      b) 35%                      c) 40%                      d) 50%
- 11) In case of water tanks the permissible shear stress for M 20 grade concrete is \_\_\_\_\_ N/mm<sup>2</sup>.  
a) 1                      b) 1.67                      c) 1.25                      d) 1.7
- 12) Thickened part of a flat slab over its supporting column, is technically known as  
a) Drop panel              b) Capital                      c) Column head              d) None of these
- 13) In-situ ribs shall be spaced at centres not greater than \_\_\_\_\_ m apart.  
a) 1.5 m                      b) 1.35 m                      c) 2.5 m                      d) 1.25 m
- 14) The effective width of a column strip of a flat slab is  
a) one-fourth the width of the panel      b) radius/width of the column  
c) half the width of the panel                      d) none of these
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) Examination, 2017  
(New-CGPA)**

**ADVANCED DESIGN OF CONCRETE STRUCTURES (Elective – I)**

Day and Date : Friday, 8-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Answer **any two** questions from **each** Section.  
2) **Use of IS 456 and IS 3370 is allowed.**  
3) Assume suitable data **if** necessary.

SECTION – I

2. Design interior panel of flat slab 4.5 m × 4.5 m in size for super imposed load of 6 kN/m<sup>2</sup>, column size 500 mm × 500 mm. Provide with drop. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**
3. Design a reinforced concrete combined rectangular footing for two columns A and B located 4.5 m apart. The sizes of columns are 400 mm × 400 mm and 500 mm × 500 mm and the loads on them are 1000 kN and 1600 kN respectively. The projection of the footing beyond the axis of column A is limited to 0.75 m. The safe bearing capacity of the soil is 275 kN/m<sup>2</sup>. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**
4. An R.C. column of 450 mm × 450 mm carrying a load of 750 kN is supported on three piles 450 mm × 450 mm in section. The centre to centre distance between the piles is 1.5 m. Design a suitable pile cap. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**

SECTION – II

5. Design a circular tank resting on firm ground to the following requirements.
- i) Capacity of tank = 6 lakh lit.
  - ii) Depth of water = 3.75 m including a free board of 250 mm.
  - iii) The wall and base slab are not monolithic with each other.
  - iv) Specific weight of water = 9810N/m<sup>3</sup>. Use M-20 concrete and Fe 415 steel. Take  $m = 13.33$ , use approximate method. Draw reinforcement details. **14**

**Set R**



6. A rectangular water tank 4.5 m long 2.5 m wide 2.5 m high has its walls rigidly jointed at the critical edges. Design the tank, it is supported on all sides under the wall. Use M-25 concrete and Fe 415 steel. Draw reinforcement. details. **14**
7. Design long wall and short wall of underground water tank 4.5 m × 8 m × 3 m deep. The sub soil consists of sand having angle of repose  $30^\circ$  and saturated unit weight  $18 \text{ kN/m}^3$ . The water table is likely to rise up to ground level. Use M-25 concrete and Fe 415 steel. Take unit weight of water as  $9.81 \text{ kN/m}^3$ . **14**
-



SLR-TJ – 60

Seat No.	
----------	--

Set **S**

**B.E. (Civil) (Part – I) Examination, 2017  
(New-CGPA)**

**ADVANCED DESIGN OF CONCRETE STRUCTURES (Elective – I)**

Day and Date : Friday, 8-12-2017

Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) **Use of IS 456 and IS 3370 is allowed.**  
4) Assume suitable data **if** necessary.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer :

**(14×1=14)**

- 1) For design of water tanks the permissible Tensile stress in members under direct tension for Plain Round Mild Steel bars is \_\_\_\_\_ N/mm<sup>2</sup>.  
a) 115                      b) 125                      c) 175                      d) 150
- 2) For design of water tanks the permissible stress in bending tension in HYSD bars is for is \_\_\_\_\_ N/mm<sup>2</sup> for thickness less than 225 mm.  
a) 115                      b) 140                      c) 150                      d) 230
- 3) In case of water tanks the permissible shear stress for M 30 grade concrete is \_\_\_\_\_ N/mm<sup>2</sup>.  
a) 1                          b) 2.2                      c) 1.2                      d) 1.7
- 4) The rectangular combined footing is required in following situations.  
a) If loaded footing of columns overlap  
b) Columns may be near to property line  
c) S.B.C. of soil being less  
d) All a, b and c
- 5) A raft foundation is provided if its area exceeds the plan area of the building by  
a) 10%                      b) 35%                      c) 40%                      d) 50%

P.T.O.



- 6) In case of water tanks the permissible shear stress for M 20 grade concrete is \_\_\_\_\_ N/mm<sup>2</sup>.
- a) 1                      b) 1.67                      c) 1.25                      d) 1.7
- 7) Thickened part of a flat slab over its supporting column, is technically known as
- a) Drop panel              b) Capital              c) Column head              d) None of these
- 8) In-situ ribs shall be spaced at centres not greater than \_\_\_\_\_ m apart.
- a) 1.5 m                      b) 1.35 m                      c) 2.5 m                      d) 1.25 m
- 9) The effective width of a column strip of a flat slab is
- a) one-fourth the width of the panel              b) radius/width of the column
- c) half the width of the panel                      d) none of these
- 10) At an interior support, the column strip shall be designed to resist \_\_\_\_\_ % of the total negative moment in the panel at that support.
- a) 65                      b) 35                      c) 25                      d) 75
- 11) The minimum longitudinal reinforcement in pile should not be less than \_\_\_\_\_ % of c/s area of pile for piles having length 30 to 40 times their least lateral dimension.
- a) 1                      b) 2.5                      c) 1.25                      d) 1.5
- 12) The minimum spacing of piles shall be \_\_\_\_\_ to \_\_\_\_\_ times diameter of the pile.
- a) 2 to 3                      b) 2.5 to 3                      c) 1.5 to 2                      d) 1 to 1.5
- 13) The floor of the underground water tanks is designed for \_\_\_\_\_ pressure, for the empty tank condition.
- a) Uplift                      b) Water                      c) Earth                      d) All of these
- 14) The minimum reinforcement in walls, floors and roofs in each of two directions at right angles shall have an area of \_\_\_\_\_ % of the concrete section in that direction for sections of thickness greater than 450 mm.
- a) 0.2                      b) 0.3                      c) 0.5                      d) 0.1
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – I) Examination, 2017  
(New-CGPA)**

**ADVANCED DESIGN OF CONCRETE STRUCTURES (Elective – I)**

Day and Date : Friday, 8-12-2017

Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Answer **any two** questions from **each** Section.  
2) **Use of IS 456 and IS 3370 is allowed.**  
3) Assume suitable data **if** necessary.

SECTION – I

2. Design interior panel of flat slab 4.5 m × 4.5 m in size for super imposed load of 6 kN/m<sup>2</sup>, column size 500 mm × 500 mm. Provide with drop. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**
3. Design a reinforced concrete combined rectangular footing for two columns A and B located 4.5 m apart. The sizes of columns are 400 mm × 400 mm and 500 mm × 500 mm and the loads on them are 1000 kN and 1600 kN respectively. The projection of the footing beyond the axis of column A is limited to 0.75 m. The safe bearing capacity of the soil is 275 kN/m<sup>2</sup>. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**
4. An R.C. column of 450 mm × 450 mm carrying a load of 750 kN is supported on three piles 450 mm × 450 mm in section. The centre to centre distance between the piles is 1.5 m. Design a suitable pile cap. Use M-20 concrete and Fe 415 steel. Draw reinforcement details. **14**

SECTION – II

5. Design a circular tank resting on firm ground to the following requirements.
- i) Capacity of tank = 6 lakh lit.
  - ii) Depth of water = 3.75 m including a free board of 250 mm.
  - iii) The wall and base slab are not monolithic with each other.
  - iv) Specific weight of water = 9810N/m<sup>3</sup>. Use M-20 concrete and Fe 415 steel. Take  $m = 13.33$ , use approximate method. Draw reinforcement details. **14**

**Set S**



6. A rectangular water tank 4.5 m long 2.5 m wide 2.5 m high has its walls rigidly jointed at the critical edges. Design the tank, it is supported on all sides under the wall. Use M-25 concrete and Fe 415 steel. Draw reinforcement. details. **14**
7. Design long wall and short wall of underground water tank 4.5 m × 8 m × 3 m deep. The sub soil consists of sand having angle of repose  $30^\circ$  and saturated unit weight  $18 \text{ kN/m}^3$ . The water table is likely to rise up to ground level. Use M-25 concrete and Fe 415 steel. Take unit weight of water as  $9.81 \text{ kN/m}^3$ . **14**
-



SLR-TJ – 61

Seat No.	
----------	--

Set	P
-----	---

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I : MANAGERIAL TECHNIQUES**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N. B. :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternative (1 mark each) : **14**
- 1) Work sampling technique is also called as
    - a) Method study
    - b) Ratio sampling
    - c) Activity sampling
    - d) None
  - 2) The benefit of productivity for customers is to reduce
    - a) Higher wages
    - b) Higher standard of living
    - c) Price of material
    - d) None
  - 3) Which of the following factors are considered for selecting a job in method study ?
    - a) Managerial aspect
    - b) Quality development aspect
    - c) Human reactions
    - d) None
  - 4) Outline process chart for operation includes
    - a) Survey and records of overall processes
    - b) All the events
    - c) Activity of the operator
    - d) Activity of LHS and RHS of an operator
  - 5) Standard time = Allowance + \_\_\_\_\_
    - a) Observed time
    - b) Standard work
    - c) Rating time
    - d) Basic time

P.T.O.



- 6) Which of the following is the method of Job Evaluation ?
- a) Employee comparison method
  - b) Checklist method
  - c) Classification method
  - d) None
- 7) Direct incentives are
- a) Paid to group of workers
  - b) Paid to an individual worker
  - c) Direct monetary payment
  - d) Social benefits
- 8) The successful application of work study is related to
- a) Relation between management and workers
  - b) Relation between employer and worker
  - c) Relation between representatives and workers
  - d) All the above
- 9)  $n = pq/bp^2$  where q represents
- a) Percentage of occurrence
  - b) Percentage of working time
  - c) Percentage of normal time
  - d) None
- 10) Juran Trilogy is based on quality planning, quality improvement and
- a) Quality measurement
  - b) Quality control
  - c) Quality system
  - d) Quality cost
- 11) PDCA cycle is developed by
- a) J. M. Juran
  - b) W. Edward Deming
  - c) Kaizen
  - d) None of these
- 12) If the part of the system fails, an alternative success path (back up) provided is called as
- a) Reliability
  - b) Redundancy
  - c) FEMA
  - d) POF
- 13) The symbols used in FTA are grouped as events, gates and \_\_\_\_\_ symbols.
- a) Main
  - b) Exclusive
  - c) Transfer
  - d) None
- 14) Value analysis is applied to
- a) Existing product
  - b) Development stage product
  - c) Specification of product
  - d) All of the above
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I : MANAGERIAL TECHNIQUES**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

***N. B. : All questions are compulsory.***

SECTION – I

2. Attempt **any four (7 marks each)** :
- Enlist steps in method study and discuss in detail any one step with example.
  - Explain in short “Elements of TQM”.
  - How work specification is useful to work study ?
  - Comment on role of trade union in work study.
  - Discuss with example 5S techniques.
  - Write a detail note on job evaluation.
  - Calculate standard time required for constructing one meter cube brick wall having one brick thickness if normal time for 1 m length is 10 min.

SECTION – II

3. Attempt **any four (7 marks each)** :
- What is random sampling ? How it is carried out ?
  - Explain the use of control charts with respect to work sampling.
  - Discuss with example “value analysis as a cost reduction technique”.
  - How creative thinking is useful for value engineering ?
  - Write a note on “Bathtub Curve”.
  - What is redundancy is reliability engineering ?
  - Pilot study shows the percentage of occurrence as 50%. Determine number of observations for 95% confidence level with accuracy of  $\pm 2\%$ .





SLR-TJ – 61

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I : MANAGERIAL TECHNIQUES**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N. B. :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternative (1 mark each) :

14

- 1) The successful application of work study is related to
  - a) Relation between management and workers
  - b) Relation between employer and worker
  - c) Relation between representatives and workers
  - d) All the above
- 2)  $n = pq/bp^2$  where q represents
  - a) Percentage of occurrence
  - b) Percentage of working time
  - c) Percentage of normal time
  - d) None
- 3) Juran Trilogy is based on quality planning, quality improvement and
  - a) Quality measurement
  - b) Quality control
  - c) Quality system
  - d) Quality cost
- 4) PDCA cycle is developed by
  - a) J. M. Juran
  - b) W. Edward Deming
  - c) Kaizen
  - d) None of these
- 5) If the part of the system fails, an alternative success path (back up) provided is called as
  - a) Reliability
  - b) Redundancy
  - c) FEMA
  - d) POF

P.T.O.





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I : MANAGERIAL TECHNIQUES**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

***N. B. : All questions are compulsory.***

SECTION – I

2. Attempt **any four (7 marks each)** :

- Enlist steps in method study and discuss in detail any one step with example.
- Explain in short “Elements of TQM”.
- How work specification is useful to work study ?
- Comment on role of trade union in work study.
- Discuss with example 5S techniques.
- Write a detail note on job evaluation.
- Calculate standard time required for constructing one meter cube brick wall having one brick thickness if normal time for 1 m length is 10 min.

SECTION – II

3. Attempt **any four (7 marks each)** :

- What is random sampling ? How it is carried out ?
- Explain the use of control charts with respect to work sampling.
- Discuss with example “value analysis as a cost reduction technique”.
- How creative thinking is useful for value engineering ?
- Write a note on “Bathtub Curve”.
- What is redundancy is reliability engineering ?
- Pilot study shows the percentage of occurrence as 50%. Determine number of observations for 95% confidence level with accuracy of  $\pm 2\%$ .







- 6) Juran Trilogy is based on quality planning, quality improvement and
- a) Quality measurement
  - b) Quality control
  - c) Quality system
  - d) Quality cost
- 7) PDCA cycle is developed by
- a) J. M. Juran
  - b) W. Edward Deming
  - c) Kaizen
  - d) None of these
- 8) If the part of the system fails, an alternative success path (back up) provided is called as
- a) Reliability
  - b) Redundancy
  - c) FEMA
  - d) POF
- 9) The symbols used in FTA are grouped as events, gates and \_\_\_\_\_ symbols.
- a) Main
  - b) Exclusive
  - c) Transfer
  - d) None
- 10) Value analysis is applied to
- a) Existing product
  - b) Development stage product
  - c) Specification of product
  - d) All of the above
- 11) Work sampling technique is also called as
- a) Method study
  - b) Ratio sampling
  - c) Activity sampling
  - d) None
- 12) The benefit of productivity for customers is to reduce
- a) Higher wages
  - b) Higher standard of living
  - c) Price of material
  - d) None
- 13) Which of the following factors are considered for selecting a job in method study ?
- a) Managerial aspect
  - b) Quality development aspect
  - c) Human reactions
  - d) None
- 14) Outline process chart for operation includes
- a) Survey and records of overall processes
  - b) All the events
  - c) Activity of the operator
  - d) Activity of LHS and RHS of an operator





Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I : MANAGERIAL TECHNIQUES**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

***N. B. : All questions are compulsory.***

SECTION – I

2. Attempt **any four (7 marks each)** :
- Enlist steps in method study and discuss in detail any one step with example.
  - Explain in short “Elements of TQM”.
  - How work specification is useful to work study ?
  - Comment on role of trade union in work study.
  - Discuss with example 5S techniques.
  - Write a detail note on job evaluation.
  - Calculate standard time required for constructing one meter cube brick wall having one brick thickness if normal time for 1 m length is 10 min.

SECTION – II

3. Attempt **any four (7 marks each)** :
- What is random sampling ? How it is carried out ?
  - Explain the use of control charts with respect to work sampling.
  - Discuss with example “value analysis as a cost reduction technique”.
  - How creative thinking is useful for value engineering ?
  - Write a note on “Bathtub Curve”.
  - What is redundancy is reliability engineering ?
  - Pilot study shows the percentage of occurrence as 50%. Determine number of observations for 95% confidence level with accuracy of  $\pm 2\%$ .





SLR-TJ – 61

Seat No.	
----------	--

Set	<b>S</b>
-----	----------

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I : MANAGERIAL TECHNIQUES**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

- N. B. :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 14

1. Choose the correct alternative (1 mark each) : **14**
- 1) Juran Trilogy is based on quality planning, quality improvement and  
a) Quality measurement                      b) Quality control  
c) Quality system                              d) Quality cost
  - 2) PDCA cycle is developed by  
a) J. M. Juran                                      b) W. Edward Deming  
c) Kaizen    d) None of these
  - 3) If the part of the system fails, an alternative success path (back up) provided is called as  
a) Reliability                                      b) Redundancy  
c) FEMA    d) POF
  - 4) The symbols used in FTA are grouped as events, gates and \_\_\_\_\_ symbols.  
a) Main    b) Exclusive  
c) Transfer    d) None
  - 5) Value analysis is applied to  
a) Existing product                              b) Development stage product  
c) Specification of product                      d) All of the above

P.T.O.



- 6) Work sampling technique is also called as
- a) Method study
  - b) Ratio sampling
  - c) Activity sampling
  - d) None
- 7) The benefit of productivity for customers is to reduce
- a) Higher wages
  - b) Higher standard of living
  - c) Price of material
  - d) None
- 8) Which of the following factors are considered for selecting a job in method study ?
- a) Managerial aspect
  - b) Quality development aspect
  - c) Human reactions
  - d) None
- 9) Outline process chart for operation includes
- a) Survey and records of overall processes
  - b) All the events
  - c) Activity of the operator
  - d) Activity of LHS and RHS of an operator
- 10) Standard time = Allowance + \_\_\_\_\_
- a) Observed time
  - b) Standard work
  - c) Rating time
  - d) Basic time
- 11) Which of the following is the method of Job Evaluation ?
- a) Employee comparison method
  - b) Checklist method
  - c) Classification method
  - d) None
- 12) Direct incentives are
- a) Paid to group of workers
  - b) Paid to an individual worker
  - c) Direct monetary payment
  - d) Social benefits
- 13) The successful application of work study is related to
- a) Relation between management and workers
  - b) Relation between employer and worker
  - c) Relation between representatives and workers
  - d) All the above
- 14)  $n = pq/bp^2$  where q represents
- a) Percentage of occurrence
  - b) Percentage of working time
  - c) Percentage of normal time
  - d) None
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – I) (New CGPA) Examination, 2017  
Elective – I : MANAGERIAL TECHNIQUES**

Day and Date : Friday, 8-12-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 56

***N. B. : All questions are compulsory.***

SECTION – I

2. Attempt **any four (7 marks each)** :

- a) Enlist steps in method study and discuss in detail any one step with example.
- b) Explain in short “Elements of TQM”.
- c) How work specification is useful to work study ?
- d) Comment on role of trade union in work study.
- e) Discuss with example 5S techniques.
- f) Write a detail note on job evaluation.
- g) Calculate standard time required for constructing one meter cube brick wall having one brick thickness if normal time for 1 m length is 10 min.

SECTION – II

3. Attempt **any four (7 marks each)** :

- a) What is random sampling ? How it is carried out ?
- b) Explain the use of control charts with respect to work sampling.
- c) Discuss with example “value analysis as a cost reduction technique”.
- d) How creative thinking is useful for value engineering ?
- e) Write a note on “Bathtub Curve”.
- f) What is redundancy is reliability engineering ?
- g) Pilot study shows the percentage of occurrence as 50%. Determine number of observations for 95% confidence level with accuracy of  $\pm 2\%$ .





SLR-TJ – 66

Seat No.	
-------------	--

Set	<b>P</b>
-----	----------

**B.E. (Civil) (Part – II) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Instructions:** 1) Q. No. 1 MCQ is **compulsory** and to be solved in **30 min.**  
Q. No. 1 to Q. No. 8 are of **1 mark each** and from Q. No. 9 to Q. No. 14 are of **2 marks each.**  
2) Write the correct option for **each** question.  
3) While solving MCQ **IS 456-2000, IS 3370** and **IS 1343** are **not allowed.**  
4) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

I. Choose the correct answer.

- 1) If W is weight of a retaining wall and P is the horizontal earth pressure, the factor of safety against sliding, is  
a) 1                      b) 1.5                      c) 1.25                      d) 2
- 2) Line along which the total resultant prestressing force acts is called as  
a) Kern point      b) Cable profile      c) Cable line      d) Cable
- 3) For footing the minimum cover for the reinforcement shall be  
a) 30 mm      b) 50 mm      c) 25 mm      d) 40 mm
- 4) The algebraic sum of bending moments due to prestress and external loads is called as  
a) Primary prestressing moment  
b) Resulting moment  
c) Secondary prestressing moment  
d) All of the above
- 5) Cantilever retaining walls can safely be used for a height not more than  
a) 3 m      b) 5 m      c) 4 m      d) 6 m

P.T.O.



- 6) The number of treads in a flight is equal to  
a) Risers in the flight                      b) Risers minus one  
c) Risers plus one                            d) None of these
- 7) In water tank, for  $F_{e500}$  the permissible tensile stress in the reinforcement near the water face is  
a) 125 N/mm<sup>2</sup>    b) 150 N/mm<sup>2</sup>    c) 205 N/mm<sup>2</sup>    d) 190 N/mm<sup>2</sup>
- 8) The horizontal portion of a step in a stairs case, is known as  
a) Rise                      b) Flight                      c) Winder                      d) Tread
- 9) A rectangular beam 250 mm × 600 mm is prestressed by 4 bars 14 mm diameter high tension steel wires located at 200 mm from soffit of the beam. Effective stress in steel wires is 700 MPa. What is the maximum bending moment (due to DL + LL) that can be applied so that no tension developed at the soffit ?  
a) 80 kN-m              b) 81.6 kN-m              c) 85 kN-m              d) 90 kN-m
- 10) Find the area and the depth of foundation required for a column carrying on axial load of 1250 kN. The safe bearing capacity of the soil is 120 kN/m<sup>2</sup>. The soil at the site weighs 18 kN/m<sup>3</sup> and has an angle of repose of 30°.  
a) 12.46 m<sup>2</sup>, 0.75 m                      b) 10 m<sup>2</sup>, 0.6 m  
c) 11.46 m<sup>2</sup>, 0.74 m                      d) 11 m<sup>2</sup>, 0.8 m
- 11) A pre-tensioned concrete member of section 200 mm and 250 mm contains tendons of area 500 mm<sup>2</sup> at the centre of gravity of the section. The pre-stress in tendons is 1000 MPa. Assuming modular ratio as 10, the stress (MPa) in concrete is  
a) 11                      b) 9                                      c) 7                                      d) 5
- 12) A rectangular pretensioned prestressed concrete beam has straight concentric force with a prestressing force of 1000 kN. The beam is 300 mm × 500 mm in section. M<sub>20</sub> grade concrete is used. The loss of prestress due to elastic shortening is  
a) 22.37 MPa    b) 32.47 MPa    c) 48.33 MPa    d) 52.33 MPa
- 13) The circular water tank having a capacity of 400000 liters and water depth 4 m including free board of 200 mm. Calculate the diameter of tank.  
a) 11.62 m              b) 11.5 m                      c) 12 m                      d) 11.2 m
- 14) A concrete beam of span is post tensioned by a cable carrying an initial stress of 1000 MPa. The slip at jacking end is 5 mm.  $E_s = 210$  kN/m<sup>2</sup>. Percentage loss of prestress due to anchorage slip.  
a) 3.5%                      b) 4%                                      c) 4.5%                      d) 5%





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Solve **any three** questions from **each** Section.  
2) **Use of IS 456, IS 1343 and IS 3370 part IV** and non programmable calculator are **allowed**.  
3) Draw **neat** sketches where required and assume suitable data **if required** and state it **clearly**.

SECTION – I

- II. Design the dog-legged for building in which the vertical distance between floors is 3.6 m. The stair hall measures 2.5 m × 5 m. The live load may be taken as 2.5 kN/m<sup>2</sup>. Assume 150 mm riser and 250 mm trade and width of stair is 1.2 m. Use M<sub>20</sub> concrete and Fe<sub>415</sub> steel. Landing is supported by beams of width 300 mm at the end of landing. **13**
- III. Design a isolated footing of uniform thickness of a R.C. column carries a vertical load of 800 kN and having a size of 500 mm × 400 mm. The safe bearing capacity is 200 kN/m<sup>2</sup>. Use M<sub>20</sub> concrete and Fe<sub>500</sub> steel. **13**
- IV. Design the stem slab of a counter fort retaining wall, if the height of wall above the ground level is 7 m. SBC of soil is 200 kN/m<sup>2</sup>, angle of internal friction is 30° and unit weight of back fill soil 18 kN/m<sup>2</sup>. Keep spacing of counter fort as 3.5 m. Coefficient of friction between soil and concrete is 0.5. Use M<sub>20</sub> concrete and Fe<sub>415</sub> steel. **14**
- V. Design a rectangular tank having capacity of 50000 liters. The depth of water is 2.5 m and the width of tank is 4 m. The water tank is rest in on firm ground, is free at top and fixed at bottom as well as vertical edges. Use M<sub>25</sub> concrete and Fe<sub>415</sub> steel. Assume free board of 300 mm. Solve by IS code method. **13**

Set P



## SECTION – II

- VI. A prestressed concrete beam 500 mm × 750 mm in section has a span 10 m and is subjected to a uniformly distributed load of 18 kN/m including the self weight of the beam. The prestressing tendons are located at an eccentricity of 125 mm at mid span and zero at support. Determine the extreme stresses in concrete at the mid span section if the prestressing force 1600 kN. Solve by following methods : stress concept method, strain concept method, load balancing concept. **13**
- VII. A pretensioned concrete beam of 250 mm × 360 mm is provided with 12 m span. The beam is prestressed by steel wires of area 350 mm<sup>2</sup> provided at a uniform eccentricity of 60 mm with an initial prestress of 1250 N/mm<sup>2</sup>. Determine the percentage loss of stress in the wires.  $E_s = 2.1 \times 10^5$  N/mm<sup>2</sup>,  $E_c = 3.5 \times 10^5$  N/mm<sup>2</sup>, Ultimate creep strain =  $45 \times 10^{-6}$  mm/mm per N/mm<sup>2</sup>. Shrinkage of concrete =  $300 \times 10^{-6}$  Relaxation loss percentage = 5%. **13**
- VIII. Design PSC I section beam for the following data :
- a) Span = 20 m
  - b) Superimposed load = 32 kN/m
  - c) Cube strength of concrete at 28 days is 30 kN/m<sup>2</sup>
  - d) Safe stress in concrete at transfer = 0.5 fck
  - e) Allowable tensile stress in concrete is  $0.129\sqrt{f_{ck}}$
  - f) Safe stress in steel is 40% of ultimate stress
  - g) Total loss of stress 18%
  - h) Ultimate stress in steel 1350 MPa
  - i) Safe stress in concrete at service = 0.4 fck. **14**
- IX. A PSC beam 250 mm × 600 mm is subjected to an effective prestressing force of 1450 kN along the longitudinal centroidal axis. Design the end block by Guyon's method. **13**
-



SLR-TJ – 66

Seat No.	
-------------	--

Set	<b>Q</b>
-----	----------

**B.E. (Civil) (Part – II) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Instructions:** 1) Q. No. 1 MCQ is **compulsory** and to be solved in **30 min.**  
Q. No. 1 to Q. No. 8 are of **1 mark each** and from Q. No. 9 to Q. No. 14 are of **2 marks each.**  
2) Write the correct option for **each** question.  
3) While solving MCQ **IS 456-2000, IS 3370 and IS 1343** are **not allowed.**  
4) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

I. Choose the correct answer.

- 1) For footing the minimum cover for the reinforcement shall be  
a) 30 mm      b) 50 mm      c) 25 mm      d) 40 mm
- 2) The algebraic sum of bending moments due to prestress and external loads is called as  
a) Primary prestressing moment  
b) Resulting moment  
c) Secondary prestressing moment  
d) All of the above
- 3) In water tank, for Fe<sub>500</sub> the permissible tensile stress in the reinforcement near the water face is  
a) 125 N/mm<sup>2</sup>      b) 150 N/mm<sup>2</sup>      c) 205 N/mm<sup>2</sup>      d) 190 N/mm<sup>2</sup>
- 4) The horizontal portion of a step in a stairs case, is known as  
a) Rise      b) Flight      c) Winder      d) Tread
- 5) If W is weight of a retaining wall and P is the horizontal earth pressure, the factor of safety against sliding, is  
a) 1      b) 1.5      c) 1.25      d) 2

P.T.O.



- 6) Line along which the total resultant prestressing force acts is called as  
a) Kern point      b) Cable profile      c) Cable line      d) Cable
- 7) Cantilever retaining walls can safely be used for a height not more than  
a) 3 m                  b) 5 m                  c) 4 m                  d) 6 m
- 8) The number of treads in a flight is equal to  
a) Risers in the flight                          b) Risers minus one  
c) Risers plus one                                  d) None of these
- 9) A concrete beam of span is post tensioned by a cable carrying an initial stress of 1000 MPa. The slip at jacking end is 5 mm.  $E_s = 210 \text{ kN/m}^2$ . Percentage loss of prestress due to anchorage slip.  
a) 3.5%                  b) 4%                  c) 4.5%                  d) 5%
- 10) The circular water tank having a capacity of 400000 liters and water depth 4 m including free board of 200 mm. Calculate the diameter of tank.  
a) 11.62 m              b) 11.5 m              c) 12 m                  d) 11.2 m
- 11) A rectangular pretensioned prestressed concrete beam has straight concentric force with a prestressing force of 1000 kN. The beam is 300 mm  $\times$  500 mm in section.  $M_{20}$  grade concrete is used. The loss of prestress due to elastic shortening is  
a) 22.37 MPa      b) 32.47 MPa      c) 48.33 MPa      d) 52.33 MPa
- 12) A pre-tensioned concrete member of section 200 mm and 250 mm contains tendons of area 500 mm<sup>2</sup> at the centre of gravity of the section. The pre-stress in tendons is 1000 MPa. Assuming modular ratio as 10, the stress (MPa) in concrete is  
a) 11                  b) 9                  c) 7                  d) 5
- 13) Find the area and the depth of foundation required for a column carrying on axial load of 1250 kN. The safe bearing capacity of the soil is 120 kN/m<sup>2</sup>. The soil at the site weighs 18 kN/m<sup>3</sup> and has an angle of repose of 30°.  
a) 12.46 m<sup>2</sup>, 0.75 m                          b) 10 m<sup>2</sup>, 0.6 m  
c) 11.46 m<sup>2</sup>, 0.74 m                          d) 11 m<sup>2</sup>, 0.8 m
- 14) A rectangular beam 250 mm  $\times$  600 mm is prestressed by 4 bars 14 mm diameter high tension steel wires located at 200 mm from suffix of the beam. Effective stress in steel wires is 700 MPa. What is the maximum bending moment (due to DL + LL) that can be applied so that no tension developed at the soffit ?  
a) 80 kN-m              b) 81.6 kN-m              c) 85 kN-m              d) 90 kN-m



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Solve **any three** questions from **each** Section.  
2) **Use of IS 456, IS 1343 and IS 3370 part IV** and non programmable calculator are **allowed**.  
3) Draw **neat** sketches where required and assume suitable data **if required** and state it **clearly**.

SECTION – I

- II. Design the dog-legged for building in which the vertical distance between floors is 3.6 m. The stair hall measures 2.5 m × 5 m. The live load may be taken as 2.5 kN/m<sup>2</sup>. Assume 150 mm riser and 250 mm trade and width of stair is 1.2 m. Use M<sub>20</sub> concrete and Fe<sub>415</sub> steel. Landing is supported by beams of width 300 mm at the end of landing. **13**
- III. Design a isolated footing of uniform thickness of a R.C. column carries a vertical load of 800 kN and having a size of 500 mm × 400 mm. The safe bearing capacity is 200 kN/m<sup>2</sup>. Use M<sub>20</sub> concrete and Fe<sub>500</sub> steel. **13**
- IV. Design the stem slab of a counter fort retaining wall, if the height of wall above the ground level is 7 m. SBC of soil is 200 kN/m<sup>2</sup>, angle of internal friction is 30° and unit weight of back fill soil 18 kN/m<sup>2</sup>. Keep spacing of counter fort as 3.5 m. Coefficient of friction between soil and concrete is 0.5. Use M<sub>20</sub> concrete and Fe<sub>415</sub> steel. **14**
- V. Design a rectangular tank having capacity of 50000 liters. The depth of water is 2.5 m and the width of tank is 4 m. The water tank is rest in on firm ground, is free at top and fixed at bottom as well as vertical edges. Use M<sub>25</sub> concrete and Fe<sub>415</sub> steel. Assume free board of 300 mm. Solve by IS code method. **13**

Set Q



## SECTION – II

- VI. A prestressed concrete beam 500 mm × 750 mm in section has a span 10 m and is subjected to a uniformly distributed load of 18 kN/m including the self weight of the beam. The prestressing tendons are located at an eccentricity of 125 mm at mid span and zero at support. Determine the extreme stresses in concrete at the mid span section if the prestressing force 1600 kN. Solve by following methods : stress concept method, strain concept method, load balancing concept. **13**
- VII. A pretensioned concrete beam of 250 mm × 360 mm is provided with 12 m span. The beam is prestressed by steel wires of area 350 mm<sup>2</sup> provided at a uniform eccentricity of 60 mm with an initial prestress of 1250 N/mm<sup>2</sup>. Determine the percentage loss of stress in the wires.  $E_s = 2.1 \times 10^5$  N/mm<sup>2</sup>,  $E_c = 3.5 \times 10^5$  N/mm<sup>2</sup>, Ultimate creep strain =  $45 \times 10^{-6}$  mm/mm per N/mm<sup>2</sup>. Shrinkage of concrete =  $300 \times 10^{-6}$  Relaxation loss percentage = 5%. **13**
- VIII. Design PSC I section beam for the following data :
- a) Span = 20 m
  - b) Superimposed load = 32 kN/m
  - c) Cube strength of concrete at 28 days is 30 kN/m<sup>2</sup>
  - d) Safe stress in concrete at transfer = 0.5 fck
  - e) Allowable tensile stress in concrete is  $0.129\sqrt{f_{ck}}$
  - f) Safe stress in steel is 40% of ultimate stress
  - g) Total loss of stress 18%
  - h) Ultimate stress in steel 1350 MPa
  - i) Safe stress in concrete at service = 0.4 fck. **14**
- IX. A PSC beam 250 mm × 600 mm is subjected to an effective prestressing force of 1450 kN along the longitudinal centroidal axis. Design the end block by Guyon's method. **13**
-



SLR-TJ – 66

Seat No.	
-------------	--

Set	R
-----	---

**B.E. (Civil) (Part – II) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Instructions:** 1) Q. No. 1 MCQ is **compulsory** and to be solved in **30 min.**  
Q. No. 1 to Q. No. 8 are of **1 mark each** and from Q. No. 9 to Q. No. 14 are of **2 marks each.**  
2) Write the correct option for **each** question.  
3) While solving MCQ **IS 456-2000, IS 3370** and **IS 1343** are **not allowed.**  
4) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

I. Choose the correct answer.

- 1) Cantilever retaining walls can safely be used for a height not more than  
a) 3 m                      b) 5 m                      c) 4 m                      d) 6 m
- 2) The number of treads in a flight is equal to  
a) Risers in the flight                      b) Risers minus one  
c) Risers plus one                      d) None of these
- 3) If W is weight of a retaining wall and P is the horizontal earth pressure, the factor of safety against sliding, is  
a) 1                      b) 1.5                      c) 1.25                      d) 2
- 4) Line along which the total resultant prestressing force acts is called as  
a) Kern point                      b) Cable profile                      c) Cable line                      d) Cable
- 5) In water tank, for Fe<sub>500</sub> the permissible tensile stress in the reinforcement near the water face is  
a) 125 N/mm<sup>2</sup>                      b) 150 N/mm<sup>2</sup>                      c) 205 N/mm<sup>2</sup>                      d) 190 N/mm<sup>2</sup>
- 6) The horizontal portion of a step in a stairs case, is known as  
a) Rise                      b) Flight                      c) Winder                      d) Tread

P.T.O.



- 7) For footing the minimum cover for the reinforcement shall be  
a) 30 mm                      b) 50 mm                      c) 25 mm                      d) 40 mm
- 8) The algebraic sum of bending moments due to prestress and external loads is called as  
a) Primary prestressing moment  
b) Resulting moment  
c) Secondary prestressing moment  
d) All of the above
- 9) Find the area and the depth of foundation required for a column carrying on axial load of 1250 kN. The safe bearing capacity of the soil is  $120 \text{ kN/m}^2$ . The soil at the sight weighs  $18 \text{ kN/m}^3$  and has an angle of repose of  $30^\circ$ .  
a)  $12.46 \text{ m}^2$ , 0.75 m                      b)  $10 \text{ m}^2$ , 0.6 m  
c)  $11.46 \text{ m}^2$ , 0.74 m                      d)  $11 \text{ m}^2$ , 0.8 m
- 10) A rectangular pretensioned prestressed concrete beam has straight concentric force with a prestressing force of 1000 kN. The beam is  $300 \text{ mm} \times 500 \text{ mm}$  in section.  $M_{20}$  grade concrete is used. The loss of prestress due to elastic shortening is  
a) 22.37 MPa      b) 32.47 MPa      c) 48.33 MPa      d) 52.33 MPa
- 11) A concrete beam of span is post tensioned by a cable carrying an initial stress of 1000 MPa. The slip at jacking end is 5 mm.  $E_s = 210 \text{ kN/m}^2$ . Percentage loss of prestress due to anchorage slip.  
a) 3.5%                      b) 4%                      c) 4.5%                      d) 5%
- 12) A rectangular beam  $250 \text{ mm} \times 600 \text{ mm}$  is prestresses by 4 bars 14 mm diameter high tension steel wires located at 200 mm from suffix of the beam. Effective stress in steel wires is 700 MPa. What is the maximum bending moment (due to DL + LL) that can be applied so that no tension developed at the soffit ?  
a) 80 kM-m                      b) 81.6 kN-m                      c) 85 kN-m                      d) 90 kN-m
- 13) A pre-tensioned concrete member of section 200 mm and 250 mm contains tendons of area  $500 \text{ mm}^2$  at the centre of gravity of the section. The pre-stress in tendons is 1000 MPa. Assuming modular ratio as 10, the stress (MPa) in concrete is  
a) 11                      b) 9                      c) 7                      d) 5
- 14) The circular water tank having a capacity of 400000 liters and water depth 4 m including free board of 200 mm. Calculate the diameter of tank.  
a) 11.62 m                      b) 11.5 m                      c) 12 m                      d) 11.2 m





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Solve **any three** questions from **each** Section.  
2) **Use of IS 456, IS 1343 and IS 3370 part IV** and non programmable calculator are **allowed**.  
3) Draw **neat** sketches where required and assume suitable data **if required** and state it **clearly**.

SECTION – I

- II. Design the dog-legged for building in which the vertical distance between floors is 3.6 m. The stair hall measures 2.5 m × 5 m. The live load may be taken as 2.5 kN/m<sup>2</sup>. Assume 150 mm riser and 250 mm trade and width of stair is 1.2 m. Use M<sub>20</sub> concrete and Fe<sub>415</sub> steel. Landing is supported by beams of width 300 mm at the end of landing. **13**
- III. Design a isolated footing of uniform thickness of a R.C. column carries a vertical load of 800 kN and having a size of 500 mm × 400 mm. The safe bearing capacity is 200 kN/m<sup>2</sup>. Use M<sub>20</sub> concrete and Fe<sub>500</sub> steel. **13**
- IV. Design the stem slab of a counter fort retaining wall, if the height of wall above the ground level is 7 m. SBC of soil is 200 kN/m<sup>2</sup>, angle of internal friction is 30° and unit weight of back fill soil 18 kN/m<sup>2</sup>. Keep spacing of counter fort as 3.5 m. Coefficient of friction between soil and concrete is 0.5. Use M<sub>20</sub> concrete and Fe<sub>415</sub> steel. **14**
- V. Design a rectangular tank having capacity of 50000 liters. The depth of water is 2.5 m and the width of tank is 4 m. The water tank is rest in on firm ground, is free at top and fixed at bottom as well as vertical edges. Use M<sub>25</sub> concrete and Fe<sub>415</sub> steel. Assume free board of 300 mm. Solve by IS code method. **13**

Set R



## SECTION – II

- VI. A prestressed concrete beam 500 mm × 750 mm in section has a span 10 m and is subjected to a uniformly distributed load of 18 kN/m including the self weight of the beam. The prestressing tendons are located at an eccentricity of 125 mm at mid span and zero at support. Determine the extreme stresses in concrete at the mid span section if the prestressing force 1600 kN. Solve by following methods : stress concept method, strain concept method, load balancing concept. **13**
- VII. A pretensioned concrete beam of 250 mm × 360 mm is provided with 12 m span. The beam is prestressed by steel wires of area 350 mm<sup>2</sup> provided at a uniform eccentricity of 60 mm with an initial prestress of 1250 N/mm<sup>2</sup>. Determine the percentage loss of stress in the wires.  $E_s = 2.1 \times 10^5$  N/mm<sup>2</sup>,  $E_c = 3.5 \times 10^5$  N/mm<sup>2</sup>, Ultimate creep strain =  $45 \times 10^{-6}$  mm/mm per N/mm<sup>2</sup>. Shrinkage of concrete =  $300 \times 10^{-6}$  Relaxation loss percentage = 5%. **13**
- VIII. Design PSC I section beam for the following data :
- Span = 20 m
  - Superimposed load = 32 kN/m
  - Cube strength of concrete at 28 days is 30 kN/m<sup>2</sup>
  - Safe stress in concrete at transfer = 0.5 fck
  - Allowable tensile stress in concrete is  $0.129\sqrt{f_{ck}}$
  - Safe stress in steel is 40% of ultimate stress
  - Total loss of stress 18%
  - Ultimate stress in steel 1350 MPa
  - Safe stress in concrete at service = 0.4 fck. **14**
- IX. A PSC beam 250 mm × 600 mm is subjected to an effective prestressing force of 1450 kN along the longitudinal centroidal axis. Design the end block by Guyon's method. **13**
-



SLR-TJ – 66

Seat No.	
-------------	--

Set	<b>S</b>
-----	----------

**B.E. (Civil) (Part – II) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Instructions:** 1) Q. No. 1 MCQ is **compulsory** and to be solved in **30 min.**  
Q. No. 1 to Q. No. 8 are of **1 mark each** and from Q. No. 9 to Q. No. 14 are of **2 marks each.**  
2) Write the correct option for **each** question.  
3) While solving MCQ **IS 456-2000, IS 3370** and **IS 1343** are **not allowed.**  
4) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

I. Choose the correct answer.

- 1) In water tank, for  $F_{e500}$  the permissible tensile stress in the reinforcement near the water face is  
a)  $125 \text{ N/mm}^2$     b)  $150 \text{ N/mm}^2$     c)  $205 \text{ N/mm}^2$     d)  $190 \text{ N/mm}^2$
- 2) The horizontal portion of a step in a stairs case, is known as  
a) Rise    b) Flight    c) Winder    d) Tread
- 3) Cantilever retaining walls can safely be used for a height not more than  
a) 3 m    b) 5 m    c) 4 m    d) 6 m
- 4) The number of treads in a flight is equal to  
a) Risers in the flight    b) Risers minus one  
c) Risers plus one    d) None of these
- 5) For footing the minimum cover for the reinforcement shall be  
a) 30 mm    b) 50 mm    c) 25 mm    d) 40 mm
- 6) The algebraic sum of bending moments due to prestress and external loads is called as  
a) Primary prestressing moment    b) Resulting moment  
c) Secondary prestressing moment    d) All of the above

P.T.O.



- 7) If  $W$  is weight of a retaining wall and  $P$  is the horizontal earth pressure, the factor of safety against sliding, is  
a) 1                      b) 1.5                      c) 1.25                      d) 2
- 8) Line along which the total resultant prestressing force acts is called as  
a) Kern point      b) Cable profile      c) Cable line      d) Cable
- 9) A pre-tensioned concrete member of section 200 mm and 250 mm contains tendons of area  $500 \text{ mm}^2$  at the centre of gravity of the section. The pre-stress in tendons is 1000 MPa. Assuming modular ratio as 10, the stress (MPa) in concrete is  
a) 11                      b) 9                      c) 7                      d) 5
- 10) A rectangular beam 250 mm  $\times$  600 mm is prestressed by 4 bars 14 mm diameter high tension steel wires located at 200 mm from soffit of the beam. Effective stress in steel wires is 700 MPa. What is the maximum bending moment (due to DL + LL) that can be applied so that no tension developed at the soffit ?  
a) 80 kN-m      b) 81.6 kN-m      c) 85 kN-m      d) 90 kN-m
- 11) The circular water tank having a capacity of 400000 liters and water depth 4 m including free board of 200 mm. Calculate the diameter of tank.  
a) 11.62 m      b) 11.5 m      c) 12 m      d) 11.2 m
- 12) Find the area and the depth of foundation required for a column carrying on axial load of 1250 kN. The safe bearing capacity of the soil is  $120 \text{ kN/m}^2$ . The soil at the site weighs  $18 \text{ kN/m}^3$  and has an angle of repose of  $30^\circ$ .  
a)  $12.46 \text{ m}^2$ , 0.75 m                      b)  $10 \text{ m}^2$ , 0.6 m  
c)  $11.46 \text{ m}^2$ , 0.74 m                      d)  $11 \text{ m}^2$ , 0.8 m
- 13) A concrete beam of span is post tensioned by a cable carrying an initial stress of 1000 MPa. The slip at jacking end is 5 mm.  $E_s = 210 \text{ kN/m}^2$ . Percentage loss of prestress due to anchorage slip.  
a) 3.5%                      b) 4%                      c) 4.5%                      d) 5%
- 14) A rectangular pretensioned prestressed concrete beam has straight concentric force with a prestressing force of 1000 kN. The beam is 300 mm  $\times$  500 mm in section.  $M_{20}$  grade concrete is used. The loss of prestress due to elastic shortening is  
a) 22.37 MPa      b) 32.47 MPa      c) 48.33 MPa      d) 52.33 MPa
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017  
DESIGN OF CONCRETE STRUCTURES – II**

Day and Date : Tuesday, 21-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Solve **any three** questions from **each** Section.  
2) **Use of IS 456, IS 1343 and IS 3370 part IV and non programmable calculator are allowed.**  
3) Draw **neat** sketches where required and assume suitable data **if required** and state it **clearly**.

SECTION – I

- II. Design the dog-legged for building in which the vertical distance between floors is 3.6 m. The stair hall measures 2.5 m × 5 m. The live load may be taken as 2.5 kN/m<sup>2</sup>. Assume 150 mm riser and 250 mm trade and width of stair is 1.2 m. Use M<sub>20</sub> concrete and Fe<sub>415</sub> steel. Landing is supported by beams of width 300 mm at the end of landing. **13**
- III. Design a isolated footing of uniform thickness of a R.C. column carries a vertical load of 800 kN and having a size of 500 mm × 400 mm. The safe bearing capacity is 200 kN/m<sup>2</sup>. Use M<sub>20</sub> concrete and Fe<sub>500</sub> steel. **13**
- IV. Design the stem slab of a counter fort retaining wall, if the height of wall above the ground level is 7 m. SBC of soil is 200 kN/m<sup>2</sup>, angle of internal friction is 30° and unit weight of back fill soil 18 kN/m<sup>2</sup>. Keep spacing of counter fort as 3.5 m. Coefficient of friction between soil and concrete is 0.5. Use M<sub>20</sub> concrete and Fe<sub>415</sub> steel. **14**
- V. Design a rectangular tank having capacity of 50000 liters. The depth of water is 2.5 m and the width of tank is 4 m. The water tank is rest in on firm ground, is free at top and fixed at bottom as well as vertical edges. Use M<sub>25</sub> concrete and Fe<sub>415</sub> steel. Assume free board of 300 mm. Solve by IS code method. **13**

Set S



## SECTION – II

- VI. A prestressed concrete beam 500 mm × 750 mm in section has a span 10 m and is subjected to a uniformly distributed load of 18 kN/m including the self weight of the beam. The prestressing tendons are located at an eccentricity of 125 mm at mid span and zero at support. Determine the extreme stresses in concrete at the mid span section if the prestressing force 1600 kN. Solve by following methods : stress concept method, strain concept method, load balancing concept. **13**
- VII. A pretensioned concrete beam of 250 mm × 360 mm is provided with 12 m span. The beam is prestressed by steel wires of area 350 mm<sup>2</sup> provided at a uniform eccentricity of 60 mm with an initial prestress of 1250 N/mm<sup>2</sup>. Determine the percentage loss of stress in the wires.  $E_s = 2.1 \times 10^5$  N/mm<sup>2</sup>,  $E_c = 3.5 \times 10^5$  N/mm<sup>2</sup>, Ultimate creep strain =  $45 \times 10^{-6}$  mm/mm per N/mm<sup>2</sup>. Shrinkage of concrete =  $300 \times 10^{-6}$  Relaxation loss percentage = 5%. **13**
- VIII. Design PSC I section beam for the following data :
- Span = 20 m
  - Superimposed load = 32 kN/m
  - Cube strength of concrete at 28 days is 30 kN/m<sup>2</sup>
  - Safe stress in concrete at transfer = 0.5 fck
  - Allowable tensile stress in concrete is  $0.129\sqrt{f_{ck}}$
  - Safe stress in steel is 40% of ultimate stress
  - Total loss of stress 18%
  - Ultimate stress in steel 1350 MPa
  - Safe stress in concrete at service = 0.4 fck. **14**
- IX. A PSC beam 250 mm × 600 mm is subjected to an effective prestressing force of 1450 kN along the longitudinal centroidal axis. Design the end block by Guyon's method. **13**
-



SLR-TJ – 67

Seat No.	
----------	--

Set 

P
---

**B.E. (Civil) (Part – II) Examination, 2017**  
**CONSTRUCTION PRACTICES AND TOWN PLANNING**

Day and Date : Wednesday, 22-11-2017

Max Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

- 1) \_\_\_\_\_ includes a regional plan, master plan, detailed development plan and a new town development plan.
  - a) Structural Plan
  - b) Comprehensive Plan
  - c) Developmental Plan
  - d) None of these
- 2) \_\_\_\_\_ aims to influence certain key vocational decisions while recognizing that there are many other things that can't and perhaps should not be decided at the outset.
  - a) Structural Plan
  - b) Comprehensive Plan
  - c) Developmental Plan
  - d) None of these
- 3) Patrick Geddes suggested that the sequence of planning shall be
  - a) Regional survey, Rural development, Town planning, City design
  - b) Rural development, Town planning, City design, Regional survey
  - c) Town planning, City design, Regional survey, Rural development
  - d) City design, Regional survey, Rural development, Town planning
- 4) As per clearance stain's conception walking distance radius is \_\_\_\_\_ mile.
  - a) 1
  - b) 2
  - c) 5
  - d) 10
- 5) Ekistics logarithmic scale consists of \_\_\_\_\_ ekistic units, classified under \_\_\_\_\_ major types.
  - a) 15, 4
  - b) 10, 2
  - c) 5, 5
  - d) 4, 2
- 6) \_\_\_\_\_ means building houses along the routes of communications radiating from a human settlement.
  - a) Satellite town
  - b) Ribbon development
  - c) Ekistics
  - d) Neighbourhood
- 7) Great Bath, Granery are seen in
  - a) Mohenjodaro
  - b) Harappa
  - c) Both 'a' and 'b'
  - d) Neither 'a' nor 'b'

P.T.O.



- 8) \_\_\_\_\_ is a category of planning and development that deals with designing and placing infrastructure and other elements across a large area.
  - a) Master plan
  - b) Town plan
  - c) Regional plan
  - d) Development plan
- 9) A piece of land divided into more than 8 parcels, each of which is to be sold separately is called
  - a) Layout
  - b) Subdivision of land
  - c) Both 'a' and 'b'
  - d) Neither 'a' nor 'b'
- 10) A piece of land divided into less than or equal to 8 parcels, each of which is to be sold separately is called
  - a) Layout
  - b) Subdivision of land
  - c) Both 'a' and 'b'
  - d) Neither 'a' nor 'b'
- 11) Urban zones fall into one of \_\_\_\_\_ major categories.
  - a) 2
  - b) 3
  - c) 4
  - d) 5
- 12) Approaches to zoning can be divided into \_\_\_\_\_ broad categories.
  - a) 2
  - b) 3
  - c) 4
  - d) 5
- 13) \_\_\_\_\_ is known as building block zoning category.
  - a) Euclidean
  - b) Performance
  - c) Incentive incentive
  - d) Design-based
- 14) \_\_\_\_\_ is known as effects-based planning zoning category.
  - a) Euclidean
  - b) Performance
  - c) Incentive incentive
  - d) Design-based
- 15) \_\_\_\_\_ zoning often utilizes a "points-based" system whereby a property developer can apply credits toward meeting established zoning goals through selecting from a 'menu' of compliance options.
  - a) Euclidean
  - b) Performance
  - c) Incentive incentive
  - d) Design-based
- 16) \_\_\_\_\_ zoning is intended to provide a reward-based system to encourage development that meets established urban development goals
  - a) Euclidean
  - b) Performance
  - c) Incentive incentive
  - d) Design-based
- 17) \_\_\_\_\_ zoning regulates not the type of land use, but the form that land use may take.
  - a) Euclidean
  - b) Performance
  - c) Incentive incentive
  - d) Form-based
- 18) Which is not a urban road system ?
  - a) Grid Iron system
  - b) Concentric and radial street system
  - c) Polynomial street system
  - d) Organic street system
- 19) An example of combination of rectangular with radial street system
  - a) New Delhi
  - b) Bhubaneshwar
  - c) Chandigarh
  - d) Gandhinagar
- 20) With the classification of town planning, which types are not square or rectangular shaped ?
  - a) Dandaka
  - b) Sarvatobhadra
  - c) Karmuka
  - d) Nandyavarka





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**CONSTRUCTION PRACTICES AND TOWN PLANNING**

Day and Date : Wednesday, 22-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instruction :** Question No. 2 and Question No. 6 is **compulsory**. Attempt **any two** out of Q. 3 to Q. 5. Attempt **any two** out of Q. 7 to Q. 9.

SECTION – I

2. Explain with suitable sketches : 16
- a) Planning in ancient India-Indus Valley Civilization.
  - b) Urban roads-objective and classification of roads, various road networks.
3. Write detailed note on : 12
- a) Land Acquisition Act–Necessity and procedure of acquisition.
  - b) Layout of residential units.
4. Explain : 12
- a) Types of surveys for town planning.
  - b) Importance of MRTP in town planning.
5. Write detailed note on : 12
- a) Growth pattern of towns.
  - b) Town aesthetics.

Set P



SECTION – II

6. Explain with suitable sketches : **16**  
a) Dragline.  
b) Clamshell.
7. Write detailed note on : **12**  
a) Mechanical V/s Manual construction.  
b) Cycle time calculation for scraper.
8. Explain : **12**  
a) Types of cranes.  
b) Prefabricated construction-relative economy.
9. Write detailed note on : **12**  
a) Floating and dredging equipment.  
b) Safety measures in construction.
-



SLR-TJ – 67

Seat No.	
----------	--

Set 

Q
---

**B.E. (Civil) (Part – II) Examination, 2017**  
**CONSTRUCTION PRACTICES AND TOWN PLANNING**

Day and Date : Wednesday, 22-11-2017

Max Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

- 1) \_\_\_\_\_ zoning is intended to provide a reward-based system to encourage development that meets established urban development goals
  - a) Euclidean
  - b) Performance
  - c) Incentive incentive
  - d) Design-based
- 2) \_\_\_\_\_ zoning regulates not the type of land use, but the form that land use may take.
  - a) Euclidean
  - b) Performance
  - c) Incentive incentive
  - d) Form-based
- 3) Which is not a urban road system ?
  - a) Grid Iron system
  - b) Concentric and radial street system
  - c) Polynomial street system
  - d) Organic street system
- 4) An example of combination of rectangular with radial street system
  - a) New Delhi
  - b) Bhubaneshwar
  - c) Chandigarh
  - d) Gandhinagar
- 5) With the classification of town planning, which types are not square or rectangular shaped ?
  - a) Dandaka
  - b) Sarvatobhadra
  - c) Karmuka
  - d) Nandyavarka
- 6) \_\_\_\_\_ includes a regional plan, master plan, detailed development plan and a new town development plan.
  - a) Structural Plan
  - b) Comprehensive Plan
  - c) Developmental Plan
  - d) None of these
- 7) \_\_\_\_\_ aims to influence certain key vocational decisions while recognizing that there are many other things that can't and perhaps should not be decided at the outset.
  - a) Structural Plan
  - b) Comprehensive Plan
  - c) Developmental Plan
  - d) None of these
- 8) Patrick Geddes suggested that the sequence of planning shall be
  - a) Regional survey, Rural development, Town planning, City design
  - b) Rural development, Town planning, City design, Regional survey
  - c) Town planning, City design, Regional survey, Rural development
  - d) City design, Regional survey, Rural development, Town planning

P.T.O.



- 9) As per clearance stain's conception walking distance radius is \_\_\_\_\_ mile.  
a) 1                                      b) 2                                      c) 5                                      d) 10
- 10) Ekistics logarithmic scale consists of \_\_\_\_\_ ekistic units, classified under \_\_\_\_\_ major types.  
a) 15, 4                                      b) 10, 2                                      c) 5, 5                                      d) 4, 2
- 11) \_\_\_\_\_ means building houses along the routes of communications radiating from a human settlement.  
a) Satellite town                                      b) Ribbon development  
c) Ekistics                                      d) Neighbourhood
- 12) Great Bath, Granery are seen in  
a) Mohenjodaro                                      b) Harappa  
c) Both 'a' and 'b'                                      d) Neither 'a' nor 'b'
- 13) \_\_\_\_\_ is a category of planning and development that deals with designing and placing infrastructure and other elements across a large area.  
a) Master plan                                      b) Town plan  
c) Regional plan                                      d) Development plan
- 14) A piece of land divided into more than 8 parcels, each of which is to be sold separately is called  
a) Layout                                      b) Subdivision of land  
c) Both 'a' and 'b'                                      d) Neither 'a' nor 'b'
- 15) A piece of land divided into less than or equal to 8 parcels, each of which is to be sold separately is called  
a) Layout                                      b) Subdivision of land  
c) Both 'a' and 'b'                                      d) Neither 'a' nor 'b'
- 16) Urban zones fall into one of \_\_\_\_\_ major categories.  
a) 2                                      b) 3                                      c) 4                                      d) 5
- 17) Approaches to zoning can be divided into \_\_\_\_\_ broad categories.  
a) 2                                      b) 3                                      c) 4                                      d) 5
- 18) \_\_\_\_\_ is known as building block zoning category.  
a) Euclidean                                      b) Performance                                      c) Incentive incentive                                      d) Design-based
- 19) \_\_\_\_\_ is known as effects-based planning zoning category.  
a) Euclidean                                      b) Performance                                      c) Incentive incentive                                      d) Design-based
- 20) \_\_\_\_\_ zoning often utilizes a "points-based" system whereby a property developer can apply credits toward meeting established zoning goals through selecting from a 'menu' of compliance options.  
a) Euclidean                                      b) Performance                                      c) Incentive incentive                                      d) Design-based
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**CONSTRUCTION PRACTICES AND TOWN PLANNING**

Day and Date : Wednesday, 22-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instruction :** Question No. 2 and Question No. 6 is **compulsory**. Attempt **any two** out of Q. 3 to Q. 5. Attempt **any two** out of Q. 7 to Q. 9.

SECTION – I

2. Explain with suitable sketches : 16
- a) Planning in ancient India-Indus Valley Civilization.
  - b) Urban roads-objective and classification of roads, various road networks.
3. Write detailed note on : 12
- a) Land Acquisition Act–Necessity and procedure of acquisition.
  - b) Layout of residential units.
4. Explain : 12
- a) Types of surveys for town planning.
  - b) Importance of MRTP in town planning.
5. Write detailed note on : 12
- a) Growth pattern of towns.
  - b) Town aesthetics.

**Set Q**



SECTION – II

6. Explain with suitable sketches : **16**  
a) Dragline.  
b) Clamshell.
7. Write detailed note on : **12**  
a) Mechanical V/s Manual construction.  
b) Cycle time calculation for scraper.
8. Explain : **12**  
a) Types of cranes.  
b) Prefabricated construction-relative economy.
9. Write detailed note on : **12**  
a) Floating and dredging equipment.  
b) Safety measures in construction.
-



SLR-TJ – 67

Seat No.	
----------	--

Set	R
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**CONSTRUCTION PRACTICES AND TOWN PLANNING**

Day and Date : Wednesday, 22-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max Marks : 100

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

- 1) Urban zones fall into one of \_\_\_\_\_ major categories.  
a) 2                                      b) 3                                      c) 4                                      d) 5
- 2) Approaches to zoning can be divided into \_\_\_\_\_ broad categories.  
a) 2                                      b) 3                                      c) 4                                      d) 5
- 3) \_\_\_\_\_ is known as building block zoning category.  
a) Euclidean                              b) Performance                              c) Incentive incentive                              d) Design-based
- 4) \_\_\_\_\_ is known as effects-based planning zoning category.  
a) Euclidean                              b) Performance                              c) Incentive incentive                              d) Design-based
- 5) \_\_\_\_\_ zoning often utilizes a “points-based” system whereby a property developer can apply credits toward meeting established zoning goals through selecting from a ‘menu’ of compliance options.  
a) Euclidean                              b) Performance                              c) Incentive incentive                              d) Design-based
- 6) \_\_\_\_\_ zoning is intended to provide a reward-based system to encourage development that meets established urban development goals  
a) Euclidean                              b) Performance                              c) Incentive incentive                              d) Design-based
- 7) \_\_\_\_\_ zoning regulates not the type of land use, but the form that land use may take.  
a) Euclidean    b) Performance  
c) Incentive incentive    d) Form-based
- 8) Which is not a urban road system ?  
a) Grid Iron system    b) Concentric and radial street system  
c) Polynomial street system    d) Organic street system
- 9) An example of combination of rectangular with radial street system  
a) New Delhi                                      b) Bhubaneshwar                                      c) Chandigarh                                      d) Gandhinagar

P.T.O.







Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**CONSTRUCTION PRACTICES AND TOWN PLANNING**

Day and Date : Wednesday, 22-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instruction :** Question No. 2 and Question No. 6 is **compulsory**. Attempt **any two** out of Q. 3 to Q. 5. Attempt **any two** out of Q. 7 to Q. 9.

SECTION – I

2. Explain with suitable sketches : 16
- a) Planning in ancient India-Indus Valley Civilization.
- b) Urban roads-objective and classification of roads, various road networks.
3. Write detailed note on : 12
- a) Land Acquisition Act–Necessity and procedure of acquisition.
- b) Layout of residential units.
4. Explain : 12
- a) Types of surveys for town planning.
- b) Importance of MRTP in town planning.
5. Write detailed note on : 12
- a) Growth pattern of towns.
- b) Town aesthetics.

Set R



SECTION – II

6. Explain with suitable sketches : **16**  
a) Dragline.  
b) Clamshell.
7. Write detailed note on : **12**  
a) Mechanical V/s Manual construction.  
b) Cycle time calculation for scraper.
8. Explain : **12**  
a) Types of cranes.  
b) Prefabricated construction-relative economy.
9. Write detailed note on : **12**  
a) Floating and dredging equipment.  
b) Safety measures in construction.
-



SLR-TJ – 67

Seat No.	
----------	--

Set	S
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**CONSTRUCTION PRACTICES AND TOWN PLANNING**

Day and Date : Wednesday, 22-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max Marks : 100

- Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

- 1) \_\_\_\_\_ means building houses along the routes of communications radiating from a human settlement.
  - a) Satellite town
  - b) Ribbon development
  - c) Ekistics
  - d) Neighbourhood
- 2) Great Bath, Granery are seen in
  - a) Mohenjodaro
  - b) Harappa
  - c) Both 'a' and 'b'
  - d) Neither 'a' nor 'b'
- 3) \_\_\_\_\_ is a category of planning and development that deals with designing and placing infrastructure and other elements across a large area.
  - a) Master plan
  - b) Town plan
  - c) Regional plan
  - d) Development plan
- 4) A piece of land divided into more than 8 parcels, each of which is to be sold separately is called
  - a) Layout
  - b) Subdivision of land
  - c) Both 'a' and 'b'
  - d) Neither 'a' nor 'b'
- 5) A piece of land divided into less than or equal to 8 parcels, each of which is to be sold separately is called
  - a) Layout
  - b) Subdivision of land
  - c) Both 'a' and 'b'
  - d) Neither 'a' nor 'b'
- 6) Urban zones fall into one of \_\_\_\_\_ major categories.
  - a) 2
  - b) 3
  - c) 4
  - d) 5
- 7) Approaches to zoning can be divided into \_\_\_\_\_ broad categories.
  - a) 2
  - b) 3
  - c) 4
  - d) 5
- 8) \_\_\_\_\_ is known as building block zoning category.
  - a) Euclidean
  - b) Performance
  - c) Incentive incentive
  - d) Design-based

P.T.O.





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**CONSTRUCTION PRACTICES AND TOWN PLANNING**

Day and Date : Wednesday, 22-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instruction :** Question No. 2 and Question No. 6 is **compulsory**. Attempt **any two** out of Q. 3 to Q. 5. Attempt **any two** out of Q. 7 to Q. 9.

SECTION – I

2. Explain with suitable sketches : 16
- a) Planning in ancient India-Indus Valley Civilization.
  - b) Urban roads-objective and classification of roads, various road networks.
3. Write detailed note on : 12
- a) Land Acquisition Act–Necessity and procedure of acquisition.
  - b) Layout of residential units.
4. Explain : 12
- a) Types of surveys for town planning.
  - b) Importance of MRTTP in town planning.
5. Write detailed note on : 12
- a) Growth pattern of towns.
  - b) Town aesthetics.

**Set S**



SECTION – II

6. Explain with suitable sketches : **16**  
a) Dragline.  
b) Clamshell.
7. Write detailed note on : **12**  
a) Mechanical V/s Manual construction.  
b) Cycle time calculation for scraper.
8. Explain : **12**  
a) Types of cranes.  
b) Prefabricated construction-relative economy.
9. Write detailed note on : **12**  
a) Floating and dredging equipment.  
b) Safety measures in construction.
-



SLR-TJ – 69

Seat No.	
----------	--

Set	<b>P</b>
-----	----------

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : GROUND IMPROVEMENT TECHNIQUES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) **Assume** suitable data if necessary and mention it **clearly**.
  - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer (1 mark each) : **(1×20=20)**

- 1) Typical operating frequency of a vibrating roller is  
a) 10 Hz                      b) 30 Hz                      c) 30 MHz                      d) 240 Volts
- 2) Sandy and silty soil which benefit most from deep vibration have a blow count N in the range of  
a) 5 – 10                      b) 10 – 20                      c) 20 – 50                      d) > 50
- 3) Stone columns are said to be possible (and beneficial) in thin layers of cohesive soil with undrained cohesion of  
a) < 10 kPa                      b) 10 – 20 kPa                      c) 20 – 60 kPa                      d) > 200 kPa
- 4) Optimum moisture content in a clayey soil is likely to be  
a) 2 – 5% below PL                      b) 2 – 5% above PL  
c) 2 – 5% below LL                      d) equal to PL
- 5) Which soil require more water content for compacting it to achieve MDD ?  
a) clay                      b) silt                      c) sand                      d) none
- 6) Deep dynamic compaction is invented by  
a) Taylor                      b) Attenberg                      c) Terzaghi                      d) Menard
- 7) In wet method of stone column construction  
a) Stones are made wet before using  
b) Water is added from top in to the column to make it wet  
c) Vibroflot is made wet  
d) Water jet is used for inserting vibroflot

P.T.O.







Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : GROUND IMPROVEMENT TECHNIQUES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) *In Section I, Q. No. 2 is compulsory, solve any two from remaining questions.*  
2) *In Section II, Q. No. 6 is compulsory; solve any two from remaining questions.*  
3) *Figures to the right indicate full marks.*  
4) **Assume** suitable data if necessary and mention it **clearly**.

SECTION – I

2. Write a note on **any three** : **(4×3=12)**
- a) Objective of ground improvement technique.
  - b) Factors affecting selection of ground improvement.
  - c) Dewatering.
  - d) Prefabricated vertical drain.
  - e) Suitability of backfill material for vibrofloatation.
3. a) What are the factors affecting selection of ground improvement ? Write in detail. **6**
- b) Explain with neat sketch installation of PVD in a soil. **4**
- c) Compare sand drain and prefabricated vertical drain. **4**
4. a) Derive the relationship between spacing and equivalent diameter for square grid and triangular grid. **6**
- b) With a neat sketch explain well point system of dewatering. **4**
- c) Derive the relationship for stress co-efficient in case of stone column. **4**
5. a) Design PVD system for a site from the following site details.
- Thickness of clayey strata – 10m  
Drain size to be used – 180 × 20 mm

**Set P**



Clayey strata has permeable boundary both at top and bottom.

Time available for consolidation – 12 months

Co-efficient of vertical consolidation –  $5.34 \times 10^{-4}$  cm<sup>2</sup>/sec. **6**

- b) What are the various equipments used for shallow compaction ? What are their characteristics ? **4**
- c) How do you decide the filter material for PVD system ? **4**

### SECTION – II

6. Write note on **any three** : **(4×3=12)**
- Commonly adopted tests for geotextiles
  - Grout Monitoring
  - Purpose of soil stabilization
  - Tests for geotextiles.
7. a) Discuss about factor of safety of R.E. Wall. **6**
- b) List various methods of slope stabilization ? Explain any one in detail. **4**
- c) Describe different steps involved in the process of soil stabilization using cement as additive. **4**
8. a) List the components parts of grouting equipment with the help of neat sketch. **6**
- b) List the major functions that the geotextiles are intended to perform. Explain any one in detail. **4**
- c) Discuss the different forms of Geogrid. **4**
9. a) Design reinforcement for the earth wall to suit the following parameters. Height of wall = 12 m, backfill soil unit weight = 18kN/m<sup>3</sup>,  $\phi = 27^\circ$ ,  $C = 0$ , Yield stress for the reinforcement strip = 250 kPa, Angle of wall friction =  $0.35 \phi$  **6**
- b) Discuss the thermal modification methods of soil. **4**
- c) What do you understand by slope stabilization ? List the various methods of slope stabilization. **4**



SLR-TJ – 69

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : GROUND IMPROVEMENT TECHNIQUES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) **Assume** suitable data if necessary and mention it **clearly**.
  - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer (1 mark each) :

(1×20=20)

- 1) To prevent clogging of drain fabric material has to satisfy
  - a)  $100k_s < k_f < 1000$  mm/s
  - b)  $100k_s < k_f < 100$  mm/s
  - c)  $1000k_s < k_f < 100$  mm/s
  - d) all
- 2) Degree of radial consolidation and that of vertical consolidation are related by
  - a)  $U = U_r + U_v$
  - b)  $U = U_r \times U_v$
  - c)  $U = U_r \div U_v$
  - d) none
- 3) For effective and efficient grouting of a site, grout has to satisfy \_\_\_\_\_ requirements.
  - a) two
  - b) three
  - c) four
  - d) five
- 4) Ability of a grout to reach the desired location is judged by
  - a) groutability
  - b) stability
  - c) permanence
  - d) setting time
- 5) For external stability of RE wall it should be safe against
  - a) sliding
  - b) overturning
  - c) bearing
  - d) all
- 6) Typical operating frequency of a vibrating roller is
  - a) 10 Hz
  - b) 30 Hz
  - c) 30 MHz
  - d) 240 Volts
- 7) Sandy and silty soil which benefit most from deep vibration have a blow count N in the range of
  - a) 5 – 10
  - b) 10 – 20
  - c) 20 – 50
  - d) > 50
- 8) Stone columns are said to be possible (and beneficial) in thin layers of cohesive soil with undrained cohesion of
  - a) < 10 kPa
  - b) 10 – 20 kPa
  - c) 20 – 60 kPa
  - d) > 200 kPa

P.T.O.





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : GROUND IMPROVEMENT TECHNIQUES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) *In Section I, Q. No. 2 is compulsory, solve any two from remaining questions.*  
2) *In Section II, Q. No. 6 is compulsory; solve any two from remaining questions.*  
3) *Figures to the right indicate full marks.*  
4) **Assume** suitable data if necessary and mention it **clearly**.

SECTION – I

2. Write a note on **any three** : **(4×3=12)**
- a) Objective of ground improvement technique.
  - b) Factors affecting selection of ground improvement.
  - c) Dewatering.
  - d) Prefabricated vertical drain.
  - e) Suitability of backfill material for vibrofloatation.
3. a) What are the factors affecting selection of ground improvement ? Write in detail. **6**
- b) Explain with neat sketch installation of PVD in a soil. **4**
- c) Compare sand drain and prefabricated vertical drain. **4**
4. a) Derive the relationship between spacing and equivalent diameter for square grid and triangular grid. **6**
- b) With a neat sketch explain well point system of dewatering. **4**
- c) Derive the relationship for stress co-efficient in case of stone column. **4**
5. a) Design PVD system for a site from the following site details.
- Thickness of clayey strata – 10m  
Drain size to be used – 180 × 20 mm

**Set Q**



Clayey strata has permeable boundary both at top and bottom.

Time available for consolidation – 12 months

Co-efficient of vertical consolidation –  $5.34 \times 10^{-4}$  cm<sup>2</sup>/sec. **6**

b) What are the various equipments used for shallow compaction ? What are their characteristics ? **4**

c) How do you decide the filter material for PVD system ? **4**

### SECTION – II

6. Write note on **any three** : **(4×3=12)**

a) Commonly adopted tests for geotextiles

b) Grout Monitoring

c) Purpose of soil stabilization

d) Tests for geotextiles.

7. a) Discuss about factor of safety of R.E. Wall. **6**

b) List various methods of slope stabilization ? Explain any one in detail. **4**

c) Describe different steps involved in the process of soil stabilization using cement as additive. **4**

8. a) List the components parts of grouting equipment with the help of neat sketch. **6**

b) List the major functions that the geotextiles are intended to perform. Explain any one in detail. **4**

c) Discuss the different forms of Geogrid. **4**

9. a) Design reinforcement for the earth wall to suit the following parameters. Height of wall = 12 m, backfill soil unit weight = 18kN/m<sup>3</sup>,  $\phi = 27^\circ$ ,  $C = 0$ , Yield stress for the reinforcement strip = 250 kPa, Angle of wall friction =  $0.35 \phi$  **6**

b) Discuss the thermal modification methods of soil. **4**

c) What do you understand by slope stabilization ? List the various methods of slope stabilization. **4**



SLR-TJ – 69

Seat No.	
----------	--

Set	R
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : GROUND IMPROVEMENT TECHNIQUES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) **Assume** suitable data if necessary and mention it **clearly**.
  - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer (1 mark each) :

(1×20=20)

- 1) Discharge capacity of drain depends on
  - a) lateral earth pressure
  - b) clogging of drain
  - c) time
  - d) All
- 2) In case of stable cohesive soil; ideal method of stone column construction is
  - a) bottom feed method
  - b) wet top feed method
  - c) dry top feed method
  - d) none
- 3) The best economical alternative for deep foundation is
  - a) mat foundation
  - b) stone column
  - c) both a) and b)
  - d) neither a) nor b)
- 4) Installation is fast for
  - a) stone column
  - b) sand drain
  - c) PVD
  - d) none
- 5) To retain the soil from entering into drain, fabric material has to satisfy
  - a)  $O_{95} \leq (2 \text{ to } 3)D_{85}$
  - b)  $O_{85} \leq (2 \text{ to } 3)D_{95}$
  - c) both a) and b)
  - d) none
- 6) To prevent clogging of drain fabric material has to satisfy
  - a)  $100k_s < k_f < 1000 \text{ mm/s}$
  - b)  $100k_s < k_f < 100 \text{ mm/s}$
  - c)  $1000k_s < k_f < 100 \text{ mm/s}$
  - d) all
- 7) Degree of radial consolidation and that of vertical consolidation are related by
  - a)  $U = U_r + U_v$
  - b)  $U = U_r \times U_v$
  - c)  $U = U_r \div U_v$
  - d) none
- 8) For effective and efficient grouting of a site, grout has to satisfy \_\_\_\_\_ requirements.
  - a) two
  - b) three
  - c) four
  - d) five

P.T.O.



- 9) Ability of a grout to reach the desired location is judged by  
a) groutability      b) stability      c) permanence      d) setting time
- 10) For external stability of RE wall it should be safe against  
a) sliding      b) overturning      c) bearing      d) all
- 11) Typical operating frequency of a vibrating roller is  
a) 10 Hz      b) 30 Hz      c) 30 MHz      d) 240 Volts
- 12) Sandy and silty soil which benefit most from deep vibration have a blow count N in the range of  
a) 5 – 10      b) 10 – 20      c) 20 – 50      d) > 50
- 13) Stone columns are said to be possible (and beneficial) in thin layers of cohesive soil with undrained cohesion of  
a) < 10 kPa      b) 10 – 20 kPa      c) 20 – 60 kPa      d) > 200 kPa
- 14) Optimum moisture content in a clayey soil is likely to be  
a) 2 – 5% below PL      b) 2 – 5% above PL  
c) 2 – 5% below LL      d) equal to PL
- 15) Which soil require more water content for compacting it to achieve MDD ?  
a) clay      b) silt      c) sand      d) none
- 16) Deep dynamic compaction is invented by  
a) Taylor      b) Attenberg      c) Terzaghi      d) Menard
- 17) In wet method of stone column construction  
a) Stones are made wet before using  
b) Water is added from top in to the column to make it wet  
c) Vibroflot is made wet  
d) Water jet is used for inserting vibroflot
- 18) In case of preloading the load used for improvement of soil is \_\_\_\_\_ load of structure.  
a) exactly equal to      b) slightly more than  
c) 50% of      d) none
- 19) Stone column method of ground improvement will  
a) reduce the settlement      b) accelerate consolidation  
c) reinforce the soil      d) all
- 20) Time required to undergo consolidation of soil do not depends on  
a) water content of soil      b) void ratio of soil  
c) permeability of soil      d) drainage path
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : GROUND IMPROVEMENT TECHNIQUES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) *In Section I, Q. No. 2 is compulsory, solve any two from remaining questions.*  
2) *In Section II, Q. No. 6 is compulsory; solve any two from remaining questions.*  
3) *Figures to the right indicate full marks.*  
4) **Assume** suitable data if necessary and mention it **clearly**.

SECTION – I

2. Write a note on **any three** : **(4×3=12)**
- a) Objective of ground improvement technique.
  - b) Factors affecting selection of ground improvement.
  - c) Dewatering.
  - d) Prefabricated vertical drain.
  - e) Suitability of backfill material for vibrofloatation.
3. a) What are the factors affecting selection of ground improvement ? Write in detail. **6**
- b) Explain with neat sketch installation of PVD in a soil. **4**
- c) Compare sand drain and prefabricated vertical drain. **4**
4. a) Derive the relationship between spacing and equivalent diameter for square grid and triangular grid. **6**
- b) With a neat sketch explain well point system of dewatering. **4**
- c) Derive the relationship for stress co-efficient in case of stone column. **4**
5. a) Design PVD system for a site from the following site details.
- Thickness of clayey strata – 10m  
Drain size to be used – 180 × 20 mm

**Set R**



Clayey strata has permeable boundary both at top and bottom.

Time available for consolidation – 12 months

Co-efficient of vertical consolidation –  $5.34 \times 10^{-4}$  cm<sup>2</sup>/sec. 6

- b) What are the various equipments used for shallow compaction ? What are their characteristics ? 4
- c) How do you decide the filter material for PVD system ? 4

### SECTION – II

6. Write note on **any three** : (4×3=12)
- a) Commonly adopted tests for geotextiles
  - b) Grout Monitoring
  - c) Purpose of soil stabilization
  - d) Tests for geotextiles.
7. a) Discuss about factor of safety of R.E. Wall. 6
- b) List various methods of slope stabilization ? Explain any one in detail. 4
- c) Describe different steps involved in the process of soil stabilization using cement as additive. 4
8. a) List the components parts of grouting equipment with the help of neat sketch. 6
- b) List the major functions that the geotextiles are intended to perform. Explain any one in detail. 4
- c) Discuss the different forms of Geogrid. 4
9. a) Design reinforcement for the earth wall to suit the following parameters. Height of wall = 12 m, backfill soil unit weight = 18kN/m<sup>3</sup>,  $\phi = 27^\circ$ ,  $C = 0$ , Yield stress for the reinforcement strip = 250 kPa, Angle of wall friction =  $0.35 \phi$  6
- b) Discuss the thermal modification methods of soil. 4
- c) What do you understand by slope stabilization ? List the various methods of slope stabilization. 4



SLR-TJ – 69

Seat No.	
----------	--

Set	S
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : GROUND IMPROVEMENT TECHNIQUES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) **Assume** suitable data if necessary and mention it **clearly**.
  - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer (1 mark each) : **(1×20=20)**

- 1) Deep dynamic compaction is invented by  
a) Taylor                      b) Attenberg                      c) Terzaghi                      d) Menard
- 2) In wet method of stone column construction  
a) Stones are made wet before using  
b) Water is added from top in to the column to make it wet  
c) Vibroflot is made wet  
d) Water jet is used for inserting vibroflot
- 3) In case of preloading the load used for improvement of soil is \_\_\_\_\_ load of structure.  
a) exactly equal to                      b) slightly more than  
c) 50% of                      d) none
- 4) Stone column method of ground improvement will  
a) reduce the settlement                      b) accelerate consolidation  
c) reinforce the soil                      d) all
- 5) Time required to undergo consolidation of soil do not depends on  
a) water content of soil                      b) void ratio of soil  
c) permeability of soil                      d) drainage path
- 6) Discharge capacity of drain depends on  
a) lateral earth pressure                      b) clogging of drain  
c) time                      d) All

P.T.O.



- 7) In case of stable cohesive soil; ideal method of stone column construction is  
a) bottom feed method                      b) wet top feed method  
c) dry top feed method                      d) none
- 8) The best economical alternative for deep foundation is  
a) mat foundation   b) stone column   c) both a) and b)   d) neither a) nor b)
- 9) Installation is fast for  
a) stone column   b) sand drain   c) PVD                      d) none
- 10) To retain the soil from entering into drain, fabric material has to satisfy  
a)  $O_{95} \leq (2 \text{ to } 3)D_{85}$                       b)  $O_{85} \leq (2 \text{ to } 3)D_{95}$   
c) both a) and b)                      d) none
- 11) To prevent clogging of drain fabric material has to satisfy  
a)  $100k_s < k_f < 1000 \text{ mm/s}$                       b)  $100k_s < k_f < 100 \text{ mm/s}$   
c)  $1000k_s < k_f < 100 \text{ mm/s}$                       d) all
- 12) Degree of radial consolidation and that of vertical consolidation are related by  
a)  $U = U_r + U_v$    b)  $U = U_r \times U_v$    c)  $U = U_r \div U_v$    d) none
- 13) For effective and efficient grouting of a site, grout has to satisfy \_\_\_\_\_ requirements.  
a) two                      b) three                      c) four                      d) five
- 14) Ability of a grout to reach the desired location is judged by  
a) groutability   b) stability   c) permanence   d) setting time
- 15) For external stability of RE wall it should be safe against  
a) sliding                      b) overturning   c) bearing                      d) all
- 16) Typical operating frequency of a vibrating roller is  
a) 10 Hz                      b) 30 Hz                      c) 30 MHz                      d) 240 Volts
- 17) Sandy and silty soil which benefit most from deep vibration have a blow count N in the range of  
a) 5 – 10                      b) 10 – 20                      c) 20 – 50                      d) > 50
- 18) Stone columns are said to be possible (and beneficial) in thin layers of cohesive soil with undrained cohesion of  
a) < 10 kPa                      b) 10 – 20 kPa   c) 20 – 60 kPa   d) > 200 kPa
- 19) Optimum moisture content in a clayey soil is likely to be  
a) 2 – 5% below PL                      b) 2 – 5% above PL  
c) 2 – 5% below LL                      d) equal to PL
- 20) Which soil require more water content for compacting it to achieve MDD ?  
a) clay                      b) silt                      c) sand                      d) none
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : GROUND IMPROVEMENT TECHNIQUES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) In Section I, Q. No. 2 is **compulsory**, solve **any two** from remaining questions.  
2) In Section II, Q. No. 6 is **compulsory**; solve **any two** from remaining questions.  
3) Figures to the **right** indicate **full** marks.  
4) **Assume** suitable data if necessary and mention it **clearly**.

SECTION – I

2. Write a note on **any three** : **(4×3=12)**
- a) Objective of ground improvement technique.
  - b) Factors affecting selection of ground improvement.
  - c) Dewatering.
  - d) Prefabricated vertical drain.
  - e) Suitability of backfill material for vibrofloatation.
3. a) What are the factors affecting selection of ground improvement ? Write in detail. **6**
- b) Explain with neat sketch installation of PVD in a soil. **4**
- c) Compare sand drain and prefabricated vertical drain. **4**
4. a) Derive the relationship between spacing and equivalent diameter for square grid and triangular grid. **6**
- b) With a neat sketch explain well point system of dewatering. **4**
- c) Derive the relationship for stress co-efficient in case of stone column. **4**
5. a) Design PVD system for a site from the following site details.
- Thickness of clayey strata – 10m  
Drain size to be used – 180 × 20 mm

**Set S**



Clayey strata has permeable boundary both at top and bottom.

Time available for consolidation – 12 months

Co-efficient of vertical consolidation –  $5.34 \times 10^{-4}$  cm<sup>2</sup>/sec. **6**

- b) What are the various equipments used for shallow compaction ? What are their characteristics ? **4**
- c) How do you decide the filter material for PVD system ? **4**

### SECTION – II

6. Write note on **any three** : **(4×3=12)**
- Commonly adopted tests for geotextiles
  - Grout Monitoring
  - Purpose of soil stabilization
  - Tests for geotextiles.
7. a) Discuss about factor of safety of R.E. Wall. **6**
- b) List various methods of slope stabilization ? Explain any one in detail. **4**
- c) Describe different steps involved in the process of soil stabilization using cement as additive. **4**
8. a) List the components parts of grouting equipment with the help of neat sketch. **6**
- b) List the major functions that the geotextiles are intended to perform. Explain any one in detail. **4**
- c) Discuss the different forms of Geogrid. **4**
9. a) Design reinforcement for the earth wall to suit the following parameters. Height of wall = 12 m, backfill soil unit weight = 18kN/m<sup>3</sup>,  $\phi = 27^\circ$ ,  $C = 0$ , Yield stress for the reinforcement strip = 250 kPa, Angle of wall friction =  $0.35 \phi$  **6**
- b) Discuss the thermal modification methods of soil. **4**
- c) What do you understand by slope stabilization. List the various methods of slope stabilization. **4**



SLR-TJ – 70

Seat No.	
----------	--

Set 

P
---

**B.E. (Part – II) (Civil) Examination, 2017**  
**TRAFFIC ENGINEERING AND CONTROL (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Figure on **right** indicates **full** marks.
- 3) Assume **any** missing data **suitably** and mention it **clearly**.
- 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

(20×1=20)

1. Choose the correct answer :

- 1) The 30<sup>th</sup> hourly volume means
  - a) Hourly volume that will be exceeded only 29 times in a year
  - b) Hourly volume that will be exceeded only 30 times in a year
  - c) Hourly volume that will be exceeded only 70 times in a year
  - d) None of the above
- 2) Cumulative speed distribution curve is usually adopted for geometric design of highway. The percentile speed adopted for geometric design is
  - a) 85<sup>th</sup> percentile
  - b) 90<sup>th</sup> percentile
  - c) 98<sup>th</sup> percentile
  - d) 99.9<sup>th</sup> percentile
- 3) If a two lane National Highway and a two lane State Highway intersect at right angles, the number of potential conflict points at the intersection, assuming that both the roads are two-ways is
  - a) 11
  - b) 17
  - c) 24
  - d) 32
- 4) Spot speed is the
  - a) Instantaneous speed of vehicle at a specified location or section
  - b) Average speed of the vehicle at a specified location or section
  - c) Effective speed of the vehicle at a specified location or section
  - d) Normal speed of the vehicle at a specified location or section
- 5) The relationship between volume (q), speed (V) and density (K) is given by
  - a)  $K = \frac{q}{v}$
  - b)  $K = \frac{q}{4v}$
  - c)  $K = \frac{q}{3v}$
  - d)  $\frac{q}{2v}$
- 6) The curve delineation can be done using
  - a) Cat eyes
  - b) Delineators
  - c) Chevron sign
  - d) All the above

P.T.O.



- 7) 'No Entry Sign' is classified under
  - a) Prohibitory sign
  - b) Informatory sign
  - c) Route marker sign
  - d) Traffic sign
- 8) The unit of traffic density is
  - a) Vehicles/hour
  - b) Vehicles/km
  - c) Km/hour
  - d) Vehicles/hour/per lane
- 9) The shape of the STOP sign according to IRC-67-2001 is
  - a) Octagonal
  - b) Circle
  - c) Triangle
  - d) Rectangle
- 10) As per IRC : 67-2001, a traffic sign indicating the speed limit on a road should be of
  - a) Circular shape with white background and red color
  - b) Triangular shape with white background and red color
  - c) Triangular shape with red background and white border
  - d) Circular shape with red background and white border
- 11) In the conditions diagram, the features shown in the diagram are
  - a) Property lines
  - b) Street lighting
  - c) Traffic signs, signals and markings
  - d) All the above
- 12) In signal design as per Webster's method, if the sum of the ratios of normal flows to saturation flow of two directional traffic flow is 0.5 and the total lost time per cycle is 10 seconds, the optimum cycle length in seconds is
  - a) 100
  - b) 80
  - c) 60
  - d) 40
- 13) As per IRC, maximum width of a vehicle is
  - a) 1.75 m
  - b) 2.20 m
  - c) 2.44 m
  - d) 3.12 m
- 14) A part of the signal cycle allocated to a traffic movement or a combination of a traffic movement is called
  - a) Cycle
  - b) Phase
  - c) Amber
  - d) None of these
- 15) The principle of linking the adjacent signals to secure maximum flow is called
  - a) Continuous flow signals
  - b) Signal co-ordination
  - c) Signal control
  - d) Automatic signal
- 16) The traffic manoeuvre means
  - a) Diverging
  - b) Merging
  - c) Crossing
  - d) All of these
- 17) The area of most acute vision of a driver is a cone of
  - a) 3°
  - b) 10°
  - c) 15°
  - d) 20°
- 18) When the speed of the traffic flow decreases
  - a) Density attains maximum value and volume becomes zero
  - b) Density decreases and volume attains maximum value
  - c) Both density and volume increases gradually
  - d) Both density and volume are constant
- 19) The weight of the vehicle affects the design of
  - a) Camber and gradient of a road
  - b) Pavement thickness
  - c) Cross drainage works and tunnels
  - d) Permissible speed of vehicle
- 20) PCU value for Bullock cart as per IRC for vehicles in rural area is
  - a) 2
  - b) 8
  - c) 3
  - d) 1





Seat No.	
----------	--

**B.E. (Part – II) (Civil) Examination, 2017**  
**TRAFFIC ENGINEERING AND CONTROL (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instructions :** 1) Figure on **right** indicates **full** marks.  
2) Assume **any** missing data **suitably** and mention it **clearly**.

SECTION – I

2. Answer **any three** questions (**each** carries **8** marks). **(3×8=24)**

- a) Explain the various vehicular characteristics which affect the road design and traffic performance.
- b) A passenger car weighing 2 tonnes is required to accelerate at a rate of  $3 \text{ m/sec}^2$  in the first gear from a speed of 10 kmph to 20 kmph. The gradient is +1% and the road have a black topped surface. The frontal projection area of the car is  $2.0 \text{ m}^2$ . The car tyres have radius of 0.33 m. The rear axle gear ratio is 3.82 : 1 and the first gear ratio is 2.78 : 1. Calculate the engine horsepower needed and the speed of the engine. Assume co-efficient of air resistance = 0.39, coefficient of rolling resistance = 0.02, tyre deformation factor = 0.935 and transmission efficiency = 0.90.
- c) State the objectives of following studies :
  - a) Speed studies
  - b) Accident studies
  - c) Traffic volume studies.
- d) The table below gives the consolidated data of spot speed studies on a section of a road. Determine the most preferred speed at which maximum proportion of vehicles travels :

Speed Range kmph	No. of vehicles observed	Speed Range kmph	No. of vehicles observed
0 to 10	0	50 to 60	216
10 to 20	11	60 to 70	68
20 to 30	30	70 to 80	24
30 to 40	105	80 to 90	0
40 to 50	233		



3. Answer **any two** questions (**each** carries **8** marks). **(2×8=16)**
- Explain factors affecting capacity and level of service.
  - Explain various preventive measures to reduce accidents.
  - A vehicle skids through a distance equal to 40 m before colliding with another parked vehicle, the weight of which is 60% of the former. After collision both the vehicles skid through 12 m before stopping. Compute the initial speed of moving vehicle, assuming average friction coefficient,  $f = 0.6$ .

## SECTION – II

4. Answer **any three** questions (**each** carries **8** marks). **(3×8=24)**
- Write a short note on
    - Regulation on driver
    - Regulation on speed.
  - Discuss the advantages and disadvantages of one way street.
  - Explain the various types of traffic signals and their functions. How is the signal timings decided ?
  - A fixed type 2 – phase signal is to be provided at an intersection having a North-South and an East-West road, where only straight ahead traffic is permitted. The design hour flows from the various arms and the saturation flows for these arms are given in the following table.

<b>Design hour flow(q) in PCU s/hour</b>	800	400	750	600
<b>Saturation flow(s) in PCU s/hour</b>	2400	2000	3000	3000

Calculate the optimum cycle time and green times for the minimum overall delay. Use Webster's method. Assume time lost per phase due to starting delays as 2 seconds and value of amber period is 2 seconds. Sketch the timing diagram for each phase.

5. Answer **any two** questions (**each** carries **8** marks). **(2×8=16)**
- Explain in detail, the various types of road markings commonly used with neat sketches.
  - Marks the different signs for below locations as per IRC-67-2001.
    - Three arm priority junction.
    - Four arm priority junction.
    - Flyover approach in rural section.
    - Curve delineation in divided highway.
  - Write a short notes on **any two** of ATMS equipments :
    - Pneumatic tube detector.
    - Weigh in Motion (WIM) systems.
    - Video Image Detection (VID).
    - Floating car data.



SLR-TJ – 70

Seat No.	
-------------	--

Set **Q**

**B.E. (Part – II) (Civil) Examination, 2017**  
**TRAFFIC ENGINEERING AND CONTROL (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Figure on **right** indicates **full** marks.
- 3) Assume **any** missing data **suitably** and mention it **clearly**.
- 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

(20×1=20)

1. Choose the correct answer :
- 1) The traffic manoeuvre means  
a) Diverging      b) Merging      c) Crossing      d) All of these
  - 2) The area of most acute vision of a driver is a cone of  
a) 3°      b) 10°      c) 15°      d) 20°
  - 3) When the speed of the traffic flow decreases  
a) Density attains maximum value and volume becomes zero  
b) Density decreases and volume attains maximum value  
c) Both density and volume increases gradually  
d) Both density and volume are constant
  - 4) The weight of the vehicle affects the design of  
a) Camber and gradient of a road      b) Pavement thickness  
c) Cross drainage works and tunnels      d) Permissible speed of vehicle
  - 5) PCU value for Bullock cart as per IRC for vehicles in rural area is  
a) 2      b) 8      c) 3      d) 1
  - 6) The 30<sup>th</sup> hourly volume means  
a) Hourly volume that will be exceeded only 29 times in a year  
b) Hourly volume that will be exceeded only 30 times in a year  
c) Hourly volume that will be exceeded only 70 times in a year  
d) None of the above
  - 7) Cumulative speed distribution curve is usually adopted for geometric design of highway. The percentile speed adopted for geometric design is  
a) 85<sup>th</sup> percentile      b) 90<sup>th</sup> percentile  
c) 98<sup>th</sup> percentile      d) 99.9<sup>th</sup> percentile

P.T.O.



- 8) If a two lane National Highway and a two lane State Highway intersect at right angles, the number of potential conflict points at the intersection, assuming that both the roads are two-ways is  
a) 11                      b) 17                      c) 24                      d) 32
- 9) Spot speed is the  
a) Instantaneous speed of vehicle at a specified location or section  
b) Average speed of the vehicle at a specified location or section  
c) Effective speed of the vehicle at a specified location or section  
d) Normal speed of the vehicle at a specified location or section
- 10) The relationship between volume (q), speed (V) and density (K) is given by  
a)  $K = \frac{q}{v}$                       b)  $K = \frac{q}{4v}$                       c)  $K = \frac{q}{3v}$                       d)  $\frac{q}{2v}$
- 11) The curve delineation can be done using  
a) Cat eyes                      b) Delineators                      c) Chevron sign                      d) All the above
- 12) 'No Entry Sign' is classified under  
a) Prohibitory sign                      b) Informatory sign  
c) Route marker sign                      d) Traffic sign
- 13) The unit of traffic density is  
a) Vehicles/hour                      b) Vehicles/km  
c) Km/hour                      d) Vehicles/hour/per lane
- 14) The shape of the STOP sign according to IRC-67-2001 is  
a) Octagonal                      b) Circle                      c) Triangle                      d) Rectangle
- 15) As per IRC : 67-2001, a traffic sign indicating the speed limit on a road should be of  
a) Circular shape with white background and red color  
b) Triangular shape with white background and red color  
c) Triangular shape with red background and white border  
d) Circular shape with red background and white border
- 16) In the conditions diagram, the features shown in the diagram are  
a) Property lines                      b) Street lighting  
c) Traffic signs, signals and markings                      d) All the above
- 17) In signal design as per Webster's method, if the sum of the ratios of normal flows to saturation flow of two directional traffic flow is 0.5 and the total lost time per cycle is 10 seconds, the optimum cycle length in seconds is  
a) 100                      b) 80                      c) 60                      d) 40
- 18) As per IRC, maximum width of a vehicle is  
a) 1.75 m                      b) 2.20 m                      c) 2.44 m                      d) 3.12 m
- 19) A part of the signal cycle allocated to a traffic movement or a combination of a traffic movement is called  
a) Cycle                      b) Phase                      c) Amber                      d) None of these
- 20) The principle of linking the adjacent signals to secure maximum flow is called  
a) Continuous flow signals                      b) Signal co-ordination  
c) Signal control                      d) Automatic signal



Seat No.	
----------	--

**B.E. (Part – II) (Civil) Examination, 2017**  
**TRAFFIC ENGINEERING AND CONTROL (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instructions :** 1) Figure on **right** indicates **full** marks.  
2) Assume **any** missing data **suitably** and mention it **clearly**.

SECTION – I

2. Answer **any three** questions (**each** carries **8** marks). **(3×8=24)**

- a) Explain the various vehicular characteristics which affect the road design and traffic performance.
- b) A passenger car weighing 2 tonnes is required to accelerate at a rate of  $3 \text{ m/sec}^2$  in the first gear from a speed of 10 kmph to 20 kmph. The gradient is +1% and the road have a black topped surface. The frontal projection area of the car is  $2.0 \text{ m}^2$ . The car tyres have radius of 0.33 m. The rear axle gear ratio is 3.82 : 1 and the first gear ratio is 2.78 : 1. Calculate the engine horsepower needed and the speed of the engine. Assume co-efficient of air resistance = 0.39, coefficient of rolling resistance = 0.02, tyre deformation factor = 0.935 and transmission efficiency = 0.90.
- c) State the objectives of following studies :
  - a) Speed studies
  - b) Accident studies
  - c) Traffic volume studies.
- d) The table below gives the consolidated data of spot speed studies on a section of a road. Determine the most preferred speed at which maximum proportion of vehicles travels :

Speed Range kmph	No. of vehicles observed	Speed Range kmph	No. of vehicles observed
0 to 10	0	50 to 60	216
10 to 20	11	60 to 70	68
20 to 30	30	70 to 80	24
30 to 40	105	80 to 90	0
40 to 50	233		



3. Answer **any two** questions (**each** carries **8** marks). **(2×8=16)**
- Explain factors affecting capacity and level of service.
  - Explain various preventive measures to reduce accidents.
  - A vehicle skids through a distance equal to 40 m before colliding with another parked vehicle, the weight of which is 60% of the former. After collision both the vehicles skid through 12 m before stopping. Compute the initial speed of moving vehicle, assuming average friction coefficient,  $f = 0.6$ .

## SECTION – II

4. Answer **any three** questions (**each** carries **8** marks). **(3×8=24)**
- Write a short note on
    - Regulation on driver
    - Regulation on speed.
  - Discuss the advantages and disadvantages of one way street.
  - Explain the various types of traffic signals and their functions. How is the signal timings decided ?
  - A fixed type 2 – phase signal is to be provided at an intersection having a North-South and an East-West road, where only straight ahead traffic is permitted. The design hour flows from the various arms and the saturation flows for these arms are given in the following table.

<b>Design hour flow(q) in PCU s/hour</b>	800	400	750	600
<b>Saturation flow(s) in PCU s/hour</b>	2400	2000	3000	3000

Calculate the optimum cycle time and green times for the minimum overall delay. Use Webster's method. Assume time lost per phase due to starting delays as 2 seconds and value of amber period is 2 seconds. Sketch the timing diagram for each phase.

5. Answer **any two** questions (**each** carries **8** marks). **(2×8=16)**
- Explain in detail, the various types of road markings commonly used with neat sketches.
  - Marks the different signs for below locations as per IRC-67-2001.
    - Three arm priority junction.
    - Four arm priority junction.
    - Flyover approach in rural section.
    - Curve delineation in divided highway.
  - Write a short notes on **any two** of ATMS equipments :
    - Pneumatic tube detector.
    - Weigh in Motion (WIM) systems.
    - Video Image Detection (VID).
    - Floating car data.



SLR-TJ – 70

Seat No.	
----------	--

Set **R**

**B.E. (Part – II) (Civil) Examination, 2017**  
**TRAFFIC ENGINEERING AND CONTROL (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Figure on **right** indicates **full** marks.
- 3) Assume **any** missing data **suitably** and mention it **clearly**.
- 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(20×1=20)

- 1) In the conditions diagram, the features shown in the diagram are
  - a) Property lines
  - b) Street lighting
  - c) Traffic signs, signals and markings
  - d) All the above
- 2) In signal design as per Webster's method, if the sum of the ratios of normal flows to saturation flow of two directional traffic flow is 0.5 and the total lost time per cycle is 10 seconds, the optimum cycle length in seconds is
  - a) 100
  - b) 80
  - c) 60
  - d) 40
- 3) As per IRC, maximum width of a vehicle is
  - a) 1.75 m
  - b) 2.20 m
  - c) 2.44 m
  - d) 3.12 m
- 4) A part of the signal cycle allocated to a traffic movement or a combination of a traffic movement is called
  - a) Cycle
  - b) Phase
  - c) Amber
  - d) None of these
- 5) The principle of linking the adjacent signals to secure maximum flow is called
  - a) Continuous flow signals
  - b) Signal co-ordination
  - c) Signal control
  - d) Automatic signal
- 6) The traffic manoeuvre means
  - a) Diverging
  - b) Merging
  - c) Crossing
  - d) All of these
- 7) The area of most acute vision of a driver is a cone of
  - a) 3°
  - b) 10°
  - c) 15°
  - d) 20°
- 8) When the speed of the traffic flow decreases
  - a) Density attains maximum value and volume becomes zero
  - b) Density decreases and volume attains maximum value
  - c) Both density and volume increases gradually
  - d) Both density and volume are constant

P.T.O.



- 9) The weight of the vehicle affects the design of  
a) Camber and gradient of a road      b) Pavement thickness  
c) Cross drainage works and tunnels      d) Permissible speed of vehicle
- 10) PCU value for Bullock cart as per IRC for vehicles in rural area is  
a) 2                                      b) 8                                      c) 3                                      d) 1
- 11) The 30<sup>th</sup> hourly volume means  
a) Hourly volume that will be exceeded only 29 times in a year  
b) Hourly volume that will be exceeded only 30 times in a year  
c) Hourly volume that will be exceeded only 70 times in a year  
d) None of the above
- 12) Cumulative speed distribution curve is usually adopted for geometric design of highway. The percentile speed adopted for geometric design is  
a) 85<sup>th</sup> percentile                                      b) 90<sup>th</sup> percentile  
c) 98<sup>th</sup> percentile                                      d) 99.9<sup>th</sup> percentile
- 13) If a two lane National Highway and a two lane State Highway intersect at right angles, the number of potential conflict points at the intersection, assuming that both the roads are two-ways is  
a) 11                                      b) 17                                      c) 24                                      d) 32
- 14) Spot speed is the  
a) Instantaneous speed of vehicle at a specified location or section  
b) Average speed of the vehicle at a specified location or section  
c) Effective speed of the vehicle at a specified location or section  
d) Normal speed of the vehicle at a specified location or section
- 15) The relationship between volume (q), speed (V) and density (K) is given by  
a)  $K = \frac{q}{v}$                                       b)  $K = \frac{q}{4v}$                                       c)  $K = \frac{q}{3v}$                                       d)  $\frac{q}{2v}$
- 16) The curve delineation can be done using  
a) Cat eyes                                      b) Delineators                                      c) Chevron sign                                      d) All the above
- 17) 'No Entry Sign' is classified under  
a) Prohibitory sign                                      b) Informatory sign  
c) Route marker sign                                      d) Traffic sign
- 18) The unit of traffic density is  
a) Vehicles/hour                                      b) Vehicles/km  
c) Km/hour                                      d) Vehicles/hour/per lane
- 19) The shape of the STOP sign according to IRC-67-2001 is  
a) Octagonal                                      b) Circle                                      c) Triangle                                      d) Rectangle
- 20) As per IRC : 67-2001, a traffic sign indicating the speed limit on a road should be of  
a) Circular shape with white background and red color  
b) Triangular shape with white background and red color  
c) Triangular shape with red background and white border  
d) Circular shape with red background and white border





Seat No.	
----------	--

**B.E. (Part – II) (Civil) Examination, 2017  
TRAFFIC ENGINEERING AND CONTROL (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instructions :** 1) Figure on **right** indicates **full** marks.  
2) Assume **any** missing data **suitably** and mention it **clearly**.

SECTION – I

2. Answer **any three** questions (**each** carries **8** marks). **(3×8=24)**

- a) Explain the various vehicular characteristics which affect the road design and traffic performance.
- b) A passenger car weighing 2 tonnes is required to accelerate at a rate of  $3 \text{ m/sec}^2$  in the first gear from a speed of 10 kmph to 20 kmph. The gradient is +1% and the road have a black topped surface. The frontal projection area of the car is  $2.0 \text{ m}^2$ . The car tyres have radius of 0.33 m. The rear axle gear ratio is 3.82 : 1 and the first gear ratio is 2.78 : 1. Calculate the engine horsepower needed and the speed of the engine. Assume co-efficient of air resistance = 0.39, coefficient of rolling resistance = 0.02, tyre deformation factor = 0.935 and transmission efficiency = 0.90.
- c) State the objectives of following studies :
  - a) Speed studies
  - b) Accident studies
  - c) Traffic volume studies.
- d) The table below gives the consolidated data of spot speed studies on a section of a road. Determine the most preferred speed at which maximum proportion of vehicles travels :

Speed Range kmph	No. of vehicles observed	Speed Range kmph	No. of vehicles observed
0 to 10	0	50 to 60	216
10 to 20	11	60 to 70	68
20 to 30	30	70 to 80	24
30 to 40	105	80 to 90	0
40 to 50	233		



3. Answer **any two** questions (**each** carries **8** marks). **(2×8=16)**
- Explain factors affecting capacity and level of service.
  - Explain various preventive measures to reduce accidents.
  - A vehicle skids through a distance equal to 40 m before colliding with another parked vehicle, the weight of which is 60% of the former. After collision both the vehicles skid through 12 m before stopping. Compute the initial speed of moving vehicle, assuming average friction coefficient,  $f = 0.6$ .

## SECTION – II

4. Answer **any three** questions (**each** carries **8** marks). **(3×8=24)**
- Write a short note on
    - Regulation on driver
    - Regulation on speed.
  - Discuss the advantages and disadvantages of one way street.
  - Explain the various types of traffic signals and their functions. How is the signal timings decided ?
  - A fixed type 2 – phase signal is to be provided at an intersection having a North-South and an East-West road, where only straight ahead traffic is permitted. The design hour flows from the various arms and the saturation flows for these arms are given in the following table.

<b>Design hour flow(q) in PCU s/hour</b>	800	400	750	600
<b>Saturation flow(s) in PCU s/hour</b>	2400	2000	3000	3000

Calculate the optimum cycle time and green times for the minimum overall delay. Use Webster's method. Assume time lost per phase due to starting delays as 2 seconds and value of amber period is 2 seconds. Sketch the timing diagram for each phase.

5. Answer **any two** questions (**each** carries **8** marks). **(2×8=16)**
- Explain in detail, the various types of road markings commonly used with neat sketches.
  - Marks the different signs for below locations as per IRC-67-2001.
    - Three arm priority junction.
    - Four arm priority junction.
    - Flyover approach in rural section.
    - Curve delineation in divided highway.
  - Write a short notes on **any two** of ATMS equipments :
    - Pneumatic tube detector.
    - Weigh in Motion (WIM) systems.
    - Video Image Detection (VID).
    - Floating car data.



SLR-TJ – 70

Seat No.	
----------	--

Set **S**

**B.E. (Part – II) (Civil) Examination, 2017**  
**TRAFFIC ENGINEERING AND CONTROL (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Figure on **right** indicates **full** marks.
- 3) Assume **any** missing data **suitably** and mention it **clearly**.
- 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(20×1=20)

- 1) The curve delineation can be done using  
a) Cat eyes                      b) Delineators                      c) Chevron sign                      d) All the above
- 2) 'No Entry Sign' is classified under  
a) Prohibitory sign                      b) Informatory sign  
c) Route marker sign                      d) Traffic sign
- 3) The unit of traffic density is  
a) Vehicles/hour                      b) Vehicles/km  
c) Km/hour                      d) Vehicles/hour/per lane
- 4) The shape of the STOP sign according to IRC-67-2001 is  
a) Octagonal                      b) Circle                      c) Triangle                      d) Rectangle
- 5) As per IRC : 67-2001, a traffic sign indicating the speed limit on a road should be of  
a) Circular shape with white background and red color  
b) Triangular shape with white background and red color  
c) Triangular shape with red background and white border  
d) Circular shape with red background and white border
- 6) In the conditions diagram, the features shown in the diagram are  
a) Property lines                      b) Street lighting  
c) Traffic signs, signals and markings                      d) All the above
- 7) In signal design as per Webster's method, if the sum of the ratios of normal flows to saturation flow of two directional traffic flow is 0.5 and the total lost time per cycle is 10 seconds, the optimum cycle length in seconds is  
a) 100                      b) 80                      c) 60                      d) 40
- 8) As per IRC, maximum width of a vehicle is  
a) 1.75 m                      b) 2.20 m                      c) 2.44 m                      d) 3.12 m

P.T.O.



- 9) A part of the signal cycle allocated to a traffic movement or a combination of a traffic movement is called  
a) Cycle                      b) Phase                      c) Amber                      d) None of these
- 10) The principle of linking the adjacent signals to secure maximum flow is called  
a) Continuous flow signals                      b) Signal co-ordination  
c) Signal control                      d) Automatic signal
- 11) The traffic manoeuvre means  
a) Diverging                      b) Merging                      c) Crossing                      d) All of these
- 12) The area of most acute vision of a driver is a cone of  
a) 3°                      b) 10°                      c) 15°                      d) 20°
- 13) When the speed of the traffic flow decreases  
a) Density attains maximum value and volume becomes zero  
b) Density decreases and volume attains maximum value  
c) Both density and volume increases gradually  
d) Both density and volume are constant
- 14) The weight of the vehicle affects the design of  
a) Camber and gradient of a road                      b) Pavement thickness  
c) Cross drainage works and tunnels                      d) Permissible speed of vehicle
- 15) PCU value for Bullock cart as per IRC for vehicles in rural area is  
a) 2                      b) 8                      c) 3                      d) 1
- 16) The 30<sup>th</sup> hourly volume means  
a) Hourly volume that will be exceeded only 29 times in a year  
b) Hourly volume that will be exceeded only 30 times in a year  
c) Hourly volume that will be exceeded only 70 times in a year  
d) None of the above
- 17) Cumulative speed distribution curve is usually adopted for geometric design of highway. The percentile speed adopted for geometric design is  
a) 85<sup>th</sup> percentile                      b) 90<sup>th</sup> percentile  
c) 98<sup>th</sup> percentile                      d) 99.9<sup>th</sup> percentile
- 18) If a two lane National Highway and a two lane State Highway intersect at right angles, the number of potential conflict points at the intersection, assuming that both the roads are two-ways is  
a) 11                      b) 17                      c) 24                      d) 32
- 19) Spot speed is the  
a) Instantaneous speed of vehicle at a specified location or section  
b) Average speed of the vehicle at a specified location or section  
c) Effective speed of the vehicle at a specified location or section  
d) Normal speed of the vehicle at a specified location or section
- 20) The relationship between volume (q), speed (V) and density (K) is given by  
a)  $K = \frac{q}{v}$                       b)  $K = \frac{q}{4v}$                       c)  $K = \frac{q}{3v}$                       d)  $\frac{q}{2v}$
-



Seat No.	
----------	--

**B.E. (Part – II) (Civil) Examination, 2017**  
**TRAFFIC ENGINEERING AND CONTROL (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instructions :** 1) Figure on **right** indicates **full** marks.  
2) Assume **any** missing data **suitably** and mention it **clearly**.

SECTION – I

2. Answer **any three** questions (**each** carries **8** marks). **(3×8=24)**

- a) Explain the various vehicular characteristics which affect the road design and traffic performance.
- b) A passenger car weighing 2 tonnes is required to accelerate at a rate of  $3 \text{ m/sec}^2$  in the first gear from a speed of 10 kmph to 20 kmph. The gradient is +1% and the road have a black topped surface. The frontal projection area of the car is  $2.0 \text{ m}^2$ . The car tyres have radius of 0.33 m. The rear axle gear ratio is 3.82 : 1 and the first gear ratio is 2.78 : 1. Calculate the engine horsepower needed and the speed of the engine. Assume co-efficient of air resistance = 0.39, coefficient of rolling resistance = 0.02, tyre deformation factor = 0.935 and transmission efficiency = 0.90.
- c) State the objectives of following studies :
  - a) Speed studies
  - b) Accident studies
  - c) Traffic volume studies.
- d) The table below gives the consolidated data of spot speed studies on a section of a road. Determine the most preferred speed at which maximum proportion of vehicles travels :

Speed Range kmph	No. of vehicles observed	Speed Range kmph	No. of vehicles observed
0 to 10	0	50 to 60	216
10 to 20	11	60 to 70	68
20 to 30	30	70 to 80	24
30 to 40	105	80 to 90	0
40 to 50	233		



3. Answer **any two** questions (**each** carries **8** marks). **(2×8=16)**
- Explain factors affecting capacity and level of service.
  - Explain various preventive measures to reduce accidents.
  - A vehicle skids through a distance equal to 40 m before colliding with another parked vehicle, the weight of which is 60% of the former. After collision both the vehicles skid through 12 m before stopping. Compute the initial speed of moving vehicle, assuming average friction coefficient,  $f = 0.6$ .

## SECTION – II

4. Answer **any three** questions (**each** carries **8** marks). **(3×8=24)**
- Write a short note on
    - Regulation on driver
    - Regulation on speed.
  - Discuss the advantages and disadvantages of one way street.
  - Explain the various types of traffic signals and their functions. How is the signal timings decided ?
  - A fixed type 2 – phase signal is to be provided at an intersection having a North-South and an East-West road, where only straight ahead traffic is permitted. The design hour flows from the various arms and the saturation flows for these arms are given in the following table.

<b>Design hour flow(q) in PCU s/hour</b>	800	400	750	600
<b>Saturation flow(s) in PCU s/hour</b>	2400	2000	3000	3000

Calculate the optimum cycle time and green times for the minimum overall delay. Use Webster's method. Assume time lost per phase due to starting delays as 2 seconds and value of amber period is 2 seconds. Sketch the timing diagram for each phase.

5. Answer **any two** questions (**each** carries **8** marks). **(2×8=16)**
- Explain in detail, the various types of road markings commonly used with neat sketches.
  - Marks the different signs for below locations as per IRC-67-2001.
    - Three arm priority junction.
    - Four arm priority junction.
    - Flyover approach in rural section.
    - Curve delineation in divided highway.
  - Write a short notes on **any two** of ATMS equipments :
    - Pneumatic tube detector.
    - Weigh in Motion (WIM) systems.
    - Video Image Detection (VID).
    - Floating car data.



SLR-TJ – 71

Seat  
No.

--

Set

P

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : INFRASTRUCTURAL ENGINEERING**

Day and Date : Thursday, 23-11-2017

Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

**Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.

2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer (**Each MCQ question carries two marks**)

1) What is meant by the term BOO ?

- |                      |                         |
|----------------------|-------------------------|
| a) Build Operate Own | b) Build Own Operate    |
| c) Build Opt Operate | d) Building Own Operate |

2) Which of the following is correct term for DBFM ?

- a) Design Build Finance Maintain
- b) Design Building Finance Maintain
- c) Design Build Finance Manage
- d) Develop Build Finance Manage

3) Which of the following is not type of contract ?

- |                      |                                  |
|----------------------|----------------------------------|
| a) Service contracts | b) Lease-develop-Operate or Buy  |
| c) Design build      | d) Lease-develop-Operate and Buy |

4) Which of the following is not one of the key challenges for sustainability ?

- |          |                      |
|----------|----------------------|
| a) Water | b) Energy            |
| c) Waste | d) Rural development |

5) Which of the following is benefit for Private sector of Public Private Partnership ?

- |                            |                         |
|----------------------------|-------------------------|
| a) Innovative solutions    | b) Export opportunities |
| c) Construction management | d) Sharing the assets   |

P.T.O.



- 6) Which of the following is not risk in infrastructure ?
- a) Demand risk
  - b) Economic risk
  - c) Agricultural risk
  - d) Political risk
- 7) Which of the following is correct term for DBFMO ?
- a) Design Build Finance Maintain Own
  - b) Design Build Finance Maintain Operate
  - c) Design Build Finance Manage Operate
  - d) Design Build Finance Manage Own
- 8) Which of the following is not the principle aspect of sustainable development ?
- a) Energy
  - b) Environmental
  - c) Social
  - d) Economic
- 9) How many contributing factors are considered for Risk Emergence ?
- a) 9
  - b) 10
  - c) 11
  - d) 12
- 10) Which of the following is suitable as VGF scheme ?
- a) Viability Gap Funding Scheme
  - b) Viability Gap Finance Scheme
  - c) Volatile Gap Funding Scheme
  - d) Volatile Growth Funding Scheme
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : INFRASTRUCTURAL ENGINEERING**

Day and Date : Thursday, 23-11-2017

Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I and **any three** questions from Section II.  
2) Assume necessary data if required and mention it **clearly**.  
3) Figures to **right** indicate **full** marks.

SECTION – I

2. a) Explain the term Net Present Value (NPV). **4**  
b) Explain the major constraints in the delivery mechanism and infrastructure of water supply sector. **10**
3. a) What is meant by Public Private Partnership ? **4**  
b) What is the role and responsibilities of Government in Public Private Partnership ? **9**
4. a) Draw a neat diagram for model of public private partnership. **4**  
b) Explain the Viability Gap Funding (VGF) scheme with respect to Public Private Partnership projects. **9**
5. a) Draw a neat diagram for model of public private partnership. **4**  
b) Explain in detail the management contracts. **9**

SECTION – II

6. a) Draw a schematic diagram of four phases of the project life cycle. **4**  
b) What activities are considered in project initiation ? **10**
7. a) Explain Risk identification in detail. **4**  
b) Explain risk allocation in Public Private Partnership project to private sector. **9**
8. a) Write a short note on risk mitigation. **4**  
b) Explain quantitative and qualitative techniques of risk assessment. **9**
9. a) State and discuss five key sustainability challenges. **4**  
b) State the strengths and weaknesses of developing commercially viable infrastructure projects. **9**





SLR-TJ – 71

Seat  
No.

--

Set

Q

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : INFRASTRUCTURAL ENGINEERING**

Day and Date : Thursday, 23-11-2017

Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

**Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.

2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer (**Each MCQ question carries two marks**)

- 1) How many contributing factors are considered for Risk Emergence ?  
a) 9                                      b) 10                                      c) 11                                      d) 12
  
- 2) Which of the following is suitable as VGF scheme ?  
a) Viability Gap Funding Scheme  
b) Viability Gap Finance Scheme  
c) Volatile Gap Funding Scheme  
d) Volatile Growth Funding Scheme
  
- 3) Which of the following is correct term for DBFMO ?  
a) Design Build Finance Maintain Own  
b) Design Build Finance Maintain Operate  
c) Design Build Finance Manage Operate  
d) Design Build Finance Manage Own
  
- 4) Which of the following is not the principle aspect of sustainable development ?  
a) Energy                                      b) Environmental                                      c) Social                                      d) Economic
  
- 5) What is meant by the term BOO ?  
a) Build Operate Own                                      b) Build Own Operate  
c) Build Opt Operate                                      d) Building Own Operate

P.T.O.



- 6) Which of the following is correct term for DBFM ?
- a) Design Build Finance Maintain
  - b) Design Building Finance Maintain
  - c) Design Build Finance Manage
  - d) Develop Build Finance Manage
- 7) Which of the following is not type of contract ?
- a) Service contracts
  - b) Lease-develop-Operate or Buy
  - c) Design build
  - d) Lease-develop-Operate and Buy
- 8) Which of the following is not one of the key challenges for sustainability ?
- a) Water
  - b) Energy
  - c) Waste
  - d) Rural development
- 9) Which of the following is benefit for Private sector of Public Private Partnership ?
- a) Innovative solutions
  - b) Export opportunities
  - c) Construction management
  - d) Sharing the assets
- 10) Which of the following is not risk in infrastructure ?
- a) Demand risk
  - b) Economic risk
  - c) Agricultural risk
  - d) Political risk
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : INFRASTRUCTURAL ENGINEERING**

Day and Date : Thursday, 23-11-2017

Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I and **any three** questions from Section II.  
2) Assume necessary data if required and mention it **clearly**.  
3) Figures to **right** indicate **full** marks.

SECTION – I

2. a) Explain the term Net Present Value (NPV). **4**  
b) Explain the major constraints in the delivery mechanism and infrastructure of water supply sector. **10**
3. a) What is meant by Public Private Partnership ? **4**  
b) What is the role and responsibilities of Government in Public Private Partnership ? **9**
4. a) Draw a neat diagram for model of public private partnership. **4**  
b) Explain the Viability Gap Funding (VGF) scheme with respect to Public Private Partnership projects. **9**
5. a) Draw a neat diagram for model of public private partnership. **4**  
b) Explain in detail the management contracts. **9**

SECTION – II

6. a) Draw a schematic diagram of four phases of the project life cycle. **4**  
b) What activities are considered in project initiation ? **10**
7. a) Explain Risk identification in detail. **4**  
b) Explain risk allocation in Public Private Partnership project to private sector. **9**
8. a) Write a short note on risk mitigation. **4**  
b) Explain quantitative and qualitative techniques of risk assessment. **9**
9. a) State and discuss five key sustainability challenges. **4**  
b) State the strengths and weaknesses of developing commercially viable infrastructure projects. **9**





SLR-TJ – 71

Seat No.	
-------------	--

Set 

R
---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : INFRASTRUCTURAL ENGINEERING**

Day and Date : Thursday, 23-11-2017

Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

**Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.

2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer (**Each MCQ question carries two marks**)

1) Which of the following is benefit for Private sector of Public Private Partnership ?

- |                            |                         |
|----------------------------|-------------------------|
| a) Innovative solutions    | b) Export opportunities |
| c) Construction management | d) Sharing the assets   |

2) Which of the following is not risk in infrastructure ?

- |                      |                   |
|----------------------|-------------------|
| a) Demand risk       | b) Economic risk  |
| c) Agricultural risk | d) Political risk |

3) How many contributing factors are considered for Risk Emergence ?

- |      |       |       |       |
|------|-------|-------|-------|
| a) 9 | b) 10 | c) 11 | d) 12 |
|------|-------|-------|-------|

4) Which of the following is suitable as VGF scheme ?

- Viability Gap Funding Scheme
- Viability Gap Finance Scheme
- Volatile Gap Funding Scheme
- Volatile Growth Funding Scheme

5) Which of the following is not type of contract ?

- |                      |                                  |
|----------------------|----------------------------------|
| a) Service contracts | b) Lease-develop-Operate or Buy  |
| c) Design build      | d) Lease-develop-Operate and Buy |

P.T.O.



- 6) Which of the following is not one of the key challenges for sustainability ?
- a) Water
  - b) Energy
  - c) Waste
  - d) Rural development
- 7) What is meant by the term BOO ?
- a) Build Operate Own
  - b) Build Own Operate
  - c) Build Opt Operate
  - d) Building Own Operate
- 8) Which of the following is correct term for DBFM ?
- a) Design Build Finance Maintain
  - b) Design Building Finance Maintain
  - c) Design Build Finance Manage
  - d) Develop Build Finance Manage
- 9) Which of the following is correct term for DBFMO ?
- a) Design Build Finance Maintain Own
  - b) Design Build Finance Maintain Operate
  - c) Design Build Finance Manage Operate
  - d) Design Build Finance Manage Own
- 10) Which of the following is not the principle aspect of sustainable development ?
- a) Energy
  - b) Environmental
  - c) Social
  - d) Economic
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : INFRASTRUCTURAL ENGINEERING**

Day and Date : Thursday, 23-11-2017

Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I and **any three** questions from Section II.  
2) Assume necessary data if required and mention it **clearly**.  
3) Figures to **right** indicate **full** marks.

SECTION – I

2. a) Explain the term Net Present Value (NPV). **4**  
b) Explain the major constraints in the delivery mechanism and infrastructure of water supply sector. **10**
3. a) What is meant by Public Private Partnership ? **4**  
b) What is the role and responsibilities of Government in Public Private Partnership ? **9**
4. a) Draw a neat diagram for model of public private partnership. **4**  
b) Explain the Viability Gap Funding (VGF) scheme with respect to Public Private Partnership projects. **9**
5. a) Draw a neat diagram for model of public private partnership. **4**  
b) Explain in detail the management contracts. **9**

SECTION – II

6. a) Draw a schematic diagram of four phases of the project life cycle. **4**  
b) What activities are considered in project initiation ? **10**
7. a) Explain Risk identification in detail. **4**  
b) Explain risk allocation in Public Private Partnership project to private sector. **9**
8. a) Write a short note on risk mitigation. **4**  
b) Explain quantitative and qualitative techniques of risk assessment. **9**
9. a) State and discuss five key sustainability challenges. **4**  
b) State the strengths and weaknesses of developing commercially viable infrastructure projects. **9**





SLR-TJ – 71

Seat  
No.

--

Set

S

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : INFRASTRUCTURAL ENGINEERING**

Day and Date : Thursday, 23-11-2017

Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

**Instructions :** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3.

2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer (**Each MCQ question carries two marks**)

- 1) Which of the following is not type of contract ?
  - a) Service contracts
  - b) Lease-develop-Operate or Buy
  - c) Design build
  - d) Lease-develop-Operate and Buy
- 2) Which of the following is not one of the key challenges for sustainability ?
  - a) Water
  - b) Energy
  - c) Waste
  - d) Rural development
- 3) Which of the following is benefit for Private sector of Public Private Partnership ?
  - a) Innovative solutions
  - b) Export opportunities
  - c) Construction management
  - d) Sharing the assets
- 4) Which of the following is not risk in infrastructure ?
  - a) Demand risk
  - b) Economic risk
  - c) Agricultural risk
  - d) Political risk
- 5) Which of the following is correct term for DBFMO ?
  - a) Design Build Finance Maintain Own
  - b) Design Build Finance Maintain Operate
  - c) Design Build Finance Manage Operate
  - d) Design Build Finance Manage Own

P.T.O.



- 6) Which of the following is not the principle aspect of sustainable development ?  
a) Energy                      b) Environmental      c) Social                      d) Economic
- 7) How many contributing factors are considered for Risk Emergence ?  
a) 9                              b) 10                      c) 11                      d) 12
- 8) Which of the following is suitable as VGF scheme ?  
a) Viability Gap Funding Scheme  
b) Viability Gap Finance Scheme  
c) Volatile Gap Funding Scheme  
d) Volatile Growth Funding Scheme
- 9) What is meant by the term BOO ?  
a) Build Operate Own                              b) Build Own Operate  
c) Build Opt Operate                              d) Building Own Operate
- 10) Which of the following is correct term for DBFM ?  
a) Design Build Finance Maintain  
b) Design Building Finance Maintain  
c) Design Build Finance Manage  
d) Develop Build Finance Manage
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : INFRASTRUCTURAL ENGINEERING**

Day and Date : Thursday, 23-11-2017

Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from Section I and **any three** questions from Section II.  
2) Assume necessary data if required and mention it **clearly**.  
3) Figures to **right** indicate **full** marks.

SECTION – I

2. a) Explain the term Net Present Value (NPV). **4**  
b) Explain the major constraints in the delivery mechanism and infrastructure of water supply sector. **10**
3. a) What is meant by Public Private Partnership ? **4**  
b) What is the role and responsibilities of Government in Public Private Partnership ? **9**
4. a) Draw a neat diagram for model of public private partnership. **4**  
b) Explain the Viability Gap Funding (VGF) scheme with respect to Public Private Partnership projects. **9**
5. a) Draw a neat diagram for model of public private partnership. **4**  
b) Explain in detail the management contracts. **9**

SECTION – II

6. a) Draw a schematic diagram of four phases of the project life cycle. **4**  
b) What activities are considered in project initiation ? **10**
7. a) Explain Risk identification in detail. **4**  
b) Explain risk allocation in Public Private Partnership project to private sector. **9**
8. a) Write a short note on risk mitigation. **4**  
b) Explain quantitative and qualitative techniques of risk assessment. **9**
9. a) State and discuss five key sustainability challenges. **4**  
b) State the strengths and weaknesses of developing commercially viable infrastructure projects. **9**





SLR-TJ – 73

Seat No.	
----------	--

Set	<b>P</b>
-----	----------

**B.E. (Civil) (Part – II) Examination, 2017**  
**SOLID AND HAZARDOUS WASTE MANAGEMENT (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Assume suitable data **wherever** necessary and mention **it clearly**.
  - 3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **two** marks.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

**20**

- 1) Mechanical grinders are used for
  - a) Reducing size
  - b) Reducing volume
  - c) Reducing temperature
  - d) None
- 2) Recovery of energy in the form of heat is obtained from
  - a) Combustion process
  - b) Sanitary land filling
  - c) Anaerobic process
  - d) None of these
- 3) Leachate is coloured liquid that comes out of
  - a) Septic tank
  - b) Sanitary land fills
  - c) Aerated lagoons
  - d) None
- 4) What is recovered in the magnetic separation ?
  - a) Ferrous materials
  - b) Non-ferrous materials
  - c) Heat
  - d) None
- 5) The final functional element in solid waste management system is
  - a) Transfer and transportation
  - b) Collection
  - c) Processing and recovery
  - d) Disposal

P.T.O.



- 6) Composting process is affected due to
    - a) Temperature
    - b) Moisture content
    - c) C/N ratio
    - d) All of above
  - 7) Household hazardous waste includes batteries and
    - a) Radioactive waste
    - b) Food waste
    - c) Leachate
    - d) Nail polish
  - 8) Characteristics of Hazardous waste includes
    - a) Ignitibility and corrosivity
    - b) Reactive and Toxicity
    - c) Both a) and b)
    - d) None
  - 9) Important aspect in the implementation of sanitary land fills includes
    - a) Site selection
    - b) Land filling methods
    - c) Movement and control of land fill and leachate
    - d) All of above
  - 10) The Biomedical Waste Management Act was enacted in
    - a) 1988
    - b) 1996
    - c) 1976
    - d) 1998
-





Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**SOLID AND HAZARDOUS WASTE MANAGEMENT (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Solve **any three** questions from Section – I. i.e. Question No. 2 to Question No. 5, Question No. 6 is **compulsory** in Section – II and solve **any two** questions from the **remaining**.
- 2) Figures to the **right** indicate **full** marks.
- 3) Assume suitable data **wherever** necessary and mention **it clearly**.
- 4) **Use** of non-programmable calculator is **not** allowed.

SECTION – I

2. A) Estimate the moisture content of solid waste sample of 100 kg. using the following data :

8

Sr. No.	Component	% by mass	% by MC (Moisture Content)
1	Food Waste	16	65
2	Paper	36	08
3	Cardboards	05	05
4	Plastics	10	02
5	Grass	12	55
6	Wood	08	04
7	Metals	13	03

- B) Explain the functional elements of municipal solid waste management with flow diagram.

6



3. A) Explain theory of composting in brief. 6  
B) Distinguish between Indore method and Bangalore method of composting. 7
4. A) Write in brief MSW (Management and Handling) rule. 5  
B) Write the advantages and disadvantages of incineration treatment. 4  
C) Write short note on pyrolysis and its products. 4
5. A) State and explain briefly the various methods of handling and processing of solid waste. 7  
B) Write the use of different industrial waste. 6

#### SECTION – II

6. A) Define Hazardous waste. Explain in brief characteristics of hazardous waste. 8  
B) Write a note on 'Risk Assessment and Management'. 6
7. A) Draw a cross section of sanitary land fill and explain its essential components. 7  
B) Write site selection criteria for sanitary land filling. 6
8. A) Write a note on waste minimization and resource recovery. 7  
B) Explain natural and manmade hazards with examples. 6
9. A) Explain in detail any one hazard episode. 7  
B) Write a note on Leachate and its control. 6
-



SLR-TJ – 73

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**SOLID AND HAZARDOUS WASTE MANAGEMENT (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Assume suitable data **wherever** necessary and mention **it clearly**.
  - 3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **two** marks.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer : **20**
- 1) Important aspect in the implementation of sanitary land fills includes
    - a) Site selection
    - b) Land filling methods
    - c) Movement and control of land fill and leachate
    - d) All of above
  - 2) The Biomedical Waste Management Act was enacted in
    - a) 1988
    - b) 1996
    - c) 1976
    - d) 1998
  - 3) Household hazardous waste includes batteries and
    - a) Radioactive waste
    - b) Food waste
    - c) Leachate
    - d) Nail polish
  - 4) Characteristics of Hazardous waste includes
    - a) Ignitibility and corrosivity
    - b) Reactivity and Toxicity
    - c) Both a) and b)
    - d) None

P.T.O.



- 5) Mechanical grinders are used for
- a) Reducing size
  - b) Reducing volume
  - c) Reducing temperature
  - d) None
- 6) Recovery of energy in the form of heat is obtained from
- a) Combustion process
  - b) Sanitary land filling
  - c) Anaerobic process
  - d) None of these
- 7) Leachate is coloured liquid that comes out of
- a) Septic tank
  - b) Sanitary land fills
  - c) Aerated lagoons
  - d) None
- 8) What is recovered in the magnetic separation ?
- a) Ferrous materials
  - b) Non-ferrous materials
  - c) Heat
  - d) None
- 9) The final functional element in solid waste management system is
- a) Transfer and transportation
  - b) Collection
  - c) Processing and recovery
  - d) Disposal
- 10) Composting process is affected due to
- a) Temperature
  - b) Moisture content
  - c) C/N ratio
  - d) All of above
-



Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**SOLID AND HAZARDOUS WASTE MANAGEMENT (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Solve **any three** questions from Section – I. i.e. Question No. 2 to Question No. 5, Question No. 6 is **compulsory** in Section – II and solve **any two** questions from the **remaining**.
- 2) Figures to the **right** indicate **full** marks.
- 3) Assume suitable data **wherever** necessary and mention **it clearly**.
- 4) **Use** of non-programmable calculator is **not** allowed.

SECTION – I

2. A) Estimate the moisture content of solid waste sample of 100 kg. using the following data :

8

Sr. No.	Component	% by mass	% by MC (Moisture Content)
1	Food Waste	16	65
2	Paper	36	08
3	Cardboards	05	05
4	Plastics	10	02
5	Grass	12	55
6	Wood	08	04
7	Metals	13	03

- B) Explain the functional elements of municipal solid waste management with flow diagram.

6



3. A) Explain theory of composting in brief. 6  
B) Distinguish between Indore method and Bangalore method of composting. 7
4. A) Write in brief MSW (Management and Handling) rule. 5  
B) Write the advantages and disadvantages of incineration treatment. 4  
C) Write short note on pyrolysis and its products. 4
5. A) State and explain briefly the various methods of handling and processing of solid waste. 7  
B) Write the use of different industrial waste. 6

#### SECTION – II

6. A) Define Hazardous waste. Explain in brief characteristics of hazardous waste. 8  
B) Write a note on 'Risk Assessment and Management'. 6
7. A) Draw a cross section of sanitary land fill and explain its essential components. 7  
B) Write site selection criteria for sanitary land filling. 6
8. A) Write a note on waste minimization and resource recovery. 7  
B) Explain natural and manmade hazards with examples. 6
9. A) Explain in detail any one hazard episode. 7  
B) Write a note on Leachate and its control. 6
-



SLR-TJ – 73

Seat No.	
----------	--

Set	<b>R</b>
-----	----------

**B.E. (Civil) (Part – II) Examination, 2017**  
**SOLID AND HAZARDOUS WASTE MANAGEMENT (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Assume suitable data **wherever** necessary and mention **it clearly**.
  - 3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **two** marks.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

**20**

- 1) The final functional element in solid waste management system is
  - a) Transfer and transportation
  - b) Collection
  - c) Processing and recovery
  - d) Disposal
- 2) Composting process is affected due to
  - a) Temperature
  - b) Moisture content
  - c) C/N ratio
  - d) All of above
- 3) Important aspect in the implementation of sanitary land fills includes
  - a) Site selection
  - b) Land filling methods
  - c) Movement and control of land fill and leachate
  - d) All of above
- 4) The Biomedical Waste Management Act was enacted in
  - a) 1988
  - b) 1996
  - c) 1976
  - d) 1998

P.T.O.



- 5) Leachate is coloured liquid that comes out of
- a) Septic tank
  - b) Sanitary land fills
  - c) Aerated lagoons
  - d) None
- 6) What is recovered in the magnetic separation ?
- a) Ferrous materials
  - b) Non-ferrous materials
  - c) Heat
  - d) None
- 7) Mechanical grinders are used for
- a) Reducing size
  - b) Reducing volume
  - c) Reducing temperature
  - d) None
- 8) Recovery of energy in the form of heat is obtained from
- a) Combustion process
  - b) Sanitary land filling
  - c) Anaerobic process
  - d) None of these
- 9) Household hazardous waste includes batteries and
- a) Radioactive waste
  - b) Food waste
  - c) Leachate
  - d) Nail polish
- 10) Characteristics of Hazardous waste includes
- a) Ignitibility and corrosivity
  - b) Reactive and Toxicity
  - c) Both a) and b)
  - d) None
-





Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**SOLID AND HAZARDOUS WASTE MANAGEMENT (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Solve **any three** questions from Section – I. i.e. Question No. 2 to Question No. 5, Question No. 6 is **compulsory** in Section – II and solve **any two** questions from the **remaining**.
- 2) Figures to the **right** indicate **full** marks.
- 3) Assume suitable data **wherever** necessary and mention **it clearly**.
- 4) **Use** of non-programmable calculator is **not** allowed.

SECTION – I

2. A) Estimate the moisture content of solid waste sample of 100 kg. using the following data :

8

Sr. No.	Component	% by mass	% by MC (Moisture Content)
1	Food Waste	16	65
2	Paper	36	08
3	Cardboards	05	05
4	Plastics	10	02
5	Grass	12	55
6	Wood	08	04
7	Metals	13	03

- B) Explain the functional elements of municipal solid waste management with flow diagram.

6



3. A) Explain theory of composting in brief. 6  
B) Distinguish between Indore method and Bangalore method of composting. 7
4. A) Write in brief MSW (Management and Handling) rule. 5  
B) Write the advantages and disadvantages of incineration treatment. 4  
C) Write short note on pyrolysis and its products. 4
5. A) State and explain briefly the various methods of handling and processing of solid waste. 7  
B) Write the use of different industrial waste. 6

#### SECTION – II

6. A) Define Hazardous waste. Explain in brief characteristics of hazardous waste. 8  
B) Write a note on 'Risk Assessment and Management'. 6
7. A) Draw a cross section of sanitary land fill and explain its essential components. 7  
B) Write site selection criteria for sanitary land filling. 6
8. A) Write a note on waste minimization and resource recovery. 7  
B) Explain natural and manmade hazards with examples. 6
9. A) Explain in detail any one hazard episode. 7  
B) Write a note on Leachate and its control. 6
-



SLR-TJ – 73

Seat No.	
----------	--

Set	<b>S</b>
-----	----------

**B.E. (Civil) (Part – II) Examination, 2017**  
**SOLID AND HAZARDOUS WASTE MANAGEMENT (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Figures to the **right** indicate **full** marks.
  - 2) Assume suitable data **wherever** necessary and mention **it clearly**.
  - 3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **two** marks.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

**20**

- 1) Leachate is coloured liquid that comes out of
  - a) Septic tank
  - b) Sanitary land fills
  - c) Aerated lagoons
  - d) None
- 2) What is recovered in the magnetic separation ?
  - a) Ferrous materials
  - b) Non-ferrous materials
  - c) Heat
  - d) None
- 3) The final functional element in solid waste management system is
  - a) Transfer and transportation
  - b) Collection
  - c) Processing and recovery
  - d) Disposal
- 4) Composting process is affected due to
  - a) Temperature
  - b) Moisture content
  - c) C/N ratio
  - d) All of above
- 5) Household hazardous waste includes batteries and
  - a) Radioactive waste
  - b) Food waste
  - c) Leachate
  - d) Nail polish

P.T.O.



- 6) Characteristics of Hazardous waste includes
- a) Ignitibility and corrosivity
  - b) Reactive and Toxicity
  - c) Both a) and b)
  - d) None
- 7) Important aspect in the implementation of sanitary land fills includes
- a) Site selection
  - b) Land filling methods
  - c) Movement and control of land fill and leachate
  - d) All of above
- 8) The Biomedical Waste Management Act was enacted in
- a) 1988
  - b) 1996
  - c) 1976
  - d) 1998
- 9) Mechanical grinders are used for
- a) Reducing size
  - b) Reducing volume
  - c) Reducing temperature
  - d) None
- 10) Recovery of energy in the form of heat is obtained from
- a) Combustion process
  - b) Sanitary land filling
  - c) Anaerobic process
  - d) None of these
-



Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017  
SOLID AND HAZARDOUS WASTE MANAGEMENT (Elective – II)**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Solve **any three** questions from Section – I. i.e. Question No. 2 to Question No. 5, Question No. 6 is **compulsory** in Section – II and solve **any two** questions from the **remaining**.
- 2) Figures to the **right** indicate **full** marks.
- 3) Assume suitable data **wherever** necessary and mention **it clearly**.
- 4) **Use** of non-programmable calculator is **not** allowed.

SECTION – I

2. A) Estimate the moisture content of solid waste sample of 100 kg. using the following data :

8

Sr. No.	Component	% by mass	% by MC (Moisture Content)
1	Food Waste	16	65
2	Paper	36	08
3	Cardboards	05	05
4	Plastics	10	02
5	Grass	12	55
6	Wood	08	04
7	Metals	13	03

- B) Explain the functional elements of municipal solid waste management with flow diagram.

6



3. A) Explain theory of composting in brief. 6  
B) Distinguish between Indore method and Bangalore method of composting. 7
4. A) Write in brief MSW (Management and Handling) rule. 5  
B) Write the advantages and disadvantages of incineration treatment. 4  
C) Write short note on pyrolysis and its products. 4
5. A) State and explain briefly the various methods of handling and processing of solid waste. 7  
B) Write the use of different industrial waste. 6

#### SECTION – II

6. A) Define Hazardous waste. Explain in brief characteristics of hazardous waste. 8  
B) Write a note on 'Risk Assessment and Management'. 6
7. A) Draw a cross section of sanitary land fill and explain its essential components. 7  
B) Write site selection criteria for sanitary land filling. 6
8. A) Write a note on waste minimization and resource recovery. 7  
B) Explain natural and manmade hazards with examples. 6
9. A) Explain in detail any one hazard episode. 7  
B) Write a note on Leachate and its control. 6
-



SLR-TJ – 76

Seat No.	
----------	--

Set	P
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : DESIGN OF BRIDGES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Solve **any three** questions **each** from Section I and Section II.
  - 4) Figures to the **right** indicates **full** marks.
  - 5) Assume suitable data if **necessary** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(1×20=20)

- 1) Aquaduct is the classification of bridge according to
  - a) Material
  - b) Function
  - c) Type of superstructure
  - d) Inter-span relationship
- 2) Section VII of IRC bridge code deals with
  - a) Composite construction
  - b) Bearings
  - c) Cement concrete
  - d) Foundations and substructure
- 3) Total load in case of IRC 70R tracked loading is
  - a) 700 kN
  - b) 710 kN
  - c) 1000 kN
  - d) 554 kN
- 4) Braking force is assumed to act along the line parallel to roadway and \_\_\_\_\_ above it.
  - a) 1.2 m
  - b) 1.5 m
  - c) 1.8 m
  - d) 2.0 m
- 5) \_\_\_\_\_ is the minimum grade of concrete for prestressed concrete bridges.
  - a) M-30
  - b) M-20
  - c) M-40
  - d) M-25
- 6) Impact force for IRC class A and B is given by
  - a)  $I_f = \frac{AB}{B+L}$
  - b)  $I_f = \frac{B+L}{A}$
  - c)  $I_f = \frac{A}{B+L}$
  - d) None of these
- 7) Solid deck slab is adopted for spans
  - a) More than 8 m
  - b) More than 20 m
  - c) Less than 8 m
  - d) Between 10 – 25 m
- 8) For spans greater than 9 m, impact factor for wheeled vehicle is
  - a) 10%
  - b) 20%
  - c) 25%
  - d) 15%

P.T.O.



- 9) As per crack control criteria of IRC-21, the spacing of main reinforced bar shall not exceed  
a) 100 mm                      b) 300 mm                      c) 200 mm                      d) 150 mm
- 10) The pier cap or abutment cap should be of minimum \_\_\_\_\_ concrete.  
a) M20 grade                      b) M25 grade                      c) M30 grade                      d) None of these
- 11) Following is not the function of the pier cap or abutment cap  
a) Provides immediate bearing surface for the support of the super structure at pier and abutment location  
b) Disperses the strip load from bearing to the substructure evenly  
c) Prevent rain water from dripping down the sides and ends of the pier  
d) Resist all horizontal forces acting on bridges
- 12) The minimum height of Kerb may be taken as \_\_\_\_\_ above the road level.  
a) 250 mm                      b) 225 mm                      c) 600 mm                      d) 300 mm
- 13) Fixed bearing allow  
a) Rotation only                      b) Translation only  
c) Both rotational as well as translation                      d) Restrict rotation as well as translation
- 14) Out of the following which cross section of the bridge pier is found to be e economical  
a) Circular c/s                      b) Rectangular c/s  
c) Square c/s                      d) None of the above
- 15) In case of curved bridges, suitable bearing is  
a) Fixed bearing                      b) Expansion bearing  
c) Rocker bearing                      d) Steel hinge
- 16) According to bridge code, all abutments to be designed for a live load surcharge of height of earth fill is  
a) 1 m                      b) 1.2 m                      c) 1.4 m                      d) 1.6 m
- 17) Courbon's theory is applicable only when the ratio of span to width is  
a) Greater than 2 but less than 4                      b) Greater than 4  
c) Greater than 4 but less than 6                      d) None of these
- 18) For road bridge minimum required grip length is specified as  
a)  $\frac{1}{2}$  the maximum scour depth                      b)  $\frac{1}{3}$  the maximum scour depth  
c)  $\frac{2}{3}$  the maximum scour depth                      d) Equal to the maximum scour depth
- 19) For railway bridge minimum required grip length is specified as  
a)  $\frac{1}{2}$  the maximum scour depth                      b)  $\frac{1}{3}$  the maximum scour depth  
c)  $\frac{2}{3}$  the maximum scour depth                      d) Equal to the maximum scour depth
- 20) Two span girder requires  
a) Fixed bearing at central support and expansion bearing at the two abutment  
b) Fixed bearing at all supports  
c) Expansion bearing on all supports  
d) Expansion bearing at central support and fixed bearing at the two abutment





Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017  
Elective – II : DESIGN OF BRIDGES**

Day and Date : Thursday, 23-11-2017

Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions **each** from Section I and Section II.  
2) Figures to the **right** indicates **full** marks.  
3) Assume suitable data if **necessary** and mention it **clearly**.

SECTION – I

2. Answer the following : (3.5×4=14)
- A) What are the characteristics of an ideal site for a major bridge across a river ?
  - B) What is the importance of subsoil exploration in the design of major bridges ?
  - C) What are the requirements of bar sizes and spacing to ensure crack control in concrete ?
  - D) Write a note on Courbon's theory with its limitations.
3. Design a solid deck slab for two lane bridge with following data : 13
- a) Effective span – 7 m
  - b) Carriage way width – 7.5 m
  - c) Kerb – 600 × 275 on both side
  - d) Live load – IRC Class AA tracked
  - e) Wearing coat – 100 mm thick
  - f) Use M-25 concrete and Fe-415 steel
  - g) Use  $\alpha = 2.64$ .
4. A RCC T beam type bridge having deck slab of 230 mm thick, wearing coat of 80 mm thick, three longitudinal girders and five cross girders. Design longitudinal girder for following additional data:
- a) Carriage way width – 9 m
  - b) Span of bridge – 14 m
  - c) Live Load – IRC class A Two Lane
  - d) Kerb – 600 mm wide, 400 mm deep
  - e) Web thickness for longitudinal and cross girder – 300 mm
  - f) Longitudinal girder spacing – 3.25 m
  - g) Use M-30 concrete and Fe-415 steel. 13
5. Answer the following :
- A) Explain the Piguad's theory for the analysis of slab panels. What are the limitations of this theory ? 7
  - B) Explain the IRC class B loading for bridges. Write about its suitability. 6

**Set P**



## SECTION – II

6. Verify the adequacy of pier for the following data :

Top width of pier – 1.7 m, height of pier upto springing level – 10 m, C/C distance of bearing – 1 m, side batter 1 : 12, HFL – 1.5 m below the bearing level, span of bridge – 12 m, reaction due to D.L. from each span = 1900 kN, reaction due to L.L. from each span = 900 kN, live load – IRC class AA tracked.

Material of pier = M20 concrete.

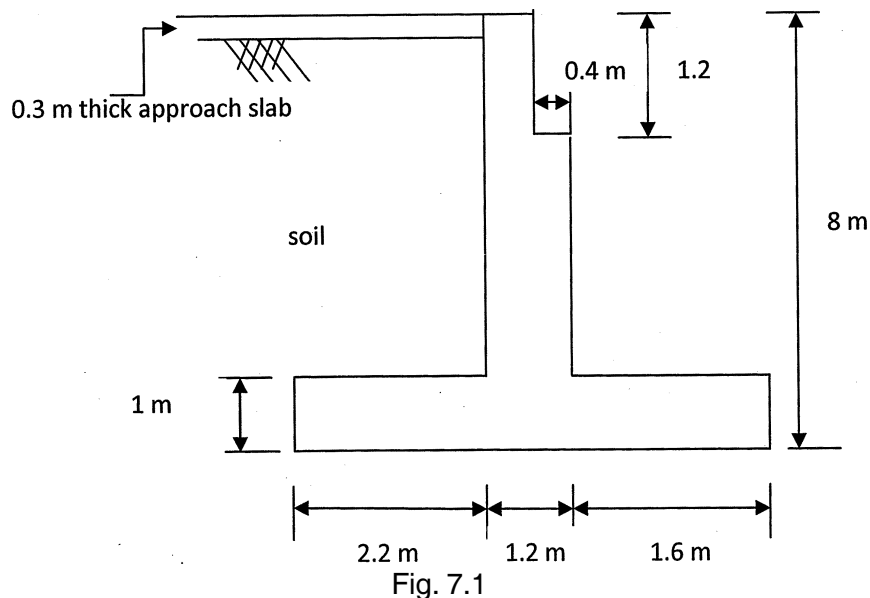
13

7. Verify the suitability of abutment as shown in the Fig. 7.1. Use following data

Density of soil –  $18 \text{ kN/m}^3$ , Friction angle of soil ( $\phi$ ) =  $31^\circ$

Coefficient of friction – 0.6, Live load IRC class AA tracked.

13



8. A) Design a elastomeric unreinforced bearing pad for following data :

Vertical load (sustained) = 196 kN

Vertical load (dynamic) = 46 kN

Horizontal force = 56 kN

Modulus of rigidity of elastomer –  $1.1 \text{ N/mm}^2$

Coefficient of friction = 0.3

8

- B) Write a note on inspection of bridges.

5

9. Write a note on following (**any four**) :

(3.5×4=14)

- Function of approach slab.
- Importance of bridge inspection.
- Expansion joints.
- Types of bearing.
- Reinforced earth retaining wall.

Set P



SLR-TJ – 76

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : DESIGN OF BRIDGES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Solve **any three** questions **each** from Section I and Section II.
  - 4) Figures to the **right** indicates **full** marks.
  - 5) Assume suitable data if **necessary** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(1×20=20)

- 1) According to bridge code, all abutments to be designed for a live load surcharge of height of earth fill is
  - a) 1 m
  - b) 1.2 m
  - c) 1.4 m
  - d) 1.6 m
- 2) Courbon's theory is applicable only when the ratio of span to width is
  - a) Greater than 2 but less than 4
  - b) Greater than 4
  - c) Greater than 4 but less than 6
  - d) None of these
- 3) For road bridge minimum required grip length is specified as
  - a)  $\frac{1}{2}$  the maximum scour depth
  - b)  $\frac{1}{3}$  the maximum scour depth
  - c)  $\frac{2}{3}$  the maximum scour depth
  - d) Equal to the maximum scour depth
- 4) For railway bridge minimum required grip length is specified as
  - a)  $\frac{1}{2}$  the maximum scour depth
  - b)  $\frac{1}{3}$  the maximum scour depth
  - c)  $\frac{2}{3}$  the maximum scour depth
  - d) Equal to the maximum scour depth
- 5) Two span girder requires
  - a) Fixed bearing at central support and expansion bearing at the two abutment
  - b) Fixed bearing at all supports
  - c) Expansion bearing on all supports
  - d) Expansion bearing at central support and fixed bearing at the two abutment
- 6) Aquaduct is the classification of bridge according to
  - a) Material
  - b) Function
  - c) Type of superstructure
  - d) Inter-span relationship
- 7) Section VII of IRC bridge code deals with
  - a) Composite construction
  - b) Bearings
  - c) Cement concrete
  - d) Foundations and substructure

P.T.O.



- 8) Total load in case of IRC 70R tracked loading is  
a) 700 kN                      b) 710 kN                      c) 1000 kN                      d) 554 kN
- 9) Braking force is assumed to act along the line parallel to roadway and \_\_\_\_\_ above it.  
a) 1.2 m                      b) 1.5 m                      c) 1.8 m                      d) 2.0 m
- 10) \_\_\_\_\_ is the minimum grade of concrete for prestressed concrete bridges.  
a) M-30                      b) M-20                      c) M-40                      d) M-25
- 11) Impact force for IRC class A and B is given by  
a)  $I_f = \frac{AB}{B+L}$                       b)  $I_f = \frac{B+L}{A}$                       c)  $I_f = \frac{A}{B+L}$                       d) None of these
- 12) Solid deck slab is adopted for spans  
a) More than 8 m                      b) More than 20 m  
c) Less than 8 m                      d) Between 10 – 25 m
- 13) For spans greater than 9 m, impact factor for wheeled vehicle is  
a) 10%                      b) 20%                      c) 25%                      d) 15%
- 14) As per crack control criteria of IRC-21, the spacing of main reinforced bar shall not exceed  
a) 100 mm                      b) 300 mm                      c) 200 mm                      d) 150 mm
- 15) The pier cap or abutment cap should be of minimum \_\_\_\_\_ concrete.  
a) M20 grade                      b) M25 grade                      c) M30 grade                      d) None of these
- 16) Following is not the function of the pier cap or abutment cap  
a) Provides immediate bearing surface for the support of the super structure at pier and abutment location  
b) Disperses the strip load from bearing to the substructure evenly  
c) Prevent rain water from dripping down the sides and ends of the pier  
d) Resist all horizontal forces acting on bridges
- 17) The minimum height of Kerb may be taken as \_\_\_\_\_ above the road level.  
a) 250 mm                      b) 225 mm                      c) 600 mm                      d) 300 mm
- 18) Fixed bearing allow  
a) Rotation only                      b) Translation only  
c) Both rotational as well as translation                      d) Restrict rotation as well as translation
- 19) Out of the following which cross section of the bridge pier is found to be e economical  
a) Circular c/s                      b) Rectangular c/s  
c) Square c/s                      d) None of the above
- 20) In case of curved bridges, suitable bearing is  
a) Fixed bearing                      b) Expansion bearing  
c) Rocker bearing                      d) Steel hinge



Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017  
Elective – II : DESIGN OF BRIDGES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Solve **any three** questions **each** from Section I and Section II.  
2) Figures to the **right** indicates **full** marks.  
3) Assume suitable data if **necessary** and mention it **clearly**.

SECTION – I

2. Answer the following : (3.5×4=14)
- A) What are the characteristics of an ideal site for a major bridge across a river ?
  - B) What is the importance of subsoil exploration in the design of major bridges ?
  - C) What are the requirements of bar sizes and spacing to ensure crack control in concrete ?
  - D) Write a note on Courbon's theory with its limitations.
3. Design a solid deck slab for two lane bridge with following data : 13
- a) Effective span – 7 m
  - b) Carriage way width – 7.5 m
  - c) Kerb – 600 × 275 on both side
  - d) Live load – IRC Class AA tracked
  - e) Wearing coat – 100 mm thick
  - f) Use M-25 concrete and Fe-415 steel
  - g) Use  $\alpha = 2.64$ .
4. A RCC T beam type bridge having deck slab of 230 mm thick, wearing coat of 80 mm thick, three longitudinal girders and five cross girders. Design longitudinal girder for following additional data:
- a) Carriage way width – 9 m
  - b) Span of bridge – 14 m
  - c) Live Load – IRC class A Two Lane
  - d) Kerb – 600 mm wide, 400 mm deep
  - e) Web thickness for longitudinal and cross girder – 300 mm
  - f) Longitudinal girder spacing – 3.25 m
  - g) Use M-30 concrete and Fe-415 steel. 13
5. Answer the following :
- A) Explain the Piguad's theory for the analysis of slab panels. What are the limitations of this theory ? 7
  - B) Explain the IRC class B loading for bridges. Write about its suitability. 6

**Set Q**



## SECTION – II

6. Verify the adequacy of pier for the following data :

Top width of pier – 1.7 m, height of pier upto springing level – 10 m, C/C distance of bearing – 1 m, side batter 1 : 12, HFL – 1.5 m below the bearing level, span of bridge – 12 m, reaction due to D.L. from each span = 1900 kN, reaction due to L.L. from each span = 900 kN, live load – IRC class AA tracked.

Material of pier = M20 concrete.

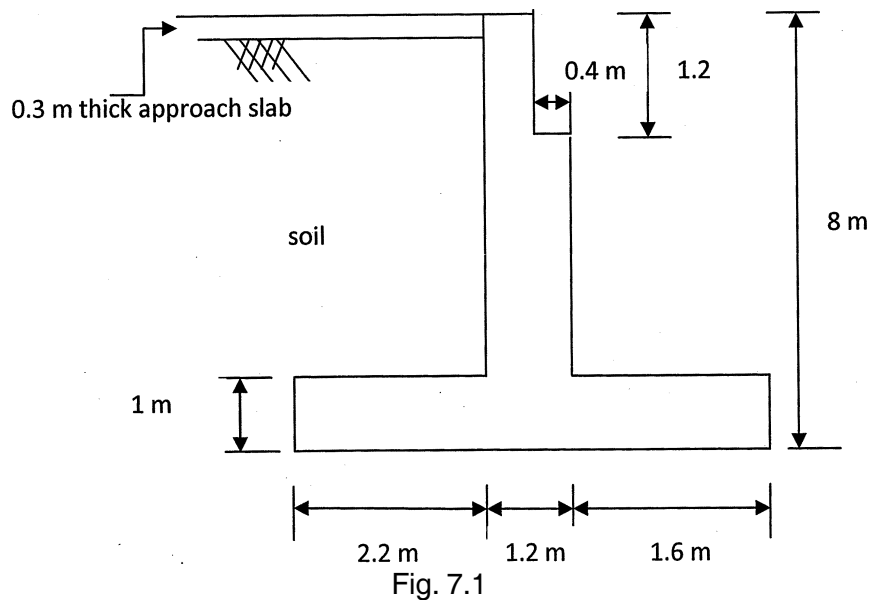
13

7. Verify the suitability of abutment as shown in the Fig. 7.1. Use following data

Density of soil –  $18 \text{ kN/m}^3$ , Friction angle of soil ( $\phi$ ) =  $31^\circ$

Coefficient of friction – 0.6, Live load IRC class AA tracked.

13



8. A) Design a elastomeric unreinforced bearing pad for following data :

Vertical load (sustained) = 196 kN

Vertical load (dynamic) = 46 kN

Horizontal force = 56 kN

Modulus of rigidity of elastomer –  $1.1 \text{ N/mm}^2$

Coefficient of friction = 0.3

8

- B) Write a note on inspection of bridges.

5

9. Write a note on following (**any four**) :

(3.5×4=14)

- Function of approach slab.
- Importance of bridge inspection.
- Expansion joints.
- Types of bearing.
- Reinforced earth retaining wall.

Set Q



SLR-TJ – 76

Seat No.	
----------	--

Set **R**

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : DESIGN OF BRIDGES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Solve **any three** questions **each** from Section I and Section II.
  - 4) Figures to the **right** indicates **full** marks.
  - 5) Assume suitable data if **necessary** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

**(1×20=20)**

- 1) Following is not the function of the pier cap or abutment cap
  - a) Provides immediate bearing surface for the support of the super structure at pier and abutment location
  - b) Disperses the strip load from bearing to the substructure evenly
  - c) Prevent rain water from dripping down the sides and ends of the pier
  - d) Resist all horizontal forces acting on bridges
- 2) The minimum height of Kerb may be taken as \_\_\_\_\_ above the road level.
  - a) 250 mm
  - b) 225 mm
  - c) 600 mm
  - d) 300 mm
- 3) Fixed bearing allow
  - a) Rotation only
  - b) Translation only
  - c) Both rotational as well as translation
  - d) Restrict rotation as well as translation
- 4) Out of the following which cross section of the bridge pier is found to be economical
  - a) Circular c/s
  - b) Rectangular c/s
  - c) Square c/s
  - d) None of the above
- 5) In case of curved bridges, suitable bearing is
  - a) Fixed bearing
  - b) Expansion bearing
  - c) Rocker bearing
  - d) Steel hinge
- 6) According to bridge code, all abutments to be designed for a live load surcharge of height of earth fill is
  - a) 1 m
  - b) 1.2 m
  - c) 1.4 m
  - d) 1.6 m
- 7) Courbon's theory is applicable only when the ratio of span to width is
  - a) Greater than 2 but less than 4
  - b) Greater than 4
  - c) Greater than 4 but less than 6
  - d) None of these

P.T.O.



- 8) For road bridge minimum required grip length is specified as
- a)  $\frac{1}{2}$  the maximum scour depth                      b)  $\frac{1}{3}$  the maximum scour depth  
 c)  $\frac{2}{3}$  the maximum scour depth                      d) Equal to the maximum scour depth
- 9) For railway bridge minimum required grip length is specified as
- a)  $\frac{1}{2}$  the maximum scour depth                      b)  $\frac{1}{3}$  the maximum scour depth  
 c)  $\frac{2}{3}$  the maximum scour depth                      d) Equal to the maximum scour depth
- 10) Two span girder requires
- a) Fixed bearing at central support and expansion bearing at the two abutment  
 b) Fixed bearing at all supports  
 c) Expansion bearing on all supports  
 d) Expansion bearing at central support and fixed bearing at the two abutment
- 11) Aquaduct is the classification of bridge according to
- a) Material    b) Function  
 c) Type of superstructure                                      d) Inter-span relationship
- 12) Section VII of IRC bridge code deals with
- a) Composite construction                                      b) Bearings  
 c) Cement concrete    d) Foundations and substructure
- 13) Total load in case of IRC 70R tracked loading is
- a) 700 kN                                      b) 710 kN                                      c) 1000 kN                                      d) 554 kN
- 14) Braking force is assumed to act along the line parallel to roadway and \_\_\_\_\_ above it.
- a) 1.2 m                                      b) 1.5 m                                      c) 1.8 m                                      d) 2.0 m
- 15) \_\_\_\_\_ is the minimum grade of concrete for prestressed concrete bridges.
- a) M-30                                      b) M-20                                      c) M-40                                      d) M-25
- 16) Impact force for IRC class A and B is given by
- a)  $I_f = \frac{AB}{B+L}$                                       b)  $I_f = \frac{B+L}{A}$                                       c)  $I_f = \frac{A}{B+L}$                                       d) None of these
- 17) Solid deck slab is adopted for spans
- a) More than 8 m    b) More than 20 m  
 c) Less than 8 m    d) Between 10 – 25 m
- 18) For spans greater than 9 m, impact factor for wheeled vehicle is
- a) 10%                                      b) 20%                                      c) 25%                                      d) 15%
- 19) As per crack control criteria of IRC-21, the spacing of main reinforced bar shall not exceed
- a) 100 mm                                      b) 300 mm                                      c) 200 mm                                      d) 150 mm
- 20) The pier cap or abutment cap should be of minimum \_\_\_\_\_ concrete.
- a) M20 grade                                      b) M25 grade                                      c) M30 grade                                      d) None of these
-





Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017  
Elective – II : DESIGN OF BRIDGES**

Day and Date : Thursday, 23-11-2017

Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions **each** from Section I and Section II.  
2) Figures to the **right** indicates **full** marks.  
3) Assume suitable data if **necessary** and mention it **clearly**.

SECTION – I

2. Answer the following : (3.5×4=14)
- A) What are the characteristics of an ideal site for a major bridge across a river ?
  - B) What is the importance of subsoil exploration in the design of major bridges ?
  - C) What are the requirements of bar sizes and spacing to ensure crack control in concrete ?
  - D) Write a note on Courbon's theory with its limitations.
3. Design a solid deck slab for two lane bridge with following data : 13
- a) Effective span – 7 m
  - b) Carriage way width – 7.5 m
  - c) Kerb – 600 × 275 on both side
  - d) Live load – IRC Class AA tracked
  - e) Wearing coat – 100 mm thick
  - f) Use M-25 concrete and Fe-415 steel
  - g) Use  $\alpha = 2.64$ .
4. A RCC T beam type bridge having deck slab of 230 mm thick, wearing coat of 80 mm thick, three longitudinal girders and five cross girders. Design longitudinal girder for following additional data:
- a) Carriage way width – 9 m
  - b) Span of bridge – 14 m
  - c) Live Load – IRC class A Two Lane
  - d) Kerb – 600 mm wide, 400 mm deep
  - e) Web thickness for longitudinal and cross girder – 300 mm
  - f) Longitudinal girder spacing – 3.25 m
  - g) Use M-30 concrete and Fe-415 steel. 13
5. Answer the following :
- A) Explain the Piguad's theory for the analysis of slab panels. What are the limitations of this theory ? 7
  - B) Explain the IRC class B loading for bridges. Write about its suitability. 6

**Set R**



## SECTION – II

6. Verify the adequacy of pier for the following data :

Top width of pier – 1.7 m, height of pier upto springing level – 10 m, C/C distance of bearing – 1 m, side batter 1 : 12, HFL – 1.5 m below the bearing level, span of bridge – 12 m, reaction due to D.L. from each span = 1900 kN, reaction due to L.L. from each span = 900 kN, live load – IRC class AA tracked.

Material of pier = M20 concrete.

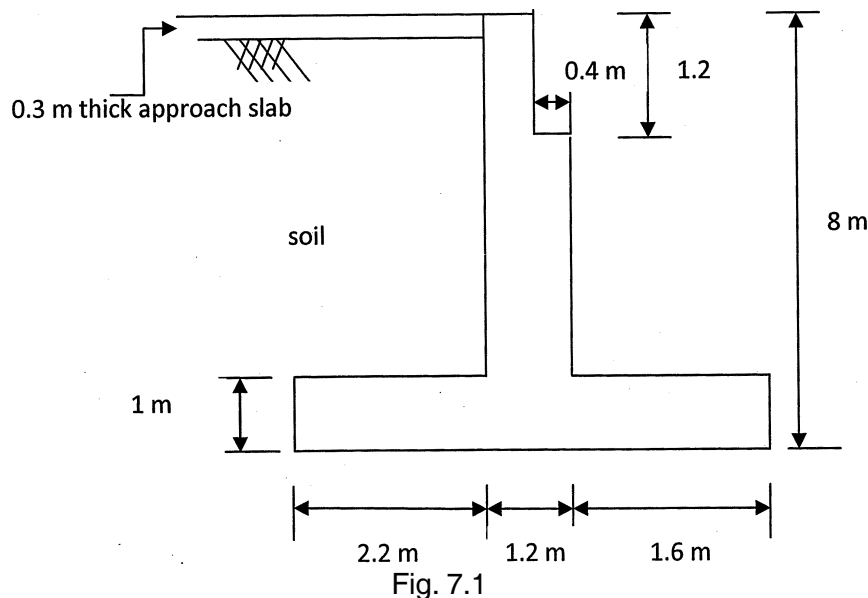
13

7. Verify the suitability of abutment as shown in the Fig. 7.1. Use following data

Density of soil –  $18 \text{ kN/m}^3$ , Friction angle of soil ( $\phi$ ) =  $31^\circ$

Coefficient of friction – 0.6, Live load IRC class AA tracked.

13



8. A) Design a elastomeric unreinforced bearing pad for following data :

Vertical load (sustained) = 196 kN

Vertical load (dynamic) = 46 kN

Horizontal force = 56 kN

Modulus of rigidity of elastomer –  $1.1 \text{ N/mm}^2$

Coefficient of friction = 0.3

8

- B) Write a note on inspection of bridges.

5

9. Write a note on following (**any four**) :

(3.5×4=14)

- Function of approach slab.
- Importance of bridge inspection.
- Expansion joints.
- Types of bearing.
- Reinforced earth retaining wall.

Set R



SLR-TJ – 76

Seat No.	
----------	--

Set	S
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : DESIGN OF BRIDGES**

Day and Date : Thursday, 23-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Solve **any three** questions **each** from Section I and Section II.
  - 4) Figures to the **right** indicates **full** marks.
  - 5) Assume suitable data if **necessary** and mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(1×20=20)

1) Impact force for IRC class A and B is given by

- a)  $I_f = \frac{AB}{B+L}$       b)  $I_f = \frac{B+L}{A}$       c)  $I_f = \frac{A}{B+L}$       d) None of these

2) Solid deck slab is adopted for spans

- a) More than 8 m      b) More than 20 m  
c) Less than 8 m      d) Between 10 – 25 m

3) For spans greater than 9 m, impact factor for wheeled vehicle is

- a) 10%      b) 20%      c) 25%      d) 15%

4) As per crack control criteria of IRC-21, the spacing of main reinforced bar shall not exceed

- a) 100 mm      b) 300 mm      c) 200 mm      d) 150 mm

5) The pier cap or abutment cap should be of minimum \_\_\_\_\_ concrete.

- a) M20 grade      b) M25 grade      c) M30 grade      d) None of these

6) Following is not the function of the pier cap or abutment cap

- a) Provides immediate bearing surface for the support of the super structure at pier and abutment location  
b) Disperses the strip load from bearing to the substructure evenly  
c) Prevent rain water from dripping down the sides and ends of the pier  
d) Resist all horizontal forces acting on bridges

7) The minimum height of Kerb may be taken as \_\_\_\_\_ above the road level.

- a) 250 mm      b) 225 mm      c) 600 mm      d) 300 mm

P.T.O.



- 8) Fixed bearing allow
- a) Rotation only
  - b) Translation only
  - c) Both rotational as well as translation
  - d) Restrict rotation as well as translation
- 9) Out of the following which cross section of the bridge pier is found to be economical
- a) Circular c/s
  - b) Rectangular c/s
  - c) Square c/s
  - d) None of the above
- 10) In case of curved bridges, suitable bearing is
- a) Fixed bearing
  - b) Expansion bearing
  - c) Rocker bearing
  - d) Steel hinge
- 11) According to bridge code, all abutments to be designed for a live load surcharge of height of earth fill is
- a) 1 m
  - b) 1.2 m
  - c) 1.4 m
  - d) 1.6 m
- 12) Courbon's theory is applicable only when the ratio of span to width is
- a) Greater than 2 but less than 4
  - b) Greater than 4
  - c) Greater than 4 but less than 6
  - d) None of these
- 13) For road bridge minimum required grip length is specified as
- a)  $\frac{1}{2}$  the maximum scour depth
  - b)  $\frac{1}{3}$  the maximum scour depth
  - c)  $\frac{2}{3}$  the maximum scour depth
  - d) Equal to the maximum scour depth
- 14) For railway bridge minimum required grip length is specified as
- a)  $\frac{1}{2}$  the maximum scour depth
  - b)  $\frac{1}{3}$  the maximum scour depth
  - c)  $\frac{2}{3}$  the maximum scour depth
  - d) Equal to the maximum scour depth
- 15) Two span girder requires
- a) Fixed bearing at central support and expansion bearing at the two abutment
  - b) Fixed bearing at all supports
  - c) Expansion bearing on all supports
  - d) Expansion bearing at central support and fixed bearing at the two abutment
- 16) Aquaduct is the classification of bridge according to
- a) Material
  - b) Function
  - c) Type of superstructure
  - d) Inter-span relationship
- 17) Section VII of IRC bridge code deals with
- a) Composite construction
  - b) Bearings
  - c) Cement concrete
  - d) Foundations and substructure
- 18) Total load in case of IRC 70R tracked loading is
- a) 700 kN
  - b) 710 kN
  - c) 1000 kN
  - d) 554 kN
- 19) Braking force is assumed to act along the line parallel to roadway and \_\_\_\_\_ above it.
- a) 1.2 m
  - b) 1.5 m
  - c) 1.8 m
  - d) 2.0 m
- 20) \_\_\_\_\_ is the minimum grade of concrete for prestressed concrete bridges.
- a) M-30
  - b) M-20
  - c) M-40
  - d) M-25



Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – II : DESIGN OF BRIDGES**

Day and Date : Thursday, 23-11-2017

Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions **each** from Section I and Section II.  
2) Figures to the **right** indicates **full** marks.  
3) Assume suitable data if **necessary** and mention it **clearly**.

SECTION – I

2. Answer the following : (3.5×4=14)
- A) What are the characteristics of an ideal site for a major bridge across a river ?
  - B) What is the importance of subsoil exploration in the design of major bridges ?
  - C) What are the requirements of bar sizes and spacing to ensure crack control in concrete ?
  - D) Write a note on Courbon's theory with its limitations.
3. Design a solid deck slab for two lane bridge with following data : 13
- a) Effective span – 7 m
  - b) Carriage way width – 7.5 m
  - c) Kerb – 600 × 275 on both side
  - d) Live load – IRC Class AA tracked
  - e) Wearing coat – 100 mm thick
  - f) Use M-25 concrete and Fe-415 steel
  - g) Use  $\alpha = 2.64$ .
4. A RCC T beam type bridge having deck slab of 230 mm thick, wearing coat of 80 mm thick, three longitudinal girders and five cross girders. Design longitudinal girder for following additional data:
- a) Carriage way width – 9 m
  - b) Span of bridge – 14 m
  - c) Live Load – IRC class A Two Lane
  - d) Kerb – 600 mm wide, 400 mm deep
  - e) Web thickness for longitudinal and cross girder – 300 mm
  - f) Longitudinal girder spacing – 3.25 m
  - g) Use M-30 concrete and Fe-415 steel. 13
5. Answer the following :
- A) Explain the Piguad's theory for the analysis of slab panels. What are the limitations of this theory ? 7
  - B) Explain the IRC class B loading for bridges. Write about its suitability. 6

**Set S**



## SECTION – II

6. Verify the adequacy of pier for the following data :

Top width of pier – 1.7 m, height of pier upto springing level – 10 m, C/C distance of bearing – 1 m, side batter 1 : 12, HFL – 1.5 m below the bearing level, span of bridge – 12 m, reaction due to D.L. from each span = 1900 kN, reaction due to L.L. from each span = 900 kN, live load – IRC class AA tracked.

Material of pier = M20 concrete.

13

7. Verify the suitability of abutment as shown in the Fig. 7.1. Use following data

Density of soil –  $18 \text{ kN/m}^3$ , Friction angle of soil ( $\phi$ ) =  $31^\circ$

Coefficient of friction – 0.6, Live load IRC class AA tracked.

13

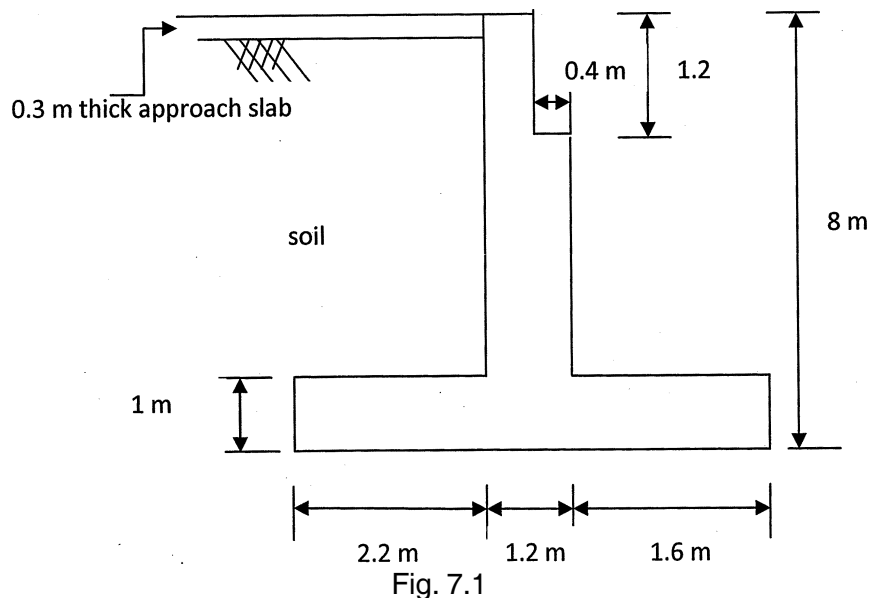


Fig. 7.1

8. A) Design a elastomeric unreinforced bearing pad for following data :

Vertical load (sustained) = 196 kN

Vertical load (dynamic) = 46 kN

Horizontal force = 56 kN

Modulus of rigidity of elastomer –  $1.1 \text{ N/mm}^2$

Coefficient of friction = 0.3

8

- B) Write a note on inspection of bridges.

5

9. Write a note on following (**any four**) :

(3.5×4=14)

- Function of approach slab.
- Importance of bridge inspection.
- Expansion joints.
- Types of bearing.
- Reinforced earth retaining wall.

Set S



SLR-TJ – 77

Seat No.	
----------	--

Set	<b>P</b>
-----	----------

**B.E. (Civil) Part – II Examination, 2017**  
**Elective – III**  
**ADVANCED DESIGN OF STEEL STRUCTURES**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- N.B :**
- 1) Solve **any two** questions from **each** Section.
  - 2) Figures to the **right** indicate the **full** marks.
  - 3) **Use** of non programmable scientific calculator is **allowed**.
  - 4) **Assume** suitable data if necessary and **clearly** mention it.
  - 5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(20×1=20)

- i) The shape factor for a I Section is  
a) 1.14                      b) 1.34                      c) 2.34                      d) 1.78
- ii) For an encased beam, the loading is carried by  
a) Steel section only                      b) Concrete section = 50 percent  
c) Concrete section only                      d) None of the above
- iii) The maximum moment of inertia of an edge stiffener about its own centroidal axis parallel in the stiffened element in light gauge steel is given by  
a)  $6.2 t^4$                       b)  $8.2 t^4$                       c)  $9.2 t^4$                       d) 9.0
- iv) The effective width 'b' for a light gauge steel plate is given by  
a)  $b = 0.9t (E/F_y)^{1/2}$                       b)  $b = 1.9t (E/F_y)^{1/2}$   
c)  $b = 2.9t (E/F_y)^{1/2}$                       d)  $b = 3.9t (E/F_y)^{1/2}$
- v) The fully plastic moment 'M<sub>p</sub>' of rectangular section of breadth 'b' and depth 'd' is given by  
a)  $M_p = fybd^2/6$                       b)  $M_p = fybd^2/4$                       c)  $M_p = fybd^2/8$                       d)  $M_p = fybd^2/12$
- vi) Shape factor is defined as ratio of plastic modulus 'S' by section modulus 'Z' for circular section shape factor is  
a)  $4/\pi$                       b)  $16/3\pi$                       c)  $20/3\pi$                       d)  $18/3\pi$
- vii) For uniformly distributed collapse load 'wc' for continuous beam of two equal spans 'l' which has section having plastic moment 'M<sub>p</sub>'  
a)  $wc = 16M_p/l^2$                       b)  $wc = 8M_p/l^2$   
c)  $wc = 4M_p/l^2$                       d)  $wc = 11.656M_p/l^2$

P.T.O.



- viii) In plastic design, the critical strain for mild steel at ultimate load shall not be more than  
a) 1.2%                      b) 1.5%                      c) 2.0%                      d) 2.5%
- ix) Sliding plate bearings are suitable for  
a) Spans less than 10 m                      b) Spans over 50 m  
c) Suspension bridges                      d) None of these
- x) The plastic moment in case of propped cantilever occurs at  
a) Fixed end only                      b)  $0.414L$  from free end only  
c) Both a) and b)                      d) At centre of beam
- xi) Shape factor for a square section with diagonal horizontal axis is  
a) 1.0                      b) 1.5                      c) 2.0                      d) 2.34
- xii) For economical span of a railway bridge  
a) Cost of the sub-structure should be equal to the cost of trusses and laterals  
b) Cost of sub-structure should be 50% greater than the cost of trusses and laterals  
c) Cost of piers should be equal to the cost of flooring  
d) Cost of sub-structure should be equal to the cost of trusses, laterals and flooring system
- xiii) Light gauge steel members are cold-formed from sheet or strips of thickness less than  
a) 5.0 mm                      b) 4.5 mm                      c) 4.0 mm                      d) 6.0 mm
- xiv) The basic design stress  $f_b$ , if  $f_y$  is minimum guaranteed yield stress is taken as  
a)  $f_b = f_y/1.25$                       b)  $f_b = f_y/1.15$                       c)  $f_b = f_y/1.50$                       d)  $f_b = f_y/1.85$
- xv) A rocker bearing  
a) Permits horizontal movement                      b) Seismic forces  
c) Permits rotation                      d) Does not allow rotation
- xvi) Which of the following arrangements is structurally better and economical for a railway bridge of same span and loading ?  
a) Deck-type solid web girder                      b) Half-trough solid web girder  
c) Both a) and b)                      d) None of the above
- xvii) The moment curvature relation of plastic hinge is  
a) Linear with inclination                      b) Bilinear  
c) Constant curvature for all moments                      d) Constant moment with increasing curvatures
- xviii) Racking forces on a railway bridges are due to  
a) Acceleration of train  
b) Lateral wind force  
c) Lateral movement of wheels on a straight track  
d) Movement of train on a curved track
- xix) Find uniformly distributed collapse load 'wc' for a propped cantilever of span 'L' which has section having plastic moment 'Mp'.  
a)  $w_c = 12M_p/L^2$                       b)  $w_c = 11.62M_p/L^2$   
c)  $w_c = 8.62M_p/L^2$                       d)  $w_c = 12.62M_p/L^2$
- xx) The maximum bearing stress in light gauge steel section is given by  
a)  $1.0 F_y$                       b)  $1.2 F_y$                       c)  $2.1 F_y$                       d)  $3.12 F_y$





Seat No.	
----------	--

**B.E. (Civil) Part – II Examination, 2017**  
**Elective – III**  
**ADVANCED DESIGN OF STEEL STRUCTURES**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :**
- 1) Solve **any two** questions from each Section.
  - 2) Figures to the **right** indicate the **full** marks.
  - 3) **Use** of non programmable scientific calculator is **allowed**.
  - 4) **Assume** suitable data **if necessary** and **clearly** mention it.

SECTION – I

2. A foot bridge has for the following particulars :

Type of girder	=	N type truss
Span of girders	=	18 mc/c
Spacing of cross girders	=	2.25 m c/c
Height of the truss	=	1.8 m
Clear walking width between main girders	=	3 m
Live load	=	4.00 KN/m <sup>2</sup>

Flooring timber planks on cross girders. Take self weight planks = 8000 N/m<sup>2</sup> and modulus of elasticity of timber planks =  $1.0 \times 10^4$  N/mm<sup>2</sup>. Design the timber planks and cross girders.

20

3. What are the approximate methods of analysis of building frames subjected to lateral loads ? Explain all with assumptions and neat sketches.

20

4. The Z-beam of section with lips is laterally supported at 5.0 m interval. Calculate the moment of resistance of the section for  $\sigma_y = 240$  N/mm<sup>2</sup> and  $C_b = 1.0$ .

20

Take flanges = 60 mm × 2mm

Web = 200 mm × 2 mm

Lips = 20 mm × 2 mm



## SECTION – II

5. A propped cantilever of span 'l' carrying uniformly distributed load 'w', find the collapse load by using : **20**
- i) Static method and
  - ii) Kinematic method.
6. A portal frame ABCD, fixed at A and D subjected to a loading 20 KN at midpoint of BC and 10 KN at B towards right. The plastic moment capacities 'Mp' values for the beams and columns being M1 and M2 respectively. Compute values of M1 and M2 for frame to have minimum weight. Take AB = 3.0 m, BC = 9.0 m and CD = 3.0 m. **20**
7. a) A column 4 m in length is adequately restrained in position but not direction at both ends. It consists of ISWB 300 @ 48.1kg /m and is encased in M15 concrete, with a cover of 50 mm on all the sides. Determine the safe load which the encased column can carry. Take  $F_y = 250 \text{ N/mm}^2$ . **10**
- b) An encased beam, having span of 8m, carries a U.D.L. of 40 KN/m, inclusive of self weight. The ends of the beam are restrained against torsion with no lateral restraints provided laterally anywhere. Design the encased beam using I Section. Take  $F_y = 250 \text{ N/mm}^2$ . **10**
-



SLR-TJ – 77

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) Part – II Examination, 2017**  
**Elective – III**  
**ADVANCED DESIGN OF STEEL STRUCTURES**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- N.B :**
- 1) Solve **any two** questions from **each** Section.
  - 2) Figures to the **right** indicate the **full** marks.
  - 3) **Use** of non programmable scientific calculator is **allowed**.
  - 4) **Assume** suitable data if necessary and **clearly** mention it.
  - 5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(20×1=20)

- Which of the following arrangements is structurally better and economical for a railway bridge of same span and loading ?
  - Deck-type solid web girder
  - Half-trough solid web girder
  - Both a) and b)
  - None of the above
- The moment curvature relation of plastic hinge is
  - Linear with inclination
  - Bilinear
  - Constant curvature for all moments
  - Constant moment with increasing curvatures
- Racking forces on a railway bridges are due to
  - Acceleration of train
  - Lateral wind force
  - Lateral movement of wheels on a straight track
  - Movement of train on a curved track
- Find uniformly distributed collapse load 'wc' for a propped cantilever of span 'L' which has section having plastic moment 'Mp'.
  - $wc = 12Mp/L^2$
  - $wc = 11.62Mp/L^2$
  - $wc = 8.62Mp/L^2$
  - $wc = 12.62Mp/L^2$
- The maximum bearing stress in light gauge steel section is given by
  - 1.0 Fy
  - 1.2 Fy
  - 2.1 Fy
  - 3.12 Fy
- The shape factor for a I Section is
  - 1.14
  - 1.34
  - 2.34
  - 1.78
- For an encased beam, the loading is carried by
  - Steel section only
  - Concrete section = 50 percent
  - Concrete section only
  - None of the above

P.T.O.



- viii) The maximum moment of inertia of an edge stiffener about its own centroidal axis parallel in the stiffened element in light gauge steel is given by  
a)  $6.2 t^4$                       b)  $8.2 t^4$                       c)  $9.2 t^4$                       d) 9.0
- ix) The effective width 'b' for a light gauge steel plate is given by  
a)  $b = 0.9t (E/F_y)^{1/2}$                       b)  $b = 1.9t (E/F_y)^{1/2}$   
c)  $b = 2.9t (E/F_y)^{1/2}$                       d)  $b = 3.9t (E/F_y)^{1/2}$
- x) The fully plastic moment 'M<sub>p</sub>' of rectangular section of breadth 'b' and depth 'd' is given by  
a)  $M_p = fybd^2/6$                       b)  $M_p = fybd^2/4$                       c)  $M_p = fybd^2/8$                       d)  $M_p = fybd^2/12$
- xi) Shape factor is defined as ratio of plastic modulus 'S' by section modulus 'Z' for circular section shape factor is  
a)  $4/\pi$                       b)  $16/3\pi$                       c)  $20/3\pi$                       d)  $18/3\pi$
- xii) For uniformly distributed collapse load 'wc' for continuous beam of two equal spans 'l' which has section having plastic moment 'M<sub>p</sub>'  
a)  $wc = 16M_p/l^2$                       b)  $wc = 8M_p/l^2$   
c)  $wc = 4M_p/l^2$                       d)  $wc = 11.656M_p/l^2$
- xiii) In plastic design, the critical strain for mild steel at ultimate load shall not be more than  
a) 1.2%                      b) 1.5%                      c) 2.0%                      d) 2.5%
- xiv) Sliding plate bearings are suitable for  
a) Spans less than 10 m                      b) Spans over 50 m  
c) Suspension bridges                      d) None of these
- xv) The plastic moment in case of propped cantilever occurs at  
a) Fixed end only                      b) 0.414L from free end only  
c) Both a) and b)                      d) At centre of beam
- xvi) Shape factor for a square section with diagonal horizontal axis is  
a) 1.0                      b) 1.5                      c) 2.0                      d) 2.34
- xvii) For economical span of a railway bridge  
a) Cost of the sub-structure should be equal to the cost of trusses and laterals  
b) Cost of sub-structure should be 50% greater than the cost of trusses and laterals  
c) Cost of piers should be equal to the cost of flooring  
d) Cost of sub-structure should be equal to the cost of trusses, laterals and flooring system
- xviii) Light gauge steel members are cold-formed from sheet or strips of thickness less than  
a) 5.0 mm                      b) 4.5 mm                      c) 4.0 mm                      d) 6.0 mm
- xix) The basic design stress  $f_b$ , if  $f_y$  is minimum guaranteed yield stress is taken as  
a)  $f_b = f_y/1.25$                       b)  $f_b = f_y/1.15$                       c)  $f_b = f_y/1.50$                       d)  $f_b = f_y/1.85$
- xx) A rocker bearing  
a) Permits horizontal movement                      b) Seismic forces  
c) Permits rotation                      d) Does not allow rotation



Seat No.	
----------	--

**B.E. (Civil) Part – II Examination, 2017**  
**Elective – III**  
**ADVANCED DESIGN OF STEEL STRUCTURES**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :**
- 1) Solve **any two** questions from each Section.
  - 2) Figures to the **right** indicate the **full** marks.
  - 3) **Use** of non programmable scientific calculator is **allowed**.
  - 4) **Assume** suitable data **if necessary** and **clearly** mention it.

SECTION – I

2. A foot bridge has for the following particulars :

Type of girder	=	N type truss
Span of girders	=	18 mc/c
Spacing of cross girders	=	2.25 m c/c
Height of the truss	=	1.8 m
Clear walking width between main girders	=	3 m
Live load	=	4.00 KN/m <sup>2</sup>

Flooring timber planks on cross girders. Take self weight planks = 8000 N/m<sup>2</sup> and modulus of elasticity of timber planks =  $1.0 \times 10^4$  N/mm<sup>2</sup>. Design the timber planks and cross girders.

20

3. What are the approximate methods of analysis of building frames subjected to lateral loads ? Explain all with assumptions and neat sketches.

20

4. The Z-beam of section with lips is laterally supported at 5.0 m interval. Calculate the moment of resistance of the section for  $\sigma_y = 240$  N/mm<sup>2</sup> and  $C_b = 1.0$ .

20

Take flanges = 60 mm × 2mm

Web = 200 mm × 2 mm

Lips = 20 mm × 2 mm



## SECTION – II

5. A propped cantilever of span 'l' carrying uniformly distributed load 'w', find the collapse load by using : **20**
- i) Static method and
  - ii) Kinematic method.
6. A portal frame ABCD, fixed at A and D subjected to a loading 20 KN at midpoint of BC and 10 KN at B towards right. The plastic moment capacities 'Mp' values for the beams and columns being M1 and M2 respectively. Compute values of M1 and M2 for frame to have minimum weight. Take AB = 3.0 m, BC = 9.0 m and CD = 3.0 m. **20**
7. a) A column 4 m in length is adequately restrained in position but not direction at both ends. It consists of ISWB 300 @ 48.1kg /m and is encased in M15 concrete, with a cover of 50 mm on all the sides. Determine the safe load which the encased column can carry. Take  $F_y = 250 \text{ N/mm}^2$ . **10**
- b) An encased beam, having span of 8m, carries a U.D.L. of 40 KN/m, inclusive of self weight. The ends of the beam are restrained against torsion with no lateral restraints provided laterally anywhere. Design the encased beam using I Section. Take  $F_y = 250 \text{ N/mm}^2$ . **10**
-



SLR-TJ – 77

Seat No.	
----------	--

Set	R
-----	---

**B.E. (Civil) Part – II Examination, 2017**  
**Elective – III**  
**ADVANCED DESIGN OF STEEL STRUCTURES**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- N.B :**
- 1) Solve **any two** questions from **each** Section.
  - 2) Figures to the **right** indicate the **full** marks.
  - 3) **Use** of non programmable scientific calculator is **allowed**.
  - 4) **Assume** suitable data if necessary and **clearly** mention it.
  - 5) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(20×1=20)

- i) Shape factor for a square section with diagonal horizontal axis is  
a) 1.0                      b) 1.5                      c) 2.0                      d) 2.34
- ii) For economical span of a railway bridge  
a) Cost of the sub-structure should be equal to the cost of trusses and laterals  
b) Cost of sub-structure should be 50% greater than the cost of trusses and laterals  
c) Cost of piers should be equal to the cost of flooring  
d) Cost of sub-structure should be equal to the cost of trusses, laterals and flooring system
- iii) Light gauge steel members are cold-formed from sheet or strips of thickness less than  
a) 5.0 mm                      b) 4.5 mm                      c) 4.0 mm                      d) 6.0 mm
- iv) The basic design stress  $f_b$ , if  $f_y$  is minimum guaranteed yield stress is taken as  
a)  $f_b = f_y/1.25$                       b)  $f_b = f_y/1.15$                       c)  $f_b = f_y/1.50$                       d)  $f_b = f_y/1.85$
- v) A rocker bearing  
a) Permits horizontal movement                      b) Seismic forces  
c) Permits rotation                      d) Does not allow rotation
- vi) Which of the following arrangements is structurally better and economical for a railway bridge of same span and loading ?  
a) Deck-type solid web girder                      b) Half-trough solid web girder  
c) Both a) and b)                      d) None of the above
- vii) The moment curvature relation of plastic hinge is  
a) Linear with inclination                      b) Bilinear  
c) Constant curvature for all moments                      d) Constant moment with increasing curvatures

P.T.O.



- viii) Racking forces on a railway bridges are due to
- Acceleration of train
  - Lateral wind force
  - Lateral movement of wheels on a straight track
  - Movement of train on a curved track
- ix) Find uniformly distributed collapse load 'wc' for a propped cantilever of span 'L' which has section having plastic moment 'Mp'.
- $wc = 12Mp/L^2$
  - $wc = 11.62Mp/L^2$
  - $wc = 8.62Mp/L^2$
  - $wc = 12.62Mp/L^2$
- x) The maximum bearing stress in light gauge steel section is given by
- 1.0 Fy
  - 1.2 Fy
  - 2.1 Fy
  - 3.12 Fy
- xi) The shape factor for a I Section is
- 1.14
  - 1.34
  - 2.34
  - 1.78
- xii) For an encased beam, the loading is carried by
- Steel section only
  - Concrete section = 50 percent
  - Concrete section only
  - None of the above
- xiii) The maximum moment of inertia of an edge stiffener about its own centroidal axis parallel in the stiffened element in light gauge steel is given by
- $6.2 t^4$
  - $8.2 t^4$
  - $9.2 t^4$
  - 9.0
- xiv) The effective width 'b' for a light gauge steel plate is given by
- $b = 0.9t (E/Fy)^{1/2}$
  - $b = 1.9t (E/Fy)^{1/2}$
  - $b = 2.9t (E/Fy)^{1/2}$
  - $b = 3.9t (E/Fy)^{1/2}$
- xv) The fully plastic moment 'Mp' of rectangular section of breadth 'b' and depth 'd' is given by
- $Mp = fybd^2/6$
  - $Mp = fybd^2/4$
  - $Mp = fybd^2/8$
  - $Mp = fybd^2/12$
- xvi) Shape factor is defined as ratio of plastic modulus 'S' by section modulus 'Z' for circular section shape factor is
- $4/\pi$
  - $16/3\pi$
  - $20/3\pi$
  - $18/3\pi$
- xvii) For uniformly distributed collapse load 'wc' for continuous beam of two equal spans 'l' which has section having plastic moment 'Mp'
- $wc = 16Mp/l^2$
  - $wc = 8Mp/l^2$
  - $wc = 4Mp/l^2$
  - $wc = 11.656Mp/l^2$
- xviii) In plastic design, the critical strain for mild steel at ultimate load shall not be more than
- 1.2%
  - 1.5%
  - 2.0%
  - 2.5%
- xix) Sliding plate bearings are suitable for
- Spans less than 10 m
  - Spans over 50 m
  - Suspension bridges
  - None of these
- xx) The plastic moment in case of propped cantilever occurs at
- Fixed end only
  - 0.414L from free end only
  - Both a) and b)
  - At centre of beam





Seat No.	
-------------	--

**B.E. (Civil) Part – II Examination, 2017**  
**Elective – III**  
**ADVANCED DESIGN OF STEEL STRUCTURES**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :**
- 1) Solve **any two** questions from each Section.
  - 2) Figures to the **right** indicate the **full** marks.
  - 3) **Use** of non programmable scientific calculator is **allowed**.
  - 4) **Assume** suitable data **if necessary** and **clearly** mention it.

SECTION – I

2. A foot bridge has for the following particulars :

Type of girder	=	N type truss
Span of girders	=	18 mc/c
Spacing of cross girders	=	2.25 m c/c
Height of the truss	=	1.8 m
Clear walking width between main girders	=	3 m
Live load	=	4.00 KN/m <sup>2</sup>

Flooring timber planks on cross girders. Take self weight planks = 8000 N/m<sup>2</sup> and modulus of elasticity of timber planks =  $1.0 \times 10^4$  N/mm<sup>2</sup>. Design the timber planks and cross girders.

20

3. What are the approximate methods of analysis of building frames subjected to lateral loads ? Explain all with assumptions and neat sketches.

20

4. The Z-beam of section with lips is laterally supported at 5.0 m interval. Calculate the moment of resistance of the section for  $\sigma_y = 240$  N/mm<sup>2</sup> and  $C_b = 1.0$ .

20

Take flanges = 60 mm × 2mm

Web = 200 mm × 2 mm

Lips = 20 mm × 2 mm



## SECTION – II

5. A propped cantilever of span 'l' carrying uniformly distributed load 'w', find the collapse load by using : **20**
- i) Static method and
  - ii) Kinematic method.
6. A portal frame ABCD, fixed at A and D subjected to a loading 20 KN at midpoint of BC and 10 KN at B towards right. The plastic moment capacities 'Mp' values for the beams and columns being M1 and M2 respectively. Compute values of M1 and M2 for frame to have minimum weight. Take AB = 3.0 m, BC = 9.0 m and CD = 3.0 m. **20**
7. a) A column 4 m in length is adequately restrained in position but not direction at both ends. It consists of ISWB 300 @ 48.1kg /m and is encased in M15 concrete, with a cover of 50 mm on all the sides. Determine the safe load which the encased column can carry. Take  $F_y = 250 \text{ N/mm}^2$ . **10**
- b) An encased beam, having span of 8m, carries a U.D.L. of 40 KN/m, inclusive of self weight. The ends of the beam are restrained against torsion with no lateral restraints provided laterally anywhere. Design the encased beam using I Section. Take  $F_y = 250 \text{ N/mm}^2$ . **10**
-



SLR-TJ – 77

Seat No.	
----------	--

Set	<b>S</b>
-----	----------

**B.E. (Civil) Part – II Examination, 2017**  
**Elective – III**  
**ADVANCED DESIGN OF STEEL STRUCTURES**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- N.B :**
- 1) Solve **any two** questions from **each** Section.
  - 2) Figures to the **right** indicate the **full** marks.
  - 3) **Use** of non programmable scientific calculator is **allowed**.
  - 4) **Assume** suitable data if necessary and **clearly** mention it.
  - 5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.
  - 6) **Answer MCQ/Objective type questions on Page No. 3 only.**  
**Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

(20×1=20)

- i) Shape factor is defined as ratio of plastic modulus 'S' by section modulus 'Z' for circular section shape factor is  
a)  $4/\pi$                       b)  $16/3\pi$                       c)  $20/3\pi$                       d)  $18/3\pi$
- ii) For uniformly distributed collapse load 'wc' for continuous beam of two equal spans 'l' which has section having plastic moment 'Mp'  
a)  $wc = 16Mp/l^2$                       b)  $wc = 8Mp/l^2$   
c)  $wc = 4Mp/l^2$                       d)  $wc = 11.656Mp/l^2$
- iii) In plastic design, the critical strain for mild steel at ultimate load shall not be more than  
a) 1.2%                      b) 1.5%                      c) 2.0%                      d) 2.5%
- iv) Sliding plate bearings are suitable for  
a) Spans less than 10 m                      b) Spans over 50 m  
c) Suspension bridges                      d) None of these
- v) The plastic moment in case of propped cantilever occurs at  
a) Fixed end only                      b) 0.414L from free end only  
c) Both a) and b)                      d) At centre of beam
- vi) Shape factor for a square section with diagonal horizontal axis is  
a) 1.0                      b) 1.5                      c) 2.0                      d) 2.34
- vii) For economical span of a railway bridge  
a) Cost of the sub-structure should be equal to the cost of trusses and laterals  
b) Cost of sub-structure should be 50% greater than the cost of trusses and laterals  
c) Cost of piers should be equal to the cost of flooring  
d) Cost of sub-structure should be equal to the cost of trusses, laterals and flooring system

P.T.O.



- viii) Light gauge steel members are cold-formed from sheet or strips of thickness less than
- a) 5.0 mm                      b) 4.5 mm                      c) 4.0 mm                      d) 6.0 mm
- ix) The basic design stress  $f_b$ , if  $f_y$  is minimum guaranteed yield stress is taken as
- a)  $f_b = f_y/1.25$               b)  $f_b = f_y/1.15$               c)  $f_b = f_y/1.50$               d)  $f_b = f_y/1.85$
- x) A rocker bearing
- a) Permits horizontal movement              b) Seismic forces  
c) Permits rotation                              d) Does not allow rotation
- xi) Which of the following arrangements is structurally better and economical for a railway bridge of same span and loading ?
- a) Deck-type solid web girder              b) Half-trough solid web girder  
c) Both a) and b)                              d) None of the above
- xii) The moment curvature relation of plastic hinge is
- a) Linear with inclination                      b) Bilinear  
c) Constant curvature for all moments      d) Constant moment with increasing curvatures
- xiii) Racking forces on a railway bridges are due to
- a) Acceleration of train  
b) Lateral wind force  
c) Lateral movement of wheels on a straight track  
d) Movement of train on a curved track
- xiv) Find uniformly distributed collapse load 'wc' for a propped cantilever of span 'L' which has section having plastic moment 'Mp'.
- a)  $w_c = 12M_p/L^2$                               b)  $w_c = 11.62M_p/L^2$   
c)  $w_c = 8.62M_p/L^2$                               d)  $w_c = 12.62M_p/L^2$
- xv) The maximum bearing stress in light gauge steel section is given by
- a) 1.0  $F_y$                       b) 1.2  $F_y$                       c) 2.1  $F_y$                       d) 3.12  $F_y$
- xvi) The shape factor for a I Section is
- a) 1.14                              b) 1.34                              c) 2.34                              d) 1.78
- xvii) For an encased beam, the loading is carried by
- a) Steel section only                              b) Concrete section = 50 percent  
c) Concrete section only                              d) None of the above
- xviii) The maximum moment of inertia of an edge stiffener about its own centroidal axis parallel in the stiffened element in light gauge steel is given by
- a)  $6.2 t^4$                               b)  $8.2 t^4$                               c)  $9.2 t^4$                               d) 9.0
- xix) The effective width 'b' for a light gauge steel plate is given by
- a)  $b = 0.9t (E/F_y)^{1/2}$                               b)  $b = 1.9t (E/F_y)^{1/2}$   
c)  $b = 2.9t (E/F_y)^{1/2}$                               d)  $b = 3.9t (E/F_y)^{1/2}$
- xx) The fully plastic moment 'Mp' of rectangular section of breadth 'b' and depth 'd' is given by
- a)  $M_p = fybd^2/6$               b)  $M_p = fybd^2/4$               c)  $M_p = fybd^2/8$               d)  $M_p = fybd^2/12$



Seat No.	
----------	--

**B.E. (Civil) Part – II Examination, 2017**  
**Elective – III**  
**ADVANCED DESIGN OF STEEL STRUCTURES**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :**
- 1) Solve **any two** questions from each Section.
  - 2) Figures to the **right** indicate the **full** marks.
  - 3) **Use** of non programmable scientific calculator is **allowed**.
  - 4) **Assume** suitable data **if necessary** and **clearly** mention it.

SECTION – I

2. A foot bridge has for the following particulars :

Type of girder	=	N type truss
Span of girders	=	18 m/c
Spacing of cross girders	=	2.25 m c/c
Height of the truss	=	1.8 m
Clear walking width between main girders	=	3 m
Live load	=	4.00 KN/m <sup>2</sup>

Flooring timber planks on cross girders. Take self weight planks = 8000 N/m<sup>2</sup> and modulus of elasticity of timber planks =  $1.0 \times 10^4$  N/mm<sup>2</sup>. Design the timber planks and cross girders.

20

3. What are the approximate methods of analysis of building frames subjected to lateral loads ? Explain all with assumptions and neat sketches.

20

4. The Z-beam of section with lips is laterally supported at 5.0 m interval. Calculate the moment of resistance of the section for  $\sigma_y = 240$  N/mm<sup>2</sup> and  $C_b = 1.0$ .

20

Take flanges = 60 mm × 2mm

Web = 200 mm × 2 mm

Lips = 20 mm × 2 mm



## SECTION – II

5. A propped cantilever of span 'l' carrying uniformly distributed load 'w', find the collapse load by using : **20**
- i) Static method and
  - ii) Kinematic method.
6. A portal frame ABCD, fixed at A and D subjected to a loading 20 KN at midpoint of BC and 10 KN at B towards right. The plastic moment capacities 'Mp' values for the beams and columns being M1 and M2 respectively. Compute values of M1 and M2 for frame to have minimum weight. Take AB = 3.0 m, BC = 9.0 m and CD = 3.0 m. **20**
7. a) A column 4 m in length is adequately restrained in position but not direction at both ends. It consists of ISWB 300 @ 48.1kg /m and is encased in M15 concrete, with a cover of 50 mm on all the sides. Determine the safe load which the encased column can carry. Take  $F_y = 250 \text{ N/mm}^2$ . **10**
- b) An encased beam, having span of 8m, carries a U.D.L. of 40 KN/m, inclusive of self weight. The ends of the beam are restrained against torsion with no lateral restraints provided laterally anywhere. Design the encased beam using I Section. Take  $F_y = 250 \text{ N/mm}^2$ . **10**
-



SLR-TJ – 78

Seat No.	
----------	--

Set 

P
---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : INDUSTRIAL WASTE TREATMENT**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Figures to the **right** indicate **full** marks.
- 3) Assume **suitable** data **wherever** necessary and mention it clearly.
- 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer : **(20×1=20)**
- 1) Typical rate of water used for paper industry is \_\_\_\_\_ m<sup>3</sup>/t.  
a) 120-160                      b) 150-190                      c) 200-250                      d) 300
  - 2) Molecular weight of glucose is  
a) 170                              b) 180                              c) 192                              d) 205
  - 3) Relative stability of waste water will \_\_\_\_\_ with increase in temperature for same bleaching time.  
a) Remains same    b) Decrease                      c) Increase                      d) None of these
  - 4) BOD<sub>5</sub> contribution per capita per day is considered as \_\_\_\_\_ gram/day.  
a) 50                              b) 80                              c) 120                              d) 180
  - 5) Water body for propagation of wild life and fisheries is \_\_\_\_\_ class of water.  
a) A                              b) B                              c) C                              d) D
  - 6) Total coliform organism MPN/100 ml shall be \_\_\_\_\_ for outdoor bathing (organised).  
a) 50 or less                      b) 500 or less                      c) Above 500                      d) Above 5000
  - 7) pH value for industrial waste water for discharge into public sewer shall be  
a) 5 to 8                              b) 5.5 to 6.5                      c) 5.5 to 9.0                      d) Above 9.0
  - 8) Waste water generation standard for sugar industry is \_\_\_\_\_ m<sup>3</sup>/t of cane crushed.  
a) 0.1                              b) 0.2                              c) 0.3                              d) 0.4

P.T.O.



- 9) Producing  $\text{CO}_2$  in waste water is a method of neutralizing \_\_\_\_\_ waste.  
a) Acid                      b) Alkaline                      c) Both a) and b)                      d) None of these
- 10) As per Vantholf Arrhenious value of  $\theta$  for temp. 20 to  $30^\circ\text{C}$  is  
a) 1                      b) 1.135                      c) 1.056                      d) 2
- 11) Total Nitrogen in combined sugar mill waste is \_\_\_\_\_ mg/L.  
a) 10 - 40                      b) 50 - 90                      c) 100 - 140                      d) Above 150
- 12) Typical value of  $\text{BOD}_5^{20}$  for a composite cotton textile mill waste is \_\_\_\_\_ mg/L.  
a) 260                      b) 560                      c) 760                      d) 960
- 13) pH value of a combined distillery waste is  
a) 3.9 - 4.3                      b) 5 - 7                      c) 6.9 - 7.3                      d) Above 8
- 14) Desizing is a operation in \_\_\_\_\_ mill.  
a) Sugar                      b) Textile                      c) Pulp and paper                      d) None of these
- 15) The crude waste is discharged into stream causes rapid \_\_\_\_\_ of the streams.  
a) Self purification                      b) Depletion of dissolved oxygen  
c) High toxicity                      d) Alkaline
- 16) \_\_\_\_\_ is the process where water becomes clear and the stream returns to its original condition.  
a) Reaeration                      b) Self purification  
c) Adsorption                      d) Settling
- 17) Presence of lime also inhibits \_\_\_\_\_ in sewage treatment plants.  
a) Chemical action                      b) Corrosion  
c) Sedimentation                      d) Biological action
- 18) Waste water generated can be estimated by multiplying water consumption by  
a) 1.2                      b) 0.9                      c) 2                      d) 1.5
- 19) \_\_\_\_\_ is the technique for removal of volatile substances from solution.  
a) Air diffuser                      b) Air wash                      c) Air stripping                      d) Aeration
- 20) The black strap molasses in sugar industries may be used as raw material for  
a) Tannery                      b) Distillery                      c) Paper                      d) Dairy
-





Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : INDUSTRIAL WASTE TREATMENT**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Answer **any three** questions from Section – I.  
2) Question **6** is **compulsory** in Section – II, solve **any two** questions from remaining.  
3) Figure to the **right** indicate **full** marks.  
4) Assume suitable data **wherever** necessary and mention it **clearly**.

SECTION – I

2. a) Discuss various sources of waste water and their flow rates. **7**  
b) Give typical composition of domestic waste water. **7**
3. a) Explain the various methods of waste water volume reduction. **6**  
b) Discuss various methods of neutralization of alkaline wastes. **7**
4. a) Find critical D.O. deficit from the following data : **8**  
A municipal wastewater treatment plant discharges secondary effluent to a river. The worst condition occurs in the summer when the treated wastewater in summer is found to have a maximum flow rate of 10000 m<sup>3</sup>/day, a BOD<sub>5</sub> of 30 mg/L, dissolved oxygen concentration of 1.5 mg/L and temperature of 25°C. At upstream of the disposal point the minimum flow in the stream is 0.65 m<sup>3</sup>/sec. with BOD<sub>5</sub> of 3.0 mg/L, dissolved oxygen concentration of 7.0 mg/L and temperature of 22°C. The mixing of wastewater and stream is almost instantaneous at the point of disposal and velocity of the mixture is 0.2 m/sec. The re-aeration constant is estimated to be 0.4 per day at 20°C temperature. Determine the critical DO deficit and distance at which it will occur.
- b) What is neutralization of waste ? **5**
5. Write short notes on :  
a) Waste volume reduction. **7**  
b) Waste strength reduction. **7**

Set P



## SECTION – II

6. a) Explain in detail acclimatization of bacteria to toxic waste. **6**  
b) What are the various factors to be studied in designing of industrial waste treatment plant ? Explain in detail. **6**
7. Draw manufacturing process flow diagram, indicate the sources of waste and explain in detail.  
a) Tannery. **7**  
b) Dairy. **7**
8. Give the characteristics of waste water, draw waste water treatment flow diagram and explain in detail.  
a) Fertilizer. **7**  
b) Sugar mill. **7**
9. Write short notes on (**any two**) : **14**  
a) Recycling of waste.  
b) Central pollution control board.  
c) Operation and maintenance requirement.
-





- 8) Relative stability of waste water will \_\_\_\_\_ with increase in temperature for same bleaching time.  
a) Remains same    b) Decrease    c) Increase    d) None of these
- 9) BOD<sub>5</sub> contribution per capita per day is considered as \_\_\_\_\_ gram/day.  
a) 50    b) 80    c) 120    d) 180
- 10) Water body for propagation of wild life and fisheries is \_\_\_\_\_ class of water.  
a) A    b) B    c) C    d) D
- 11) Total coliform organism MPN/100 ml shall be \_\_\_\_\_ for outdoor bathing (organised).  
a) 50 or less    b) 500 or less    c) Above 500    d) Above 5000
- 12) pH value for industrial waste water for discharge into public sewer shall be  
a) 5 to 8    b) 5.5 to 6.5    c) 5.5 to 9.0    d) Above 9.0
- 13) Waste water generation standard for sugar industry is \_\_\_\_\_ m<sup>3</sup>/t of cane crushed.  
a) 0.1    b) 0.2    c) 0.3    d) 0.4
- 14) Producing CO<sub>2</sub> in waste water is a method of neutralizing \_\_\_\_\_ waste.  
a) Acid    b) Alkaline    c) Both a) and b)    d) None of these
- 15) As per Vantholf Arrhenious value of  $\theta$  for temp. 20 to 30°C is  
a) 1    b) 1.135    c) 1.056    d) 2
- 16) Total Nitrogen in combined sugar mill waste is \_\_\_\_\_ mg/L.  
a) 10 - 40    b) 50 - 90    c) 100 - 140    d) Above 150
- 17) Typical value of BOD<sub>5</sub><sup>20</sup> for a composite cotton textile mill waste is \_\_\_\_\_ mg/L.  
a) 260    b) 560    c) 760    d) 960
- 18) pH value of a combined distillery waste is  
a) 3.9 - 4.3    b) 5 - 7    c) 6.9 - 7.3    d) Above 8
- 19) Desizing is a operation in \_\_\_\_\_ mill.  
a) Sugar    b) Textile    c) Pulp and paper    d) None of these
- 20) The crude waste is discharged into stream causes rapid \_\_\_\_\_ of the streams.  
a) Self purification    b) Depletion of dissolved oxygen  
c) High toxicity    d) Alkaline
-



Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : INDUSTRIAL WASTE TREATMENT**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Answer **any three** questions from Section – I.  
2) Question **6** is **compulsory** in Section – II, solve **any two** questions from remaining.  
3) Figure to the **right** indicate **full** marks.  
4) Assume suitable data **wherever** necessary and mention it **clearly**.

SECTION – I

2. a) Discuss various sources of waste water and their flow rates. **7**  
b) Give typical composition of domestic waste water. **7**
3. a) Explain the various methods of waste water volume reduction. **6**  
b) Discuss various methods of neutralization of alkaline wastes. **7**
4. a) Find critical D.O. deficit from the following data : **8**  
A municipal wastewater treatment plant discharges secondary effluent to a river. The worst condition occurs in the summer when the treated wastewater in summer is found to have a maximum flow rate of 10000 m<sup>3</sup>/day, a BOD<sub>5</sub> of 30 mg/L, dissolved oxygen concentration of 1.5 mg/L and temperature of 25°C. At upstream of the disposal point the minimum flow in the stream is 0.65 m<sup>3</sup>/sec. with BOD<sub>5</sub> of 3.0 mg/L, dissolved oxygen concentration of 7.0 mg/L and temperature of 22°C. The mixing of wastewater and stream is almost instantaneous at the point of disposal and velocity of the mixture is 0.2 m/sec. The re-aeration constant is estimated to be 0.4 per day at 20°C temperature. Determine the critical DO deficit and distance at which it will occur.
- b) What is neutralization of waste ? **5**
5. Write short notes on :  
a) Waste volume reduction. **7**  
b) Waste strength reduction. **7**

Set Q



## SECTION – II

6. a) Explain in detail acclimatization of bacteria to toxic waste. **6**  
b) What are the various factors to be studied in designing of industrial waste treatment plant ? Explain in detail. **6**
7. Draw manufacturing process flow diagram, indicate the sources of waste and explain in detail.  
a) Tannery. **7**  
b) Dairy. **7**
8. Give the characteristics of waste water, draw waste water treatment flow diagram and explain in detail.  
a) Fertilizer. **7**  
b) Sugar mill. **7**
9. Write short notes on (**any two**) : **14**  
a) Recycling of waste.  
b) Central pollution control board.  
c) Operation and maintenance requirement.
-



SLR-TJ – 78

Seat No.	
----------	--

Set **R**

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : INDUSTRIAL WASTE TREATMENT**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Figures to the **right** indicate **full** marks.
- 3) Assume **suitable** data **wherever** necessary and mention it clearly.
- 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer : **(20×1=20)**
- 1) Total Nitrogen in combined sugar mill waste is \_\_\_\_\_ mg/L.  
a) 10 - 40                      b) 50 - 90                      c) 100 - 140                      d) Above 150
- 2) Typical value of  $BOD_5^{20}$  for a composite cotton textile mill waste is \_\_\_\_\_ mg/L.  
a) 260                              b) 560                              c) 760                              d) 960
- 3) pH value of a combined distillery waste is  
a) 3.9 - 4.3                      b) 5 - 7                              c) 6.9 - 7.3                      d) Above 8
- 4) Desizing is a operation in \_\_\_\_\_ mill.  
a) Sugar                              b) Textile                              c) Pulp and paper                      d) None of these
- 5) The crude waste is discharged into stream causes rapid \_\_\_\_\_ of the streams.  
a) Self purification                              b) Depletion of dissolved oxygen  
c) High toxicity                              d) Alkaline
- 6) \_\_\_\_\_ is the process where water becomes clear and the stream returns to its original condition.  
a) Reaeration                              b) Self purification  
c) Adsorption                              d) Settling
- 7) Presence of lime also inhibits \_\_\_\_\_ in sewage treatment plants.  
a) Chemical action                              b) Corrosion  
c) Sedimentation                              d) Biological action

P.T.O.



- 8) Waste water generated can be estimated by multiplying water consumption by  
a) 1.2                      b) 0.9                      c) 2                      d) 1.5
- 9) \_\_\_\_\_ is the technique for removal of volatile substances from solution.  
a) Air diffuser              b) Air wash              c) Air stripping              d) Aeration
- 10) The black strap molasses in sugar industries may be used as raw material for  
a) Tannery                      b) Distillery                      c) Paper                      d) Dairy
- 11) Typical rate of water used for paper industry is \_\_\_\_\_ m<sup>3</sup>/t.  
a) 120 -160                      b) 150 -190                      c) 200 -250                      d) 300
- 12) Molecular weight of glucose is  
a) 170                      b) 180                      c) 192                      d) 205
- 13) Relative stability of waste water will \_\_\_\_\_ with increase in temperature for same bleaching time.  
a) Remains same              b) Decrease                      c) Increase                      d) None of these
- 14) BOD<sub>5</sub> contribution per capita per day is considered as \_\_\_\_\_ gram/day.  
a) 50                      b) 80                      c) 120                      d) 180
- 15) Water body for propagation of wild life and fisheries is \_\_\_\_\_ class of water.  
a) A                      b) B                      c) C                      d) D
- 16) Total coliform organism MPN/100 ml shall be \_\_\_\_\_ for outdoor bathing (organised).  
a) 50 or less                      b) 500 or less                      c) Above 500                      d) Above 5000
- 17) pH value for industrial waste water for discharge into public sewer shall be  
a) 5 to 8                      b) 5.5 to 6.5                      c) 5.5 to 9.0                      d) Above 9.0
- 18) Waste water generation standard for sugar industry is \_\_\_\_\_ m<sup>3</sup>/t of cane crushed.  
a) 0.1                      b) 0.2                      c) 0.3                      d) 0.4
- 19) Producing CO<sub>2</sub> in waste water is a method of neutralizing \_\_\_\_\_ waste.  
a) Acid                      b) Alkaline                      c) Both a) and b)                      d) None of these
- 20) As per Vantholf Arrhenious value of  $\theta$  for temp. 20 to 30°C is  
a) 1                      b) 1.135                      c) 1.056                      d) 2
-





Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : INDUSTRIAL WASTE TREATMENT**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Answer **any three** questions from Section – I.  
2) Question **6** is **compulsory** in Section – II, solve **any two** questions from remaining.  
3) Figure to the **right** indicate **full** marks.  
4) Assume suitable data **wherever** necessary and mention it **clearly**.

SECTION – I

2. a) Discuss various sources of waste water and their flow rates. **7**  
b) Give typical composition of domestic waste water. **7**
3. a) Explain the various methods of waste water volume reduction. **6**  
b) Discuss various methods of neutralization of alkaline wastes. **7**
4. a) Find critical D.O. deficit from the following data : **8**  
A municipal wastewater treatment plant discharges secondary effluent to a river. The worst condition occurs in the summer when the treated wastewater in summer is found to have a maximum flow rate of 10000 m<sup>3</sup>/day, a BOD<sub>5</sub> of 30 mg/L, dissolved oxygen concentration of 1.5 mg/L and temperature of 25°C. At upstream of the disposal point the minimum flow in the stream is 0.65 m<sup>3</sup>/sec. with BOD<sub>5</sub> of 3.0 mg/L, dissolved oxygen concentration of 7.0 mg/L and temperature of 22°C. The mixing of wastewater and stream is almost instantaneous at the point of disposal and velocity of the mixture is 0.2 m/sec. The re-aeration constant is estimated to be 0.4 per day at 20°C temperature. Determine the critical DO deficit and distance at which it will occur.
- b) What is neutralization of waste ? **5**
5. Write short notes on :  
a) Waste volume reduction. **7**  
b) Waste strength reduction. **7**

Set R



## SECTION – II

6. a) Explain in detail acclimatization of bacteria to toxic waste. **6**  
b) What are the various factors to be studied in designing of industrial waste treatment plant ? Explain in detail. **6**
7. Draw manufacturing process flow diagram, indicate the sources of waste and explain in detail.  
a) Tannery. **7**  
b) Dairy. **7**
8. Give the characteristics of waste water, draw waste water treatment flow diagram and explain in detail.  
a) Fertilizer. **7**  
b) Sugar mill. **7**
9. Write short notes on (**any two**) : **14**  
a) Recycling of waste.  
b) Central pollution control board.  
c) Operation and maintenance requirement.
-



SLR-TJ – 78

Seat No.	
----------	--

Set 

S
---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : INDUSTRIAL WASTE TREATMENT**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions:** 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 2) Figures to the **right** indicate **full** marks.
- 3) Assume **suitable** data **wherever** necessary and mention it clearly.
- 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer : **(20×1=20)**
- 1) Total coliform organism MPN/100 ml shall be \_\_\_\_\_ for outdoor bathing (organised).  
a) 50 or less      b) 500 or less      c) Above 500      d) Above 5000
  - 2) pH value for industrial waste water for discharge into public sewer shall be  
a) 5 to 8      b) 5.5 to 6.5      c) 5.5 to 9.0      d) Above 9.0
  - 3) Waste water generation standard for sugar industry is \_\_\_\_\_ m<sup>3</sup>/t of cane crushed.  
a) 0.1      b) 0.2      c) 0.3      d) 0.4
  - 4) Producing CO<sub>2</sub> in waste water is a method of neutralizing \_\_\_\_\_ waste.  
a) Acid      b) Alkaline      c) Both a) and b)      d) None of these
  - 5) As per VantHolf Arrhenious value of  $\theta$  for temp. 20 to 30°C is  
a) 1      b) 1.135      c) 1.056      d) 2
  - 6) Total Nitrogen in combined sugar mill waste is \_\_\_\_\_ mg/L.  
a) 10 - 40      b) 50 - 90      c) 100 - 140      d) Above 150
  - 7) Typical value of BOD<sub>5</sub><sup>20</sup> for a composite cotton textile mill waste is \_\_\_\_\_ mg/L.  
a) 260      b) 560      c) 760      d) 960
  - 8) pH value of a combined distillery waste is  
a) 3.9 - 4.3      b) 5 - 7      c) 6.9 - 7.3      d) Above 8

P.T.O.



- 9) Desizing is a operation in \_\_\_\_\_ mill.  
a) Sugar                      b) Textile                      c) Pulp and paper      d) None of these
- 10) The crude waste is discharged into stream causes rapid \_\_\_\_\_ of the streams.  
a) Self purification                      b) Depletion of dissolved oxygen  
c) High toxicity                      d) Alkaline
- 11) \_\_\_\_\_ is the process where water becomes clear and the stream returns to its original condition.  
a) Reaeration                      b) Self purification  
c) Adsorption                      d) Settling
- 12) Presence of lime also inhibits \_\_\_\_\_ in sewage treatment plants.  
a) Chemical action                      b) Corrosion  
c) Sedimentation                      d) Biological action
- 13) Waste water generated can be estimated by multiplying water consumption by  
a) 1.2                      b) 0.9                      c) 2                      d) 1.5
- 14) \_\_\_\_\_ is the technique for removal of volatile substances from solution.  
a) Air diffuser                      b) Air wash                      c) Air stripping                      d) Aeration
- 15) The black strap molasses in sugar industries may be used as raw material for  
a) Tannery                      b) Distillery                      c) Paper                      d) Dairy
- 16) Typical rate of water used for paper industry is \_\_\_\_\_ m<sup>3</sup>/t.  
a) 120 -160                      b) 150 -190                      c) 200 -250                      d) 300
- 17) Molecular weight of glucose is  
a) 170                      b) 180                      c) 192                      d) 205
- 18) Relative stability of waste water will \_\_\_\_\_ with increase in temperature for same bleaching time.  
a) Remains same      b) Decrease                      c) Increase                      d) None of these
- 19) BOD<sub>5</sub> contribution per capita per day is considered as \_\_\_\_\_ gram/day.  
a) 50                      b) 80                      c) 120                      d) 180
- 20) Water body for propagation of wild life and fisheries is \_\_\_\_\_ class of water.  
a) A                      b) B                      c) C                      d) D
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : INDUSTRIAL WASTE TREATMENT**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions :** 1) Answer **any three** questions from Section – I.  
2) Question **6** is **compulsory** in Section – II, solve **any two** questions from remaining.  
3) Figure to the **right** indicate **full** marks.  
4) Assume suitable data **wherever** necessary and mention it **clearly**.

SECTION – I

2. a) Discuss various sources of waste water and their flow rates. **7**  
b) Give typical composition of domestic waste water. **7**
3. a) Explain the various methods of waste water volume reduction. **6**  
b) Discuss various methods of neutralization of alkaline wastes. **7**
4. a) Find critical D.O. deficit from the following data : **8**  
A municipal wastewater treatment plant discharges secondary effluent to a river. The worst condition occurs in the summer when the treated wastewater in summer is found to have a maximum flow rate of 10000 m<sup>3</sup>/day, a BOD<sub>5</sub> of 30 mg/L, dissolved oxygen concentration of 1.5 mg/L and temperature of 25°C. At upstream of the disposal point the minimum flow in the stream is 0.65 m<sup>3</sup>/sec. with BOD<sub>5</sub> of 3.0 mg/L, dissolved oxygen concentration of 7.0 mg/L and temperature of 22°C. The mixing of wastewater and stream is almost instantaneous at the point of disposal and velocity of the mixture is 0.2 m/sec. The re-aeration constant is estimated to be 0.4 per day at 20°C temperature. Determine the critical DO deficit and distance at which it will occur.
- b) What is neutralization of waste ? **5**
5. Write short notes on :  
a) Waste volume reduction. **7**  
b) Waste strength reduction. **7**

Set S



## SECTION – II

6. a) Explain in detail acclimatization of bacteria to toxic waste. **6**  
b) What are the various factors to be studied in designing of industrial waste treatment plant ? Explain in detail. **6**
7. Draw manufacturing process flow diagram, indicate the sources of waste and explain in detail.  
a) Tannery. **7**  
b) Dairy. **7**
8. Give the characteristics of waste water, draw waste water treatment flow diagram and explain in detail.  
a) Fertilizer. **7**  
b) Sugar mill. **7**
9. Write short notes on (**any two**) : **14**  
a) Recycling of waste.  
b) Central pollution control board.  
c) Operation and maintenance requirement.
-



SLR-TJ – 79

Seat No.	
----------	--

Set	P
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**WATER POWER ENGINEERING (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions** : 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3 only.*  
2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*  
3) *Solve any three questions from Q. No. 2 to Q. No. 5 from Section I and any three questions from Q. No. 6 to Q. No. 9 from Section II.*  
4) *Draw neat sketches wherever necessary.*  
5) *Assume suitable data wherever necessary.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer : **(1×20=20)**
- 1) Power plant having maximum demand more than the installed rated capacity will have utilization factor
    - a) Equal to unity
    - b) More than unity
    - c) Less than unity
    - d) None
  - 2) The primary power at a hydro plant is determined considering
    - a) Minimum stream flow
    - b) Available pondage
    - c) Probable load curve
    - d) All the above
  - 3) Which plant can never have 100 percent load factor ?
    - a) Base load plant
    - b) Peak load plant
    - c) Nuclear power plant
    - d) Hydroelectric plant
  - 4) A nuclear power plant is variably used as a
    - a) Base load plant
    - b) Peak load plant
    - c) Stand by plant
    - d) None
  - 5) Which of the following place is not associated with nuclear power plants in India ?
    - a) Narora
    - b) Tarapur
    - c) Kota
    - d) Bangalore
  - 6) Function of surge tank is to
    - a) Store water on load rejection
    - b) Furnish additional water during increased load demand
    - c) Both to store and supply water
    - d) None

P.T.O.



- 7) In hydro electric power station what is an enlarged body of water just above the intake and used as a regulating reservoir called
- a) Penstock      b) Spillways      c) Reservoir      d) Fore day
- 8) Unit power of turbine is
- a)  $P/H^{3/2}$       b)  $P/H$       c)  $P/\sqrt{H}$       d)  $p/H^2$
- 9) With reference to a power station which of the following cost is not an affixed cost
- a) Insurance charges      b) Interest on capital  
c) Fuel cost      d) Depreciation
- 10) The flow duration curve at a given head of hydroelectric plant is used to determine
- a) Load factor at the plant      b) Diversity factor of the plant  
c) Total power available at the site      d) Total unit of energy available
- 11) Pump storage schemes are used to improve
- a) Load factor  
b) Power factor  
c) Plant capacity factor as well as load factor  
d) Delivery factor
- 12) The draft tube is provided to
- a) Reduce the effect of water hammer  
b) Raise the water surface of the stream  
c) To create an artificial head  
d) None
- 13) Storage requirement can be determined from
- a) Flow duration curve      b) Mass-curve  
c) Hydrograph      d) Both b) and c)
- 14) Cavitation in a turbine causes
- a) Low efficiency      b) Blade surface is damaged  
c) Vibration and noise      d) None of the above
- 15) Surge tank is necessarily provided
- a) Long penstocks      b) Short length penstocks  
c) Surface penstocks      d) Embedded penstocks
- 16) Alternate formation and breakage of bubbles is called
- a) Cavitation      b) Water hammering      c) Surgification      d) All
- 17) The specific speed of water turbine is the speed at which the turbine develops
- a) Maximum horse power      b) A minimum horse power  
c) Unit horse power at unit head      d) Unit horse power at all head
- 18) Taking the water to  $100\text{kg/m}^3$ , how much power would be developed by a hydroelectric generator unit, assuming 100% efficiency, with 1.0 m head and  $1.0\text{ m}^3/\text{s}$  discharge ?
- a) 2.90 kW      b) 4.45 kW      c) 9.80 kW      d) 19.60 kW
- 19) The capacity of small hydro power plants are in order of
- a) 20-5 MW      b) 15-100 MW      c) 1-15 MW      d) 15-20 MW
- 20) The specific speeds of Pelton wheel, Francis and Kaplan turbines are in
- a) Increasing order      b) Decreasing order  
c) Neither increasing nor decreasing order      d) None





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017  
WATER POWER ENGINEERING (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions** : 1) Solve **any three** questions from Q. No. 2 to Q. No. 5 from Section I and **any three** questions from Q. No. 6 to Q. No. 9 from Section II.  
2) **Draw** neat sketches **wherever** necessary.  
3) **Assume** suitable data **wherever** necessary.

SECTION – I

2. a) What do you understand by non-conventional sources of power generation ?  
What is the scope of these sources in India ? **7**  
b) What are the various objectives of planning for water power development ? **7**
3. a) When a run of river plant operates as a peak load stations with a weekly load factor of 20%, all its capacity is firm capacity. What will be the minimum flow in the river so that the station may serve as the base load stations. It is given that, installed capacity of generator = 10,000 kW, Operating Head = 15 m, Plant efficiency = 80%, estimate the daily load factor of the plant if the stream flow is 20 cumcs. **7**  
b) Define the mass-curve and explain its use in the design of dam capacity and spill-way capacity. **6**
4. a) What are the functions a surge tank ? Describe different types of surge tanks. How will you differentiate between differential type of surge tank with sample and restricted orifice type of surge tank ? **6**  
b) The (90%) dependable discharge of river is 20 m<sup>3</sup>/sec. If the head utilised is 25 m, calculate :  
1) Theoretical hp and kW  
2) The approximate actual amount of power outputs  
3) Total yearly developable energy  
4) The actual capacity that may be installed to utilise all average flow and corresponding energy. **7**

**Set P**



5. a) What are the different salient factors to be considered in deciding the alignment of a tunnel in a hydroelectric project ? 7
- b) Discuss briefly, various types of hydraulic valves used in the penstock. 6

### SECTION – II

6. a) The following data refers to a proposed hydroelectric power plant, available Head = 27 m, catchment area = 440 km<sup>2</sup> a Rainfall = 150 cm/yr, of total rain fall utilized = 6.5%, turbine efficiency 80%, penstock efficiency 86%, generator efficiency 84%, load factor 0.45, calculate the power that can be developed suggest suitable turbine for the plant. 7
- b) For the same power under the given head, compare impulse wheels and reaction turbines with respect to efficiency, speed, space occupied, freedom from breakdown, ease of repairs and durability with silt laden water. 7
7. a) A closed cycle-pumped storage plant, with a gross head of 350 m, has a head race tunnel of 4.0 m diameter and 700 m long. The flow velocity is 7.0 m/sec. and friction factor  $f = 0.020$ . The overall efficiencies of pumping and generation are 86% and 89% respectively. Estimate the plant efficiency. 7
- b) How will you classify 'pumped storage power development' ? How does it differ from conventional hydropower development ? 6
8. a) What topographical features are in favour of adopting underground power plant ? What are the different types of underground power stations ? Draw neat layout. 7
- b) Discuss the necessity for the development of pumped storage power in the country. Mention the advantages and limitations of pumped storage power. 6
9. a) Describe how ocean tides are generated. With tidal cycle in view, describe how hydropower can be generated. Enumerate the limitations of tidal power generation. 7
- b) What do you understand by the term 'specific speed' of a turbine ? What information does it give and how it is made use in practice ? State, how the reaction turbine depends on specific speed. 6



SLR-TJ – 79

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**WATER POWER ENGINEERING (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions** : 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3 only.*  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Solve **any three** questions from Q. No. 2 to Q. No. 5 from Section I and **any three** questions from Q. No. 6 to Q. No. 9 from Section II.  
4) **Draw** neat sketches **wherever** necessary.  
5) **Assume** suitable data **wherever** necessary.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer : **(1×20=20)**
- 1) Alternate formation and breakage of bubbles is called  
a) Cavitation      b) Water hammering      c) Surgification      d) All
  - 2) The specific speed of water turbine is the speed at which the turbine develops  
a) Maximum horse power      b) A minimum horse power  
c) Unit horse power at unit head      d) Unit horse power at all head
  - 3) Taking the water to  $100\text{kg/m}^3$ , how much power would developed by a hydroelectric generator unit, assuming 100% efficiency, with 1.0 m head and  $1.0\text{ m}^3/\text{s}$  discharge ?  
a) 2.90 kW      b) 4.45 kW      c) 9.80 kW      d) 19.60 kW
  - 4) The capacity of small hydro power plant are in order of  
a) 20-5 MW      b) 15-100 MW      c) 1-15 MW      d) 15-20 MW
  - 5) The specific speeds of Pelton wheel, Francis and Kaplan turbines are in  
a) Increasing order      b) Decreasing order  
c) Neither increasing nor decreasing order      d) None
  - 6) Power plant having maximum demand more than the installed rated capacity will have utilization factor  
a) Equal to unity      b) More than unity  
c) Less than unity      d) None
  - 7) The primary power at a hydro plant is determined considering  
a) Minimum stream flow      b) Available pondage  
c) Probable load curve      d) All the above
  - 8) Which plant can never have 100 percent load factor ?  
a) Base load plant      b) Peak load plant  
c) Nuclear power plant      d) Hydroelectric plant

P.T.O.



- 9) A nuclear power plant is variably used as a
- a) Base load plant
  - b) Peak load plant
  - c) Stand by plant
  - d) None
- 10) Which of the following place is not associated with nuclear power plants in India ?
- a) Narora
  - b) Tarapur
  - c) Kota
  - d) Bangalore
- 11) Function of surge tank is to
- a) Store water on load rejection
  - b) Furnish additional water during increased load demand
  - c) Both to store and supply water
  - d) None
- 12) In hydro electric power station what is an enlarged body of water just above the intake and used as a regulating reservoir called
- a) Penstock
  - b) Spillways
  - c) Reservoir
  - d) Fore bay
- 13) Unit power of turbine is
- a)  $P/H^{3/2}$
  - b)  $P/H$
  - c)  $P/\sqrt{H}$
  - d)  $p/H^2$
- 14) With reference to a power station which of the following cost is not affixed cost
- a) Insurance charges
  - b) Interest on capital
  - c) Fuel cost
  - d) Depreciation
- 15) The flow duration curve at a given head of hydroelectric plant is used to determine
- a) Load factor at the plant
  - b) Diversity factor of the plant
  - c) Total power available at the site
  - d) Total unit of energy available
- 16) Pump storage scheme are used to improve
- a) Load factor
  - b) Power factor
  - c) Plant capacity factor as well as load factor
  - d) Delivery factor
- 17) The draft tube is provided to
- a) Reduce the effect of water hammer
  - b) Raise the water surface of the stream
  - c) To create an artificial head
  - d) None
- 18) Storage requirement can be determined from
- a) Flow duration curve
  - b) Mass-curve
  - c) Hydrograph
  - d) Both b) and c)
- 19) Cavitation in a turbine causes
- a) Low efficiency
  - b) Blade surface is damaged
  - c) Vibration and noise
  - d) None of the above
- 20) Surge tank is necessarily provided
- a) Long penstocks
  - b) Short length penstocks
  - c) Surface penstocks
  - d) Embedded penstocks



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017  
WATER POWER ENGINEERING (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions** : 1) Solve **any three** questions from Q. No. 2 to Q. No. 5 from Section I and **any three** questions from Q. No. 6 to Q. No. 9 from Section II.  
2) **Draw** neat sketches **wherever** necessary.  
3) **Assume** suitable data **wherever** necessary.

SECTION – I

2. a) What do you understand by non-conventional sources of power generation ?  
What is the scope of these sources in India ? 7  
b) What are the various objectives of planning for water power development ? 7
3. a) When a run of river plant operates as a peak load stations with a weekly load factor of 20%, all its capacity is firm capacity. What will be the minimum flow in the river so that the station may serve as the base load stations. It is given that, installed capacity of generator = 10,000 kW, Operating Head = 15 m, Plant efficiency = 80%, estimate the daily load factor of the plant if the stream flow is 20 cumcs. 7  
b) Define the mass-curve and explain its use in the design of dam capacity and spill-way capacity. 6
4. a) What are the functions a surge tank ? Describe different types of surge tanks. How will you differentiate between differential type of surge tank with sample and restricted orifice type of surge tank ? 6  
b) The (90%) dependable discharge of river is 20 m<sup>3</sup>/sec. If the head utilised is 25 m, calculate :  
1) Theoretical hp and kW  
2) The approximate actual amount of power outputs  
3) Total yearly developable energy  
4) The actual capacity that may be installed to utilise all average flow and corresponding energy. 7

**Set Q**



5. a) What are the different salient factors to be considered in deciding the alignment of a tunnel in a hydroelectric project ? **7**
- b) Discuss briefly, various types of hydraulic valves used in the penstock. **6**

### SECTION – II

6. a) The following data refers to a proposed hydroelectric power plant, available Head = 27 m, catchment area = 440 km<sup>2</sup> a Rainfall = 150 cm/yr, of total rain fall utilized = 6.5%, turbine efficiency 80%, penstock efficiency 86%, generator efficiency 84%, load factor 0.45, calculate the power that can be developed suggest suitable turbine for the plant. **7**
- b) For the same power under the given head, compare impulse wheels and reaction turbines with respect to efficiency, speed, space occupied, freedom from breakdown, ease of repairs and durability with silt laden water. **7**
7. a) A closed cycle-pumped storage plant, with a gross head of 350 m, has a head race tunnel of 4.0 m diameter and 700 m long. The flow velocity is 7.0 m/sec. and friction factor  $f = 0.020$ . The overall efficiencies of pumping and generation are 86% and 89% respectively. Estimate the plant efficiency. **7**
- b) How will you classify 'pumped storage power development' ? How does it differ from conventional hydropower development ? **6**
8. a) What topographical features are in favour of adopting underground power plant ? What are the different types of underground power stations ? Draw neat layout. **7**
- b) Discuss the necessity for the development of pumped storage power in the country. Mention the advantages and limitations of pumped storage power. **6**
9. a) Describe how ocean tides are generated. With tidal cycle in view, describe how hydropower can be generated. Enumerate the limitations of tidal power generation. **7**
- b) What do you understand by the term 'specific speed' of a turbine ? What information does it give and how it is made use in practice ? State, how the reaction turbine depends on specific speed. **6**



SLR-TJ – 79

Seat No.	
----------	--

Set	R
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**WATER POWER ENGINEERING (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions** : 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3 only.  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**  
3) Solve **any three** questions from Q. No. 2 to Q. No. 5 from Section I and **any three** questions from Q. No. 6 to Q. No. 9 from Section II.  
4) **Draw neat sketches wherever necessary.**  
5) **Assume suitable data wherever necessary.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer : **(1×20=20)**
- 1) Pump storage scheme are used to improve
    - a) Load factor
    - b) Power factor
    - c) Plant capacity factor as well as load factor
    - d) Delivery factor
  - 2) The draft tube is provided to
    - a) Reduce the effect of water hammer
    - b) Raise the water surface of the stream
    - c) To create an artificial head
    - d) None
  - 3) Storage requirement can be determined from
    - a) Flow duration curve
    - b) Mass-curve
    - c) Hydrograph
    - d) Both b) and c)
  - 4) Cavitation in a turbine causes
    - a) Low efficiency
    - b) Blade surface is damaged
    - c) Vibration and noise
    - d) None of the above
  - 5) Surge tank is necessarily provided
    - a) Long penstocks
    - b) Short length penstocks
    - c) Surface penstocks
    - d) Embedded penstocks
  - 6) Alternate formation and breakage of bubbles is called
    - a) Cavitation
    - b) Water hammering
    - c) Surgification
    - d) All
  - 7) The specific speed of water turbine is the speed at which the turbine develops
    - a) Maximum horse power
    - b) A minimum horse power
    - c) Unit horse power at unit head
    - d) Unit horse power at all head

P.T.O.



- 8) Taking the water to  $100\text{kg/m}^3$ , how much power would developed by a hydroelectric generator unit, assuming 100% efficiency, with 1.0 m head and  $1.0\text{ m}^3/\text{s}$  discharge ?  
a) 2.90 kW                      b) 4.45 kW                      c) 9.80 kW                      d) 19.60 kW
- 9) The capacity of small hydro power plant are in order of  
a) 20-5 MW                      b) 15-100 MW                      c) 1-15 MW                      d) 15-20 MW
- 10) The specific speeds of Pelton wheel, Francis and Kaplan turbines are in  
a) Increasing order                      b) Decreasing order  
c) Neither increasing nor decreasing order                      d) None
- 11) Power plant having maximum demand more than the installed rated capacity will have utilization factor  
a) Equal to unity                      b) More than unity  
c) Less than unity                      d) None
- 12) The primary power at a hydro plant is determined considering  
a) Minimum stream flow                      b) Available pondage  
c) Probable load curve                      d) All the above
- 13) Which plant can never have 100 percent load factor ?  
a) Base load plant                      b) Peak load plant  
c) Nuclear power plant                      d) Hydroelectric plant
- 14) A nuclear power plant is variably used as a  
a) Base load plant                      b) Peak load plant  
c) Stand by plant                      d) None
- 15) Which of the following place is not associated with nuclear power plants in India ?  
a) Narora                      b) Tarapur                      c) Kota                      d) Bangalore
- 16) Function of surge tank is to  
a) Store water on load rejection  
b) Furnish additional water during increased load demand  
c) Both to store and supply water  
d) None
- 17) Inhydro electric power station what is an enlarge body of water just above the intake and used as a regulating reservoir called  
a) Penstock                      b) Spillways                      c) Reservoir                      d) Fore day
- 18) Unit power of turbine is  
a)  $P/H^{3/2}$                       b)  $P/H$                       c)  $P/\sqrt{H}$                       d)  $p/H^2$
- 19) With reference to a power station which of the following cost is not affixed cost  
a) Insurance charges                      b) Interest on capital  
c) Fuel cost                      d) Depreciation
- 20) The flow duration curve at a given head of hydroelectric plant is used to determine  
a) Load factor at the plant                      b) Diversity factor of the plant  
c) Total power available at the site                      d) Total unit of energy available





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017  
WATER POWER ENGINEERING (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions** : 1) Solve **any three** questions from Q. No. 2 to Q. No. 5 from Section I and **any three** questions from Q. No. 6 to Q. No. 9 from Section II.  
2) **Draw** neat sketches **wherever** necessary.  
3) **Assume** suitable data **wherever** necessary.

SECTION – I

2. a) What do you understand by non-conventional sources of power generation ?  
What is the scope of these sources in India ? **7**  
b) What are the various objectives of planning for water power development ? **7**
3. a) When a run of river plant operates as a peak load stations with a weekly load factor of 20%, all its capacity is firm capacity. What will be the minimum flow in the river so that the station may serve as the base load stations. It is given that, installed capacity of generator = 10,000 kW, Operating Head = 15 m, Plant efficiency = 80%, estimate the daily load factor of the plant if the stream flow is 20 cumcs. **7**  
b) Define the mass-curve and explain its use in the design of dam capacity and spill-way capacity. **6**
4. a) What are the functions a surge tank ? Describe different types of surge tanks. How will you differentiate between differential type of surge tank with sample and restricted orifice type of surge tank ? **6**  
b) The (90%) dependable discharge of river is 20 m<sup>3</sup>/sec. If the head utilised is 25 m, calculate :  
1) Theoretical hp and kW  
2) The approximate actual amount of power outputs  
3) Total yearly developable energy  
4) The actual capacity that may be installed to utilise all average flow and corresponding energy. **7**

**Set R**



5. a) What are the different salient factors to be considered in deciding the alignment of a tunnel in a hydroelectric project ? 7
- b) Discuss briefly, various types of hydraulic valves used in the penstock. 6

### SECTION – II

6. a) The following data refers to a proposed hydroelectric power plant, available Head = 27 m, catchment area = 440 km<sup>2</sup> a Rainfall = 150 cm/yr, of total rain fall utilized = 6.5%, turbine efficiency 80%, penstock efficiency 86%, generator efficiency 84%, load factor 0.45, calculate the power that can be developed suggest suitable turbine for the plant. 7
- b) For the same power under the given head, compare impulse wheels and reaction turbines with respect to efficiency, speed, space occupied, freedom from breakdown, ease of repairs and durability with silt laden water. 7
7. a) A closed cycle-pumped storage plant, with a gross head of 350 m, has a head race tunnel of 4.0 m diameter and 700 m long. The flow velocity is 7.0 m/sec. and friction factor  $f = 0.020$ . The overall efficiencies of pumping and generation are 86% and 89% respectively. Estimate the plant efficiency. 7
- b) How will you classify 'pumped storage power development' ? How does it differ from conventional hydropower development ? 6
8. a) What topographical features are in favour of adopting underground power plant ? What are the different types of underground power stations ? Draw neat layout. 7
- b) Discuss the necessity for the development of pumped storage power in the country. Mention the advantages and limitations of pumped storage power. 6
9. a) Describe how ocean tides are generated. With tidal cycle in view, describe how hydropower can be generated. Enumerate the limitations of tidal power generation. 7
- b) What do you understand by the term 'specific speed' of a turbine ? What information does it give and how it is made use in practice ? State, how the reaction turbine depends on specific speed. 6



SLR-TJ – 79

Seat No.	
----------	--

Set	S
-----	---

**B.E. (Civil) (Part – II) Examination, 2017**  
**WATER POWER ENGINEERING (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions** : 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3 only.*  
2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*  
3) *Solve any three questions from Q. No. 2 to Q. No. 5 from Section I and any three questions from Q. No. 6 to Q. No. 9 from Section II.*  
4) *Draw neat sketches wherever necessary.*  
5) *Assume suitable data wherever necessary.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer : **(1×20=20)**
- 1) Function of surge tank is to
    - a) Store water on load rejection
    - b) Furnish additional water during increased load demand
    - c) Both to store and supply water
    - d) None
  - 2) In hydro electric power station what is an enlarged body of water just above the intake and used as a regulating reservoir called
    - a) Penstock
    - b) Spillways
    - c) Reservoir
    - d) Fore day
  - 3) Unit power of turbine is
    - a)  $P/H^{3/2}$
    - b)  $P/H$
    - c)  $P/\sqrt{H}$
    - d)  $p/H^2$
  - 4) With reference to a power station which of the following cost is not affixed cost
    - a) Insurance charges
    - b) Interest on capital
    - c) Fuel cost
    - d) Depreciation
  - 5) The flow duration curve at a given head of hydroelectric plant is used to determine
    - a) Load factor at the plant
    - b) Diversity factor of the plant
    - c) Total power available at the site
    - d) Total unit of energy available
  - 6) Pump storage scheme are used to improve
    - a) Load factor
    - b) Power factor
    - c) Plant capacity factor as well as load factor
    - d) Delivery factor

P.T.O.



- 7) The draft tube is provided to
  - a) Reduce the effect of water hammer
  - b) Raise the water surface of the stream
  - c) To create an artificial head
  - d) None
- 8) Storage requirement can be determined from
  - a) Flow duration curve
  - b) Mass-curve
  - c) Hydrograph
  - d) Both b) and c)
- 9) Cavitation in a turbine causes
  - a) Low efficiency
  - b) Blade surface is damaged
  - c) Vibration and noise
  - d) None of the above
- 10) Surge tank is necessarily provided
  - a) Long penstocks
  - b) Short length penstocks
  - c) Surface penstocks
  - d) Embedded penstocks
- 11) Alternate formation and breakage of bubbles is called
  - a) Cavitation
  - b) Water hammering
  - c) Surgification
  - d) All
- 12) The specific speed of water turbine is the speed at which the turbine develops
  - a) Maximum horse power
  - b) A minimum horse power
  - c) Unit horse power at unit head
  - d) Unit horse power at all head
- 13) Taking the water to  $100\text{kg/m}^3$ , how much power would developed by a hydroelectric generator unit, assuming 100% efficiency, with 1.0 m head and  $1.0\text{ m}^3/\text{s}$  discharge ?
  - a) 2.90 kW
  - b) 4.45 kW
  - c) 9.80 kW
  - d) 19.60 kW
- 14) The capacity of small hydro power plant are in order of
  - a) 20-5 MW
  - b) 15-100 MW
  - c) 1-15 MW
  - d) 15-20 MW
- 15) The specific speeds of Pelton wheel, Francis and Kaplan turbines are in
  - a) Increasing order
  - b) Decreasing order
  - c) Neither increasing nor decreasing order
  - d) None
- 16) Power plant having maximum demand more than the installed rated capacity will have utilization factor
  - a) Equal to unity
  - b) More than unity
  - c) Less than unity
  - d) None
- 17) The primary power at a hydro plant is determined considering
  - a) Minimum stream flow
  - b) Available pondage
  - c) Probable load curve
  - d) All the above
- 18) Which plant can never have 100 percent load factor ?
  - a) Base load plant
  - b) Peak load plant
  - c) Nuclear power plant
  - d) Hydroelectric plant
- 19) A nuclear power plant is variably used as a
  - a) Base load plant
  - b) Peak load plant
  - c) Stand by plant
  - d) None
- 20) Which of the following place is not associated with nuclear power plants in India ?
  - a) Narora
  - b) Tarapur
  - c) Kota
  - d) Bangalore



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017  
WATER POWER ENGINEERING (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions** : 1) Solve **any three** questions from Q. No. 2 to Q. No. 5 from Section I and **any three** questions from Q. No. 6 to Q. No. 9 from Section II.  
2) **Draw** neat sketches **wherever** necessary.  
3) **Assume** suitable data **wherever** necessary.

SECTION – I

2. a) What do you understand by non-conventional sources of power generation ?  
What is the scope of these sources in India ? **7**  
b) What are the various objectives of planning for water power development ? **7**
3. a) When a run of river plant operates as a peak load stations with a weekly load factor of 20%, all its capacity is firm capacity. What will be the minimum flow in the river so that the station may serve as the base load stations. It is given that, installed capacity of generator = 10,000 kW, Operating Head = 15 m, Plant efficiency = 80%, estimate the daily load factor of the plant if the stream flow is 20 cumcs. **7**  
b) Define the mass-curve and explain its use in the design of dam capacity and spill-way capacity. **6**
4. a) What are the functions a surge tank ? Describe different types of surge tanks. How will you differentiate between differential type of surge tank with sample and restricted orifice type of surge tank ? **6**  
b) The (90%) dependable discharge of river is 20 m<sup>3</sup>/sec. If the head utilised is 25 m, calculate :  
1) Theoretical hp and kW  
2) The approximate actual amount of power outputs  
3) Total yearly developable energy  
4) The actual capacity that may be installed to utilise all average flow and corresponding energy. **7**

**Set S**



5. a) What are the different salient factors to be considered in deciding the alignment of a tunnel in a hydroelectric project ? 7
- b) Discuss briefly, various types of hydraulic valves used in the penstock. 6

### SECTION – II

6. a) The following data refers to a proposed hydroelectric power plant, available Head = 27 m, catchment area = 440 km<sup>2</sup> a Rainfall = 150 cm/yr, of total rain fall utilized = 6.5%, turbine efficiency 80%, penstock efficiency 86%, generator efficiency 84%, load factor 0.45, calculate the power that can be developed suggest suitable turbine for the plant. 7
- b) For the same power under the given head, compare impulse wheels and reaction turbines with respect to efficiency, speed, space occupied, freedom from breakdown, ease of repairs and durability with silt laden water. 7
7. a) A closed cycle-pumped storage plant, with a gross head of 350 m, has a head race tunnel of 4.0 m diameter and 700 m long. The flow velocity is 7.0 m/sec. and friction factor  $f = 0.020$ . The overall efficiencies of pumping and generation are 86% and 89% respectively. Estimate the plant efficiency. 7
- b) How will you classify 'pumped storage power development' ? How does it differ from conventional hydropower development ? 6
8. a) What topographical features are in favour of adopting underground power plant ? What are the different types of underground power stations ? Draw neat layout. 7
- b) Discuss the necessity for the development of pumped storage power in the country. Mention the advantages and limitations of pumped storage power. 6
9. a) Describe how ocean tides are generated. With tidal cycle in view, describe how hydropower can be generated. Enumerate the limitations of tidal power generation. 7
- b) What do you understand by the term 'specific speed' of a turbine ? What information does it give and how it is made use in practice ? State, how the reaction turbine depends on specific speed. 6



SLR-TJ – 80

Seat No.	
----------	--

Set 

P
---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : ADVANCED CONCRETE TECHNOLOGY**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

**Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries two marks.*  
2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

Choose the correct answer :

20

- 1) Testing of hardened concrete can be done by
  - a) Schmidt's Rebound Hammer
  - b) Penetration technique
  - c) Dynamic Method
  - d) All of these
- 2) Measurement of concrete workability is done by
  - a) Compacting factor test
  - b) Abrasion test
  - c) Soundness test
  - d) Setting time test
- 3) Fineness of cement is done by the sieve
  - a) 600  $\mu$
  - b) 300  $\mu$
  - c) 150  $\mu$
  - d) 90  $\mu$
- 4) Volume of one bag of cement is taken as
  - a) 35 liters
  - b) 70 liters
  - c) 35 m<sup>3</sup>
  - d) 70 m<sup>3</sup>
- 5) IS provision for concrete mix design is given in
  - a) IS : 4031-1968
  - b) IS : 383-1970
  - c) IS : 456-2000
  - d) IS : 10262-2009
- 6) For concrete mix pH value of water shall not be less than
  - a) 7
  - b) 6
  - c) 8
  - d) 9

P.T.O.



- 7) The standard consistency of a cement paste is defined as
- Consistency which will permit vicat plunger to penetrate to a depth of 33 to 35 mm from the top of the mould
  - Consistency which will permit vicat plunger to penetrate to a depth of 05 to 07 mm from the top of the mould
  - Consistency which will permit vicat plunger to penetrate to a depth of 33 to 35 mm from the bottom of the mould
  - Consistency which will permit vicat plunger to penetrate to a depth of 05 to 07 mm from the bottom of the mould
- a) only i                      b) only ii                      c) only iv                      d) i and iv both
- 8) Which of the following is not a effect of creep ?
- Due to creep there is a volume change in concrete
  - Creep increases the deflection of structure with time
  - Creep will lead to buckling
  - It may cause cracking in interior of structure
- 9) The approximate value of the total shrinkage strain of concrete may be taken as
- 3.0                      b) 0.3                      c) 0.003                      d) 0.0003
- 10) Aggregate which are suitable for making the concrete may have the angularity no. from
- 1 to 11                      b) 11 to 111                      c) 0 to 11                      d) 0 to 100
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : ADVANCED CONCRETE TECHNOLOGY**

Day and Date : Friday, 24-11-2017

Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from **each** Section.  
2) Figures to **right** indicate **full** marks.  
3) Use of non-programmable calculator is **allowed**.  
4) Assume suitable data **if necessary** and mention it **clearly**.

SECTION – I

1. a) Distinguish between plasticizers and superplasticizers. 4  
b) Classify the various concrete chemicals based on their use. 9
2. a) Describe the importance of curing. 4  
b) Compare the relative merits and demerits of various workability tests. 9
3. a) Write in brief about relationship between strength and density of concrete. 4  
b) Discuss the maturity of concrete. How is it measured ? What are its uses in concrete industry ? 9
4. How can aggregate cause efflorescence in concrete ? How does the maximum size of aggregate affect the workability of concrete with a given water content ? 13

Set P



## SECTION – II

- |   |   |
|---|---|
| 5. a) What are the advantages of placing concrete by pumping ?                                  | 4 |
| b) Describe wet-process shotcreting.  | 9 |
| 6. a) What is meant by a crack arrester in concrete ?   | 4 |
| b) Discuss crack propagation in concrete.   | 9 |
| 7. a) What are the workability requirements for concrete to be pumped ?                         | 4 |
| b) What are the special requirements for mix proportions of concrete which is to be pumped ?    | 9 |
| 8. a) Explain the significance of quality control.  | 4 |
| b) What is meant by jacketing of concrete sections ? Describe the different types of jacketing. | 9 |
-



SLR-TJ – 80

Seat No.	
----------	--

Set 

Q
---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : ADVANCED CONCRETE TECHNOLOGY**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries two marks.*  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

Choose the correct answer :

**20**

- 1) The approximate value of the total shrinkage strain of concrete may be taken as
  - a) 3.0
  - b) 0.3
  - c) 0.003
  - d) 0.0003
- 2) Aggregate which are suitable for making the concrete may have the angularity no. from
  - a) 1 to 11
  - b) 11 to 111
  - c) 0 to 11
  - d) 0 to 100
- 3) The standard consistency of a cement paste is defined as
  - i. Consistency which will permit vicat plunger to penetrate to a depth of 33 to 35 mm from the top of the mould
  - ii. Consistency which will permit vicat plunger to penetrate to a depth of 05 to 07 mm from the top of the mould
  - iii. Consistency which will permit vicat plunger to penetrate to a depth of 33 to 35 mm from the bottom of the mould
  - iv. Consistency which will permit vicat plunger to penetrate to a depth of 05 to 07 mm from the bottom of the mould
  - a) only i
  - b) only ii
  - c) only iv
  - d) i and iv both

P.T.O.



- 4) Which of the following is not a effect of creep ?
- a) Due to creep there is a volume change in concrete
  - b) Creep increases the deflection of structure with time
  - c) Creep will lead to buckling
  - d) It may cause cracking in interior of structure
- 5) Testing of hardened concrete can be done by
- a) Schmidt's Rebound Hammer
  - b) Penetration technique
  - c) Dynamic Method
  - d) All of these
- 6) Measurement of concrete workability is done by
- a) Compacting factor test
  - b) Abrasion test
  - c) Soundness test
  - d) Setting time test
- 7) Fineness of cement is done by the sieve
- a) 600  $\mu$
  - b) 300  $\mu$
  - c) 150  $\mu$
  - d) 90  $\mu$
- 8) Volume of one bag of cement is taken as
- a) 35 liters
  - b) 70 liters
  - c) 35 m<sup>3</sup>
  - d) 70 m<sup>3</sup>
- 9) IS provision for concrete mix design is given in
- a) IS : 4031-1968
  - b) IS : 383-1970
  - c) IS : 456-2000
  - d) IS : 10262-2009
- 10) For concrete mix pH value of water shall not be less than
- a) 7
  - b) 6
  - c) 8
  - d) 9
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : ADVANCED CONCRETE TECHNOLOGY**

Day and Date : Friday, 24-11-2017

Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from **each** Section.  
2) Figures to **right** indicate **full** marks.  
3) Use of non-programmable calculator is **allowed**.  
4) Assume suitable data **if necessary** and mention it **clearly**.

SECTION – I

1. a) Distinguish between plasticizers and superplasticizers. 4  
b) Classify the various concrete chemicals based on their use. 9
2. a) Describe the importance of curing. 4  
b) Compare the relative merits and demerits of various workability tests. 9
3. a) Write in brief about relationship between strength and density of concrete. 4  
b) Discuss the maturity of concrete. How is it measured ? What are its uses in concrete industry ? 9
4. How can aggregate cause efflorescence in concrete ? How does the maximum size of aggregate affect the workability of concrete with a given water content ? 13



## SECTION – II

- |   |   |
|---|---|
| 5. a) What are the advantages of placing concrete by pumping ?                                  | 4 |
| b) Describe wet-process shotcreting.  | 9 |
| 6. a) What is meant by a crack arrester in concrete ?   | 4 |
| b) Discuss crack propagation in concrete.   | 9 |
| 7. a) What are the workability requirements for concrete to be pumped ?                         | 4 |
| b) What are the special requirements for mix proportions of concrete which is to be pumped ?    | 9 |
| 8. a) Explain the significance of quality control.  | 4 |
| b) What is meant by jacketing of concrete sections ? Describe the different types of jacketing. | 9 |
-



SLR-TJ – 80

Seat No.	
----------	--

Set 

R
---

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : ADVANCED CONCRETE TECHNOLOGY**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

**Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries two marks.*  
2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

Choose the correct answer :

20

- 1) IS provision for concrete mix design is given in
  - a) IS : 4031-1968
  - b) IS : 383-1970
  - c) IS : 456-2000
  - d) IS : 10262-2009
- 2) For concrete mix pH value of water shall not be less than
  - a) 7
  - b) 6
  - c) 8
  - d) 9
- 3) The approximate value of the total shrinkage strain of concrete may be taken as
  - a) 3.0
  - b) 0.3
  - c) 0.003
  - d) 0.0003
- 4) Aggregate which are suitable for making the concrete may have the angularity no. from
  - a) 1 to 11
  - b) 11 to 111
  - c) 0 to 11
  - d) 0 to 100
- 5) Fineness of cement is done by the sieve
  - a) 600  $\mu$
  - b) 300  $\mu$
  - c) 150  $\mu$
  - d) 90  $\mu$
- 6) Volume of one bag of cement is taken as
  - a) 35 liters
  - b) 70 liters
  - c) 35 m<sup>3</sup>
  - d) 70 m<sup>3</sup>

P.T.O.



- 7) Testing of hardened concrete can be done by
- a) Schmidt's Rebound Hammer
  - b) Penetration technique
  - c) Dynamic Method
  - d) All of these
- 8) Measurement of concrete workability is done by
- a) Compacting factor test
  - b) Abrasion test
  - c) Soundness test
  - d) Setting time test
- 9) The standard consistency of a cement paste is defined as
- i. Consistency which will permit vicat plunger to penetrate to a depth of 33 to 35 mm from the top of the mould
  - ii. Consistency which will permit vicat plunger to penetrate to a depth of 05 to 07 mm from the top of the mould
  - iii. Consistency which will permit vicat plunger to penetrate to a depth of 33 to 35 mm from the bottom of the mould
  - iv. Consistency which will permit vicat plunger to penetrate to a depth of 05 to 07 mm from the bottom of the mould
- a) only i                      b) only ii                      c) only iv                      d) i and iv both
- 10) Which of the following is not a effect of creep ?
- a) Due to creep there is a volume change in concrete
  - b) Creep increases the deflection of structure with time
  - c) Creep will lead to buckling
  - d) It may cause cracking in interior of structure
-





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : ADVANCED CONCRETE TECHNOLOGY**

Day and Date : Friday, 24-11-2017

Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from **each** Section.  
2) Figures to **right** indicate **full** marks.  
3) Use of non-programmable calculator is **allowed**.  
4) Assume suitable data **if necessary** and mention it **clearly**.

SECTION – I

1. a) Distinguish between plasticizers and superplasticizers. 4  
b) Classify the various concrete chemicals based on their use. 9
2. a) Describe the importance of curing. 4  
b) Compare the relative merits and demerits of various workability tests. 9
3. a) Write in brief about relationship between strength and density of concrete. 4  
b) Discuss the maturity of concrete. How is it measured ? What are its uses in concrete industry ? 9
4. How can aggregate cause efflorescence in concrete ? How does the maximum size of aggregate affect the workability of concrete with a given water content ? 13

Set R



## SECTION – II

- |   |   |
|---|---|
| 5. a) What are the advantages of placing concrete by pumping ?                                  | 4 |
| b) Describe wet-process shotcreting.  | 9 |
| 6. a) What is meant by a crack arrester in concrete ?   | 4 |
| b) Discuss crack propagation in concrete.   | 9 |
| 7. a) What are the workability requirements for concrete to be pumped ?                         | 4 |
| b) What are the special requirements for mix proportions of concrete which is to be pumped ?    | 9 |
| 8. a) Explain the significance of quality control.  | 4 |
| b) What is meant by jacketing of concrete sections ? Describe the different types of jacketing. | 9 |
-



SLR-TJ – 80

Seat No.	
----------	--

Set

S

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : ADVANCED CONCRETE TECHNOLOGY**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :** 1) *Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries two marks.*  
2) *Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.*

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

Choose the correct answer :

20

- 1) Fineness of cement is done by the sieve
  - a) 600  $\mu$
  - b) 300  $\mu$
  - c) 150  $\mu$
  - d) 90  $\mu$
- 2) Volume of one bag of cement is taken as
  - a) 35 liters
  - b) 70 liters
  - c) 35 m<sup>3</sup>
  - d) 70 m<sup>3</sup>
- 3) IS provision for concrete mix design is given in
  - a) IS : 4031-1968
  - b) IS : 383-1970
  - c) IS : 456-2000
  - d) IS : 10262-2009
- 4) For concrete mix pH value of water shall not be less than
  - a) 7
  - b) 6
  - c) 8
  - d) 9
- 5) The standard consistency of a cement paste is defined as
  - i. Consistency which will permit vicat plunger to penetrate to a depth of 33 to 35 mm from the top of the mould
  - ii. Consistency which will permit vicat plunger to penetrate to a depth of 05 to 07 mm from the top of the mould
  - iii. Consistency which will permit vicat plunger to penetrate to a depth of 33 to 35 mm from the bottom of the mould
  - iv. Consistency which will permit vicat plunger to penetrate to a depth of 05 to 07 mm from the bottom of the mould
  - a) only i
  - b) only ii
  - c) only iv
  - d) i and iv both

P.T.O.



- 6) Which of the following is not a effect of creep ?
- a) Due to creep there is a volume change in concrete
  - b) Creep increases the deflection of structure with time
  - c) Creep will lead to buckling
  - d) It may cause cracking in interior of structure
- 7) The approximate value of the total shrinkage strain of concrete may be taken as
- a) 3.0
  - b) 0.3
  - c) 0.003
  - d) 0.0003
- 8) Aggregate which are suitable for making the concrete may have the angularity no. from
- a) 1 to 11
  - b) 11 to 111
  - c) 0 to 11
  - d) 0 to 100
- 9) Testing of hardened concrete can be done by
- a) Schmidt's Rebound Hammer
  - b) Penetration technique
  - c) Dynamic Method
  - d) All of these
- 10) Measurement of concrete workability is done by
- a) Compacting factor test
  - b) Abrasion test
  - c) Soundness test
  - d) Setting time test
-



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**Elective – III : ADVANCED CONCRETE TECHNOLOGY**

Day and Date : Friday, 24-11-2017

Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) Solve **any three** questions from **each** Section.  
2) Figures to **right** indicate **full** marks.  
3) Use of non-programmable calculator is **allowed**.  
4) Assume suitable data **if necessary** and mention it **clearly**.

SECTION – I

1. a) Distinguish between plasticizers and superplasticizers. 4  
b) Classify the various concrete chemicals based on their use. 9
2. a) Describe the importance of curing. 4  
b) Compare the relative merits and demerits of various workability tests. 9
3. a) Write in brief about relationship between strength and density of concrete. 4  
b) Discuss the maturity of concrete. How is it measured ? What are its uses in concrete industry ? 9
4. How can aggregate cause efflorescence in concrete ? How does the maximum size of aggregate affect the workability of concrete with a given water content ? 13



## SECTION – II

- |   |   |
|---|---|
| 5. a) What are the advantages of placing concrete by pumping ?                                  | 4 |
| b) Describe wet-process shotcreting.  | 9 |
| 6. a) What is meant by a crack arrester in concrete ?   | 4 |
| b) Discuss crack propagation in concrete.   | 9 |
| 7. a) What are the workability requirements for concrete to be pumped ?                         | 4 |
| b) What are the special requirements for mix proportions of concrete which is to be pumped ?    | 9 |
| 8. a) Explain the significance of quality control.  | 4 |
| b) What is meant by jacketing of concrete sections ? Describe the different types of jacketing. | 9 |
-



SLR-TJ – 84

Seat No.	
----------	--

Set	P
-----	---

**B.E. (Civil) (Part – II) Examination, 2017  
OPTIMIZATION TECHNIQUES (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) **Assume** suitable data whenever required.
  - 2) **Use** of non-programmable calculator is **allowed**.
  - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Write the correct option in your answer book : **20**
- 1) Simple linear programming problem with \_\_\_\_\_ variables can be easily solved by the graphical method.  
a) One decision      b) Four decisions      c) Three decisions      d) Two decisions
  - 2) Any solution to a LPP which satisfies the non-negativity restrictions of the LPP is called its \_\_\_\_\_.  
a) Unbounded solution      b) Optimal solution  
c) Feasible solution      d) Both a) and b)
  - 3) Any feasible solution which optimizes (minimizes or maximizes) the objective function of the LPP is called its \_\_\_\_\_.  
a) Optimal solution      b) Non-basic variables  
c) Solution      d) Basic feasible solution
  - 4) A non-degenerate basic feasible solution is the basic feasible solution which has exactly  $m$  positive  $X_i$  ( $i=1,2, \dots, m$ ), i.e., none of the basic variable is \_\_\_\_\_.  
a) Infinity      b) One      c) Zero      d) X
  - 5) What is also defined as the non-negative variables which are added in the LHS of the constraint to convert the inequality ' $\leq$ ' into an equation ?  
a) Slack variables      b) Simplex algorithm  
c) Key element      d) None of the above
  - 6) \_\_\_\_\_ is another method to solve a given LPP involving some artificial variable.  
a) Big M method      b) Method of penalties  
c) Two-phase simplex method      d) None of the above

P.T.O.







Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017  
OPTIMIZATION TECHNIQUES (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions:**
- 1) Qu. 2 from Section – I and Qu. 6 from Section – II are **compulsory**.
  - 2) Solve **any two** questions out of remaining questions from Section – I and Section – II.
  - 3) **Assume** suitable data whenever **required**.
  - 4) Figure to the **right** indicates **full** marks.
  - 5) **Use** of non-programmable calculator is **allowed**.

SECTION – I

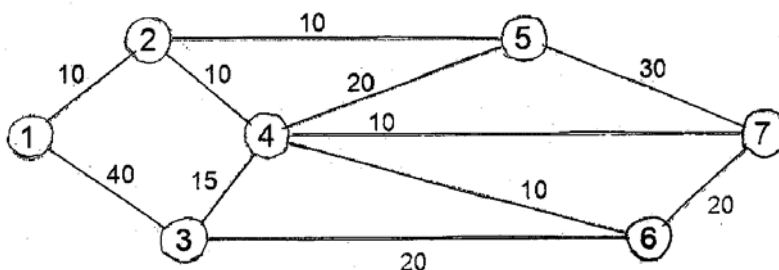
2. a) Write the general form of optimization model. 6  
 b) Solve following problem using graphical method. 10

Minimize  $Z = -x_1 + 2x_2$   
 S.to  $-x_1 + 3x_2 \leq 10$   
 $x_1 + x_2 \leq 6$   
 $x_1 - x_2 \leq 2$   
 Where,  $x_1, x_2 \geq 0$

3. Solve the following problem by simplex method. 12

Maximize  $Z = 3x_1 + 5x_2 + 4x_3$   
 S.to  $2x_1 + 3x_2 \leq 8$   
 $2x_2 + 5x_3 \leq 10$   
 $3x_1 + 2x_2 + 4x_3 \leq 15$   
 Where  $x_1, x_2, x_3 \geq 0$ .

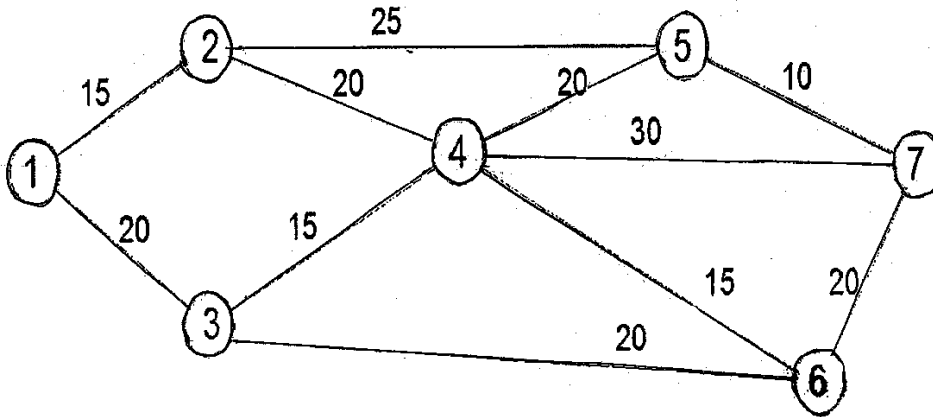
4. Find the maximum flow from node 1 to node 7 for the pipe network shown in fig. 12





5. Find the shortest distance between node 1 – node 7.

12



SECTION – II

- 6. a) Explain decision making under uncertainty with example.
- b) Find the saddle point of pay off matrix given below.

8  
8

**Player B**

	6	2	3
<b>Player A</b>	2	-1	-3
	5	4	5

- 7. a) Explain probabilistic model of inventory management.
- b) Derive the formula for Economic Order Quantity (EOQ).
- 8. a) What is integer programming ? Explain any one method in details to solve the problems on integer programming.
- b) What is dynamic programming ?
- 9. a) What is genetic algorithm ? How it could be used to solve civil engineering problems ?
- b) What is simulation ? What are its advantages ?

4  
8  
8  
4  
8  
4







Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017  
OPTIMIZATION TECHNIQUES (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions:**
- 1) Qu. 2 from Section – I and Qu. 6 from Section – II are **compulsory**.
  - 2) Solve **any two** questions out of remaining questions from Section – I and Section – II.
  - 3) **Assume** suitable data whenever **required**.
  - 4) Figure to the **right** indicates **full** marks.
  - 5) **Use** of non-programmable calculator is **allowed**.

SECTION – I

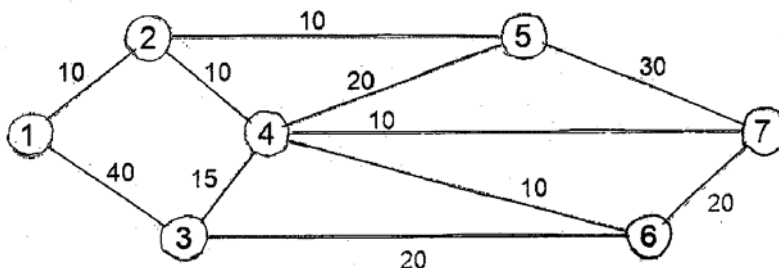
2. a) Write the general form of optimization model. 6  
 b) Solve following problem using graphical method. 10

Minimize  $Z = -x_1 + 2x_2$   
 S.to  $-x_1 + 3x_2 \leq 10$   
 $x_1 + x_2 \leq 6$   
 $x_1 - x_2 \leq 2$   
 Where,  $x_1, x_2 \geq 0$

3. Solve the following problem by simplex method. 12

Maximize  $Z = 3x_1 + 5x_2 + 4x_3$   
 S.to  $2x_1 + 3x_2 \leq 8$   
 $2x_2 + 5x_3 \leq 10$   
 $3x_1 + 2x_2 + 4x_3 \leq 15$   
 Where  $x_1, x_2, x_3 \geq 0$ .

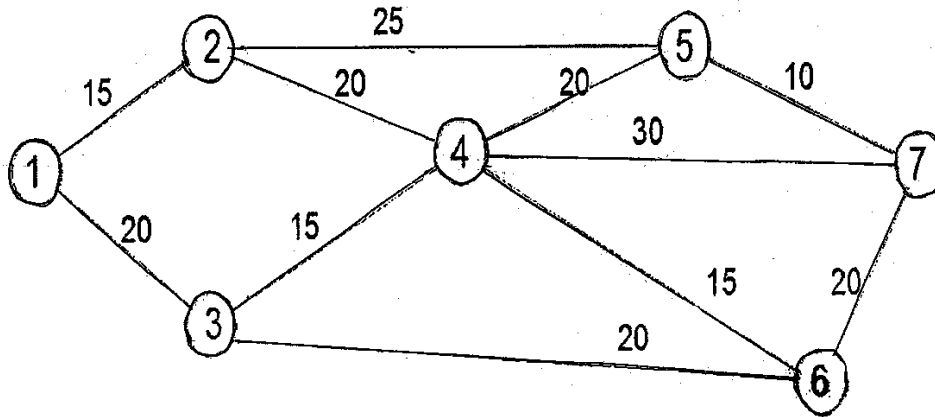
4. Find the maximum flow from node 1 to node 7 for the pipe network shown in fig. 12





5. Find the shortest distance between node 1 – node 7.

12



SECTION – II

- 6. a) Explain decision making under uncertainty with example.
- b) Find the saddle point of pay off matrix given below.

8  
8

**Player B**

	6	2	3
<b>Player A</b>	2	-1	-3
	5	4	5

- 7. a) Explain probabilistic model of inventory management.
- b) Derive the formula for Economic Order Quantity (EOQ).
- 8. a) What is integer programming ? Explain any one method in details to solve the problems on integer programming.
- b) What is dynamic programming ?
- 9. a) What is genetic algorithm ? How it could be used to solve civil engineering problems ?
- b) What is simulation ? What are its advantages ?

4  
8  
8  
4  
8  
4



SLR-TJ – 84

Seat No.	
----------	--

Set	R
-----	---

**B.E. (Civil) (Part – II) Examination, 2017  
OPTIMIZATION TECHNIQUES (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) **Assume** suitable data whenever required.
  - 2) **Use** of non-programmable calculator is **allowed**.
  - 3) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
  - 4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Write the correct option in your answer book : **20**
- 1) For maximization in TP, the objective is to maximize the total \_\_\_\_\_  
a) Solution                      b) Profit matrix                      c) Profit                      d) None of the above
  - 2) To find the optimal solution, we apply  
a) LPP                      b) VAM                      c) MODI method                      d) Rim
  - 3) VAM stands for \_\_\_\_\_  
a) Voegal's Approximation method                      b) Vogel's Approximate method  
c) Vangel's Approximation method                      d) Vogel's Approximation method
  - 4) Any set of non-negative allocations ( $X_{ij} > 0$ ) which satisfies the row and column sum (rim requirement) is called a \_\_\_\_\_  
a) Linear programming                      b) Basic feasible solution  
c) Feasible solution                      d) None of the above
  - 5) A feasible solution is called a basic feasible solution if the number of non-negative allocations is equal to \_\_\_\_\_  
a)  $m - n + 1$                       b)  $m - n - 1$                       c)  $m + n - 1$                       d) None of the above
  - 6) What can be defined as a useful idle resource which has economic value eg; raw materials, spare parts, finished items, etc. ?  
a) Inventory control                      b) Inventory  
c) Inventory planning                      d) None of the above
  - 7) Probabilistic models are also known as \_\_\_\_\_  
a) Deterministic models                      b) Stochastic models  
c) Dynamic models                      d) Static models

P.T.O.







Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017  
OPTIMIZATION TECHNIQUES (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions:**
- 1) Qu. 2 from Section – I and Qu. 6 from Section – II are **compulsory**.
  - 2) Solve **any two** questions out of remaining questions from Section – I and Section – II.
  - 3) **Assume** suitable data whenever **required**.
  - 4) Figure to the **right** indicates **full** marks.
  - 5) **Use** of non-programmable calculator is **allowed**.

SECTION – I

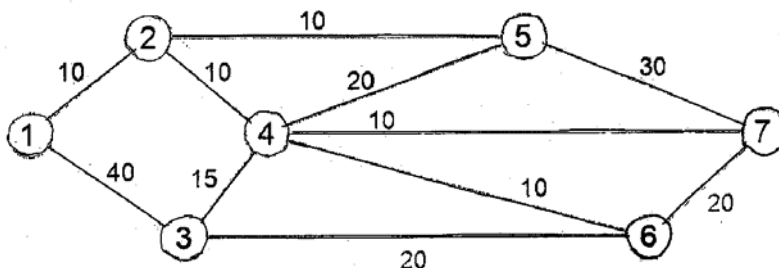
2. a) Write the general form of optimization model. 6  
 b) Solve following problem using graphical method. 10

Minimize  $Z = -x_1 + 2x_2$   
 S.to  $-x_1 + 3x_2 \leq 10$   
 $x_1 + x_2 \leq 6$   
 $x_1 - x_2 \leq 2$   
 Where,  $x_1, x_2 \geq 0$

3. Solve the following problem by simplex method. 12

Maximize  $Z = 3x_1 + 5x_2 + 4x_3$   
 S.to  $2x_1 + 3x_2 \leq 8$   
 $2x_2 + 5x_3 \leq 10$   
 $3x_1 + 2x_2 + 4x_3 \leq 15$   
 Where  $x_1, x_2, x_3 \geq 0$ .

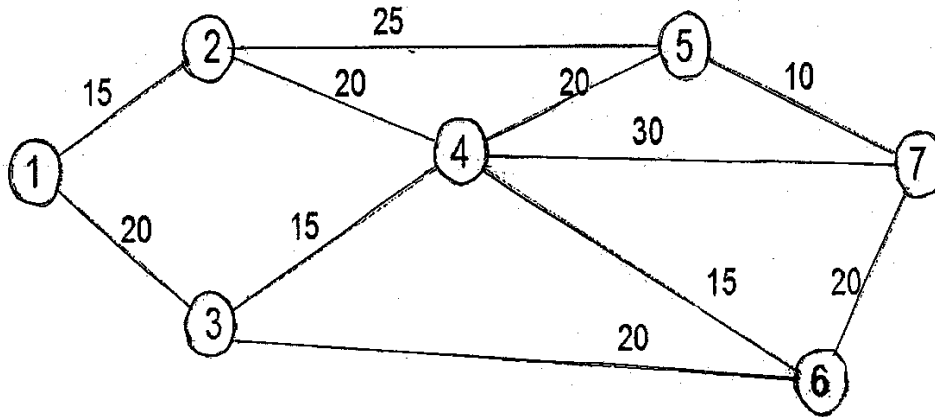
4. Find the maximum flow from node 1 to node 7 for the pipe network shown in fig. 12





5. Find the shortest distance between node 1 – node 7.

12



SECTION – II

- 6. a) Explain decision making under uncertainty with example.
- b) Find the saddle point of pay off matrix given below.

8  
8

**Player B**

	6	2	3
<b>Player A</b>	2	-1	-3
	5	4	5

- 7. a) Explain probabilistic model of inventory management.
- b) Derive the formula for Economic Order Quantity (EOQ).
- 8. a) What is integer programming ? Explain any one method in details to solve the problems on integer programming.
- b) What is dynamic programming ?
- 9. a) What is genetic algorithm ? How it could be used to solve civil engineering problems ?
- b) What is simulation ? What are its advantages ?

4  
8  
8  
4  
8  
4





- 8) VAM stands for \_\_\_\_\_  
a) Vogel's Approximation method      b) Vogel's Approximate method  
c) Vangel's Approximation method      d) Vogel's Approximation method
- 9) Any set of non-negative allocations ( $X_{ij} > 0$ ) which satisfies the row and column sum (rim requirement) is called a \_\_\_\_\_  
a) Linear programming      b) Basic feasible solution  
c) Feasible solution      d) None of the above
- 10) A feasible solution is called a basic feasible solution if the number of non-negative allocations is equal to \_\_\_\_\_  
a)  $m - n + 1$       b)  $m - n - 1$       c)  $m + n - 1$       d) None of the above
- 11) What can be defined as a useful idle resource which has economic value eg; raw materials, spare parts, finished items, etc. ?  
a) Inventory control      b) Inventory  
c) Inventory planning      d) None of the above
- 12) Probabilistic models are also known as \_\_\_\_\_  
a) Deterministic models      b) Stochastic models  
c) Dynamic models      d) Static models
- 13) Allocation models are \_\_\_\_\_  
a) Iconic models      b) Analogue models  
c) Symbolic models      d) None of the above
- 14) What aims at optimizing inventory levels ?  
a) Inventory control      b) Inventory capacity  
c) Inventory planning      d) None of the above
- 15) LP model is based on the assumptions of  
a) Proportionality      b) Additivity      c) Certainty      d) All of the above
- 16) Simple linear programming problem with \_\_\_\_\_ variables can be easily solved by the graphical method.  
a) One decision      b) Four decisions      c) Three decisions      d) Two decisions
- 17) Any solution to a LPP which satisfies the non-negativity restrictions of the LPP is called its \_\_\_\_\_  
a) Unbounded solution      b) Optimal solution  
c) Feasible solution      d) Both a) and b)
- 18) Any feasible solution which optimizes (minimizes or maximizes) the objective function of the LPP is called its \_\_\_\_\_  
a) Optimal solution      b) Non-basic variables  
c) Solution      d) Basic feasible solution
- 19) A non-degenerate basic feasible solution is the basic feasible solution which has exactly  $m$  positive  $X_i$  ( $i=1, 2, \dots, m$ ), i.e., none of the basic variable is \_\_\_\_\_  
a) Infinity      b) One      c) Zero      d) X
- 20) What is also defined as the non-negative variables which are added in the LHS of the constraint to convert the inequality ' $\leq$ ' into an equation ?  
a) Slack variables      b) Simplex algorithm  
c) Key element      d) None of the above



Seat No.	
----------	--

**B.E. (Civil) (Part – II) Examination, 2017  
OPTIMIZATION TECHNIQUES (Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

- Instructions:** 1) Qu. 2 from Section – I and Qu. 6 from Section – II are **compulsory**.  
2) Solve **any two** questions out of remaining questions from Section – I and Section – II.  
3) **Assume** suitable data whenever **required**.  
4) Figure to the **right** indicates **full** marks.  
5) **Use** of non-programmable calculator is **allowed**.

SECTION – I

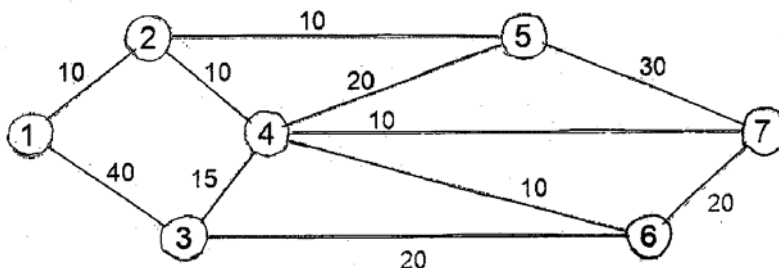
2. a) Write the general form of optimization model. 6  
b) Solve following problem using graphical method. 10

Minimize  $Z = -x_1 + 2x_2$   
S.to  $-x_1 + 3x_2 \leq 10$   
 $x_1 + x_2 \leq 6$   
 $x_1 - x_2 \leq 2$   
Where,  $x_1, x_2 \geq 0$

3. Solve the following problem by simplex method. 12

Maximize  $Z = 3x_1 + 5x_2 + 4x_3$   
S.to  $2x_1 + 3x_2 \leq 8$   
 $2x_2 + 5x_3 \leq 10$   
 $3x_1 + 2x_2 + 4x_3 \leq 15$   
Where  $x_1, x_2, x_3 \geq 0$ .

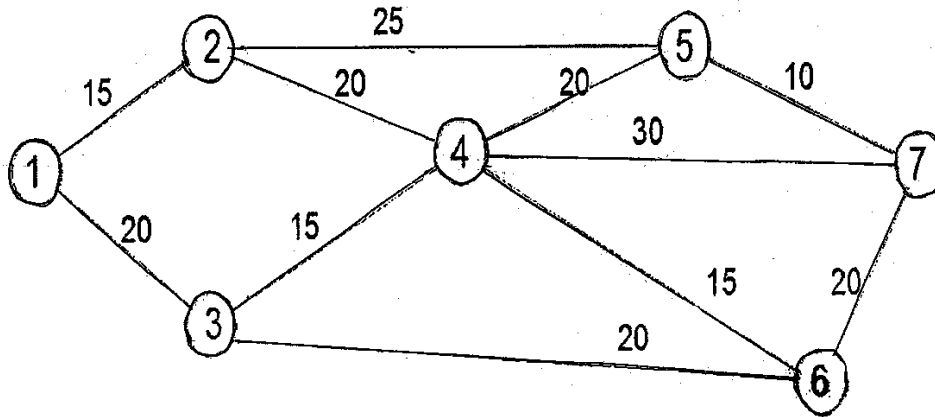
4. Find the maximum flow from node 1 to node 7 for the pipe network shown in fig. 12





5. Find the shortest distance between node 1 – node 7.

12



SECTION – II

- 6. a) Explain decision making under uncertainty with example. 8
- b) Find the saddle point of pay off matrix given below. 8

**Player B**

	6	2	3
<b>Player A</b>	2	-1	-3
	5	4	5

- 7. a) Explain probabilistic model of inventory management. 4
- b) Derive the formula for Economic Order Quantity (EOQ). 8
- 8. a) What is integer programming ? Explain any one method in details to solve the problems on integer programming. 8
- b) What is dynamic programming ? 4
- 9. a) What is genetic algorithm ? How it could be used to solve civil engineering problems ? 8
- b) What is simulation ? What are its advantages ? 4



SLR-TJ – 85

Seat No.	
----------	--

Set	P
-----	---

**B.E. (Civil) (Part – II) Examination, 2017  
DISASTER MANAGEMENT  
(Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Assume suitable data **if necessary** but mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

**20**

- 1) The eye of a cyclone is
  - a) Cloudy and highly stormy
  - b) Full of strong winds
  - c) Calm and cloudless
  - d) Site with high atmospheric pressure
- 2) What does the acronym ISDR stand for ?
  - a) International Significant Disaster Resources
  - b) International Sustainable Development Report
  - c) International Strategy for Disaster Reduction
  - d) Intergovernmental Strategy for Developing Recreation
- 3) A flash flood is a flood that
  - a) Is caused by heavy rain rather than from the flooding of a river
  - b) Occurs in urban areas
  - c) Occurs suddenly and unexpectedly and for a short duration
  - d) Is caused by the blocking of drains
- 4) The Probable Maximum Flood is
  - a) An estimation of the largest possible flood that could occur at a particular location
  - b) The maximum flood experienced in the last 100 years
  - c) The maximum flood experienced in the last 200 years
  - d) The maximum flood experienced since flood records have existed
- 5) For good land use planning, buildings should be built
  - a) Above the 1 in 100 year flood level
  - b) Above the level of the Probable Maximum Flood
  - c) Based on the chance and consequences of a flood for that particular building
  - d) Above the level of the largest historical flood
- 6) The change in elevation of a stream per unit length is called
  - a) Base level
  - b) Gradient
  - c) Velocity
  - d) Discharge

P.T.O.







Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017  
DISASTER MANAGEMENT  
(Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instructions :** 1) Assume suitable data *if necessary* but mention it **clearly**.  
2) Q. 2 and Q. 6 are **compulsory**. Attempt **any two** out of Q. 3 to Q. 5  
and **any two** out of Q. 7 to Q. 9.

SECTION – I

2. a) Explain Ecosystem approach. 9
- b) Explain the concept of Environmental hazard. What is environmental stress ? 5
3. a) What do you mean by Flood ? Discuss its types. 5
- b) What is Earthquake ? State its Hazardous effects. 8
4. a) What are causes of Cyclones ? 8
- b) Explain about one of the recent Earthquakes in India. 5
5. a) Explain conservation measures of Soil Erosion. 8
- b) What is DROUGHT ? Explain its types. 5

SECTION – II

6. a) Define Disaster Management Cycle. Briefly explain its various phases. 9
- b) Discuss the immediate relief measures to be taken for disaster victims. 5
7. a) Explain the role of Seismological observatory in Disaster mitigation. 5
- b) What are programs of disaster research run by IGBP ? 8
8. a) Explain role of Panchayats in Disaster mitigation. 5
- b) Write a note on Disaster Management Act – 2005. 8
9. a) Provide the details of disasters in Hills in India. 8
- b) Write a note on National Institute of Disaster Management. 5

---

Set P





SLR-TJ – 85

Seat No.	
----------	--

Set	Q
-----	---

**B.E. (Civil) (Part – II) Examination, 2017  
DISASTER MANAGEMENT  
(Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Assume suitable data **if necessary** but mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

**20**

- 1) Major tsunamis are produced by earthquakes with hypocenters less than  
a) 5 km                      b) 10 km                      c) 20 km                      d) 30 km
- 2) \_\_\_\_\_ drought makes the soil's moisture level insufficient to maintain the average crop yield.  
a) Meteorological drought                      b) Hydrological drought  
c) Agricultural drought                      d) Socio-economic drought
- 3) \_\_\_\_\_ drought correlates the supply and demand of goods with the all other droughts.  
a) Meteorological drought                      b) Hydrological drought  
c) Agricultural drought                      d) Socio-economic drought
- 4) If the deficiency of a particular year's rainfall exceeds 25% of normal it is termed as  
a) Onset of Drought      b) Moderate Drought      c) Severe Drought      d) None of the above
- 5) If deficiency of a particular year's rainfall exceeds 26 – 50% of normal it is termed as  
a) Onset of Drought      b) Moderate Drought      c) Severe Drought      d) None of the above
- 6) The eye of a cyclone is  
a) Cloudy and highly stormy                      b) Full of strong winds  
c) Calm and cloudless                      d) Site with high atmospheric pressure
- 7) What does the acronym ISDR stand for ?  
a) International Significant Disaster Resources  
b) International Sustainable Development Report  
c) International Strategy for Disaster Reduction  
d) Intergovernmental Strategy for Developing Recreation
- 8) A flash flood is a flood that  
a) Is caused by heavy rain rather than from the flooding of a river  
b) Occurs in urban areas  
c) Occurs suddenly and unexpectedly and for a short duration  
d) Is caused by the blocking of drains

P.T.O.



- 9) The Probable Maximum Flood is
- An estimation of the largest possible flood that could occur at a particular location
  - The maximum flood experienced in the last 100 years
  - The maximum flood experienced in the last 200 years
  - The maximum flood experienced since flood records have existed
- 10) For good land use planning, buildings should be built
- Above the 1 in 100 year flood level
  - Above the level of the Probable Maximum Flood
  - Based on the chance and consequences of a flood for that particular building
  - Above the level of the largest historical flood
- 11) The change in elevation of a stream per unit length is called
- Base level
  - Gradient
  - Velocity
  - Discharge
- 12) Land slide can be defined as the \_\_\_\_\_ of slope.
- Downward movement
  - Upward movement
  - Outward movement
  - Downward and outward movement
- 13) Which of the following is not a characteristic of a braided stream ?
- Branching channels
  - High gradient
  - Abundant bed load
  - Constant discharge
- 14) What is the speed of tsunami waves ?
- 40 meters/hour
  - 100 kms/hour
  - 9000 km/hour
  - 800 km/hour
- 15) Urbanization usually results in an increase in flood frequency because
- less water is able to runoff in streams
  - less water is able to infiltrate into the ground, so instead is discharged rapidly into streams
  - more water is used by humans and then discharged to streams
  - rainfall is greater in urban areas than in rural areas
- 16) Channelization of streams is designed to reduce flooding by
- speeding the passage of floodwaters
  - reducing bank erosion
  - slowing down river velocity so as to reduce damage
  - increase the meandering of streams
- 17) Tsunami is classified as
- Water Hazard
  - Environmental Hazard
  - Biological Hazard
  - Geological Hazard
- 18) Flash floods are often caused
- by thunderstorms
  - dikes and dams that are too high
  - by rainfall over many days
  - by river beds that are too high
- 19) What is a flash flood ?
- A sophisticated flood
  - Power lines fallen in flood waters
  - A deep flood
  - A flood that happens fast with little warning
- 20) \_\_\_\_\_ drought is often identified by sunny days and hot weather.
- Meteorological drought
  - Hydrological drought
  - Agricultural drought
  - Socio-economic drought



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017  
DISASTER MANAGEMENT  
(Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instructions :** 1) Assume suitable data *if necessary* but mention it **clearly**.  
2) Q. 2 and Q. 6 are **compulsory**. Attempt **any two** out of Q. 3 to Q. 5  
and **any two** out of Q. 7 to Q. 9.

SECTION – I

2. a) Explain Ecosystem approach. 9
- b) Explain the concept of Environmental hazard. What is environmental stress ? 5
3. a) What do you mean by Flood ? Discuss its types. 5
- b) What is Earthquake ? State its Hazardous effects. 8
4. a) What are causes of Cyclones ? 8
- b) Explain about one of the recent Earthquakes in India. 5
5. a) Explain conservation measures of Soil Erosion. 8
- b) What is DROUGHT ? Explain its types. 5

SECTION – II

6. a) Define Disaster Management Cycle. Briefly explain its various phases. 9
- b) Discuss the immediate relief measures to be taken for disaster victims. 5
7. a) Explain the role of Seismological observatory in Disaster mitigation. 5
- b) What are programs of disaster research run by IGBP ? 8
8. a) Explain role of Panchayats in Disaster mitigation. 5
- b) Write a note on Disaster Management Act – 2005. 8
9. a) Provide the details of disasters in Hills in India. 8
- b) Write a note on National Institute of Disaster Management. 5

---

Set Q





SLR-TJ – 85

Seat No.	
----------	--

Set	R
-----	---

**B.E. (Civil) (Part – II) Examination, 2017  
DISASTER MANAGEMENT  
(Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Assume suitable data **if necessary** but mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

**20**

- 1) Channelization of streams is designed to reduce flooding by
  - a) speeding the passage of floodwaters
  - b) reducing bank erosion
  - c) slowing down river velocity so as to reduce damage
  - d) increase the meandering of streams
- 2) Tsunami is classified as
  - a) Water Hazard
  - b) Environmental Hazard
  - c) Biological Hazard
  - d) Geological Hazard
- 3) Flash floods are often caused
  - a) by thunderstorms
  - b) dikes and dams that are too high
  - c) by rainfall over many days
  - d) by river beds that are too high
- 4) What is a flash flood ?
  - a) A sophisticated flood
  - b) Power lines fallen in flood waters
  - c) A deep flood
  - d) A flood that happens fast with little warning
- 5) \_\_\_\_\_ drought is often identified by sunny days and hot weather.
  - a) Meteorological drought
  - b) Hydrological drought
  - c) Agricultural drought
  - d) Socio-economic drought
- 6) Major tsunamis are produced by earthquakes with hypocenters less than
  - a) 5 km
  - b) 10 km
  - c) 20 km
  - d) 30 km
- 7) \_\_\_\_\_ drought makes the soil's moisture level insufficient to maintain the average crop yield.
  - a) Meteorological drought
  - b) Hydrological drought
  - c) Agricultural drought
  - d) Socio-economic drought
- 8) \_\_\_\_\_ drought correlates the supply and demand of goods with the all other droughts.
  - a) Meteorological drought
  - b) Hydrological drought
  - c) Agricultural drought
  - d) Socio-economic drought

P.T.O.



- 9) If the deficiency of a particular year's rainfall exceeds 25% of normal it is termed as
- a) Onset of Drought
  - b) Moderate Drought
  - c) Severe Drought
  - d) None of the above
- 10) If deficiency of a particular year's rainfall exceeds 26 – 50% of normal it is termed as
- a) Onset of Drought
  - b) Moderate Drought
  - c) Severe Drought
  - d) None of the above
- 11) The eye of a cyclone is
- a) Cloudy and highly stormy
  - b) Full of strong winds
  - c) Calm and cloudless
  - d) Site with high atmospheric pressure
- 12) What does the acronym ISDR stand for ?
- a) International Significant Disaster Resources
  - b) International Sustainable Development Report
  - c) International Strategy for Disaster Reduction
  - d) Intergovernmental Strategy for Developing Recreation
- 13) A flash flood is a flood that
- a) Is caused by heavy rain rather than from the flooding of a river
  - b) Occurs in urban areas
  - c) Occurs suddenly and unexpectedly and for a short duration
  - d) Is caused by the blocking of drains
- 14) The Probable Maximum Flood is
- a) An estimation of the largest possible flood that could occur at a particular location
  - b) The maximum flood experienced in the last 100 years
  - c) The maximum flood experienced in the last 200 years
  - d) The maximum flood experienced since flood records have existed
- 15) For good land use planning, buildings should be built
- a) Above the 1 in 100 year flood level
  - b) Above the level of the Probable Maximum Flood
  - c) Based on the chance and consequences of a flood for that particular building
  - d) Above the level of the largest historical flood
- 16) The change in elevation of a stream per unit length is called
- a) Base level
  - b) Gradient
  - c) Velocity
  - d) Discharge
- 17) Land slide can be defined as the \_\_\_\_\_ of slope.
- a) Downward movement
  - b) Upward movement
  - c) Outward movement
  - d) Downward and outward movement
- 18) Which of the following is not a characteristic of a braided stream ?
- a) Branching channels
  - b) High gradient
  - c) Abundant bed load
  - d) Constant discharge
- 19) What is the speed of tsunami waves ?
- a) 40 meters/hour
  - b) 100 kms/hour
  - c) 9000 km/hour
  - d) 800 km/hour
- 20) Urbanization usually results in an increase in flood frequency because
- a) less water is able to runoff in streams
  - b) less water is able to infiltrate into the ground, so instead is discharged rapidly intostreams
  - c) more water is used by humans and then discharged to streams
  - d) rainfall is greater in urban areas than in rural areas





Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**DISASTER MANAGEMENT**  
**(Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instructions :** 1) Assume suitable data *if necessary* but mention it **clearly**.  
2) Q. 2 and Q. 6 are **compulsory**. Attempt **any two** out of Q. 3 to Q. 5  
and **any two** out of Q. 7 to Q. 9.

SECTION – I

2. a) Explain Ecosystem approach. 9
- b) Explain the concept of Environmental hazard. What is environmental stress ? 5
3. a) What do you mean by Flood ? Discuss its types. 5
- b) What is Earthquake ? State its Hazardous effects. 8
4. a) What are causes of Cyclones ? 8
- b) Explain about one of the recent Earthquakes in India. 5
5. a) Explain conservation measures of Soil Erosion. 8
- b) What is DROUGHT ? Explain its types. 5

SECTION – II

6. a) Define Disaster Management Cycle. Briefly explain its various phases. 9
- b) Discuss the immediate relief measures to be taken for disaster victims. 5
7. a) Explain the role of Seismological observatory in Disaster mitigation. 5
- b) What are programs of disaster research run by IGBP ? 8
8. a) Explain role of Panchayats in Disaster mitigation. 5
- b) Write a note on Disaster Management Act – 2005. 8
9. a) Provide the details of disasters in Hills in India. 8
- b) Write a note on National Institute of Disaster Management. 5

---

Set R





SLR-TJ – 85

Seat No.	
----------	--

Set	S
-----	---

**B.E. (Civil) (Part – II) Examination, 2017  
DISASTER MANAGEMENT  
(Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

- Instructions :**
- 1) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. Each question carries **one** mark.
  - 2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.**
  - 3) Assume suitable data **if necessary** but mention it **clearly**.

**MCQ/Objective Type Questions**

Duration : 30 Minutes

Marks : 20

1. Choose the correct answer :

**20**

- 1) The change in elevation of a stream per unit length is called  
a) Base level                      b) Gradient                      c) Velocity                      d) Discharge
- 2) Land slide can be defined as the \_\_\_\_\_ of slope.  
a) Downward movement                      b) Upward movement  
c) Outward movement                      d) Downward and outward movement
- 3) Which of the following is not a characteristic of a braided stream ?  
a) Branching channels                      b) High gradient  
c) Abundant bed load                      d) Constant discharge
- 4) What is the speed of tsunami waves ?  
a) 40 meters/hour                      b) 100 kms/hour                      c) 9000 km/hour                      d) 800 km/hour
- 5) Urbanization usually results in an increase in flood frequency because  
a) less water is able to runoff in streams  
b) less water is able to infiltrate into the ground, so instead is discharged rapidly intostreams  
c) more water is used by humans and then discharged to streams  
d) rainfall is greater in urban areas than in rural areas
- 6) Channelization of streams is designed to reduce flooding by  
a) speeding the passage of floodwaters  
b) reducing bank erosion  
c) slowing down river velocity so as to reduce damage  
d) increase the meandering of streams
- 7) Tsunami is classified as  
a) Water Hazard                      b) Environmental Hazard  
c) Biological Hazard                      d) Geological Hazard
- 8) Flash floods are often caused  
a) by thunderstorms                      b) dikes and dams that are too high  
c) by rainfall over many days                      d) by river beds that are too high

**P.T.O.**



- 9) What is a flash flood ?  
a) A sophisticated flood  
b) Power lines fallen in flood waters  
c) A deep flood  
d) A flood that happens fast with little warning
- 10) \_\_\_\_\_ drought is often identified by sunny days and hot weather.  
a) Meteorological drought  
b) Hydrological drought  
c) Agricultural drought  
d) Socio-economic drought
- 11) Major tsunamis are produced by earthquakes with hypocenters less than  
a) 5 km  
b) 10 km  
c) 20 km  
d) 30 km
- 12) \_\_\_\_\_ drought makes the soil's moisture level insufficient to maintain the average crop yield.  
a) Meteorological drought  
b) Hydrological drought  
c) Agricultural drought  
d) Socio-economic drought
- 13) \_\_\_\_\_ drought correlates the supply and demand of goods with the all other droughts.  
a) Meteorological drought  
b) Hydrological drought  
c) Agricultural drought  
d) Socio-economic drought
- 14) If the deficiency of a particular year's rainfall exceeds 25% of normal it is termed as  
a) Onset of Drought  
b) Moderate Drought  
c) Severe Drought  
d) None of the above
- 15) If deficiency of a particular year's rainfall exceeds 26 – 50% of normal it is termed as  
a) Onset of Drought  
b) Moderate Drought  
c) Severe Drought  
d) None of the above
- 16) The eye of a cyclone is  
a) Cloudy and highly stormy  
b) Full of strong winds  
c) Calm and cloudless  
d) Site with high atmospheric pressure
- 17) What does the acronym ISDR stand for ?  
a) International Significant Disaster Resources  
b) International Sustainable Development Report  
c) International Strategy for Disaster Reduction  
d) Intergovernmental Strategy for Developing Recreation
- 18) A flash flood is a flood that  
a) Is caused by heavy rain rather than from the flooding of a river  
b) Occurs in urban areas  
c) Occurs suddenly and unexpectedly and for a short duration  
d) Is caused by the blocking of drains
- 19) The Probable Maximum Flood is  
a) An estimation of the largest possible flood that could occur at a particular location  
b) The maximum flood experienced in the last 100 years  
c) The maximum flood experienced in the last 200 years  
d) The maximum flood experienced since flood records have existed
- 20) For good land use planning, buildings should be built  
a) Above the 1 in 100 year flood level  
b) Above the level of the Probable Maximum Flood  
c) Based on the chance and consequences of a flood for that particular building  
d) Above the level of the largest historical flood



Seat No.	
-------------	--

**B.E. (Civil) (Part – II) Examination, 2017**  
**DISASTER MANAGEMENT**  
**(Elective – III)**

Day and Date : Friday, 24-11-2017  
Time : 3.00 p.m. to 6.00 p.m.

Marks : 80

**Instructions :** 1) Assume suitable data *if necessary* but mention it **clearly**.  
2) Q. 2 and Q. 6 are **compulsory**. Attempt **any two** out of Q. 3 to Q. 5  
and **any two** out of Q. 7 to Q. 9.

SECTION – I

2. a) Explain Ecosystem approach. 9
- b) Explain the concept of Environmental hazard. What is environmental stress ? 5
3. a) What do you mean by Flood ? Discuss its types. 5
- b) What is Earthquake ? State its Hazardous effects. 8
4. a) What are causes of Cyclones ? 8
- b) Explain about one of the recent Earthquakes in India. 5
5. a) Explain conservation measures of Soil Erosion. 8
- b) What is DROUGHT ? Explain its types. 5

SECTION – II

6. a) Define Disaster Management Cycle. Briefly explain its various phases. 9
- b) Discuss the immediate relief measures to be taken for disaster victims. 5
7. a) Explain the role of Seismological observatory in Disaster mitigation. 5
- b) What are programs of disaster research run by IGBP ? 8
8. a) Explain role of Panchayats in Disaster mitigation. 5
- b) Write a note on Disaster Management Act – 2005. 8
9. a) Provide the details of disasters in Hills in India. 8
- b) Write a note on National Institute of Disaster Management. 5

---

Set S

