SLR-EP – 54

Seat No.	

Set P

S.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2016
ANALYSIS OF MECHANICAL ELEMENTS

Day and Date : Tuesday, 13-12-2016 Max. Marks : 70

Time : 10.00 a.m. to 1.00 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. Choose the correct answer :

1) Bulk modulus is the ratio of
   a) Longitudinal stress/Longitudinal strain
   b) Shear stress/Shear strain
   c) Volumetric stress/Volumetric Strain
   d) Lateral Strain/Linear strain

2) Hooke's Law holds good upto
   a) Ultimate point
   b) Yield point
   c) Elastic Limit
   d) Plastic Limit

3) Under torsion, the strength of hollow shaft for the same length, material and weight is _____ a solid shaft.
   a) Less than
   b) More than
   c) Equal to
   d) None of the above

4) In a cantilever beam carrying a load where intensity varies uniformly from zero at the free end to 'w' per unit run at the fixed end. The shear force changes a following
   a) Linear law
   b) Parabolic law
   c) Cubic law
   d) None of the above

5) For a simply supported beam of span *l* carries a uniformly distributed load over the whole span, the SFD will be
   a) A rectangle
   b) Parabolic
   c) Two equal and opposite rectangles
   d) Two equal and opposite triangles

6) Strength of beam mainly depends on
   a) Bending moment
   b) Geometry of the section
   c) Section modulus
   d) It's weight

P.T.O.

7) In case of rectangular section subjected to a shear force

a) $\tau_{max} = \frac{1}{2}\tau_{mean}$ b) $\tau_{max} = \frac{3}{2}\tau_{mean}$

c) $\tau_{max} = \frac{5}{2}\tau_{mean}$ d) $\tau_{max} = \tau_{mean}$

8) The deflection at the free end of cantilever of length (l) carrying point load 'w' at the free end is given by

a) $\frac{W/}{2EI}$ b) $WL^2/2EI$

c) $WL^3/2EI$ d) $WL^3/3EI$

9) In double integration method, second integration will be value of

a) Slope b) Bending moment

c) Deflection d) Shear force

10) The buckling in case of a column takes place about the axis having

a) Minimum radius of gyration b) Maximum radius of gyration

c) Either of above d) None of the above

11) Rankine's formula taken into account which of the following

a) The variations in mechanical properties b) The initial curvature of the column

c) The eccentricity of loading d) The effect of direct compressive stress

12) The strain energy stored by the body within elastic limit when loaded externally is called

a) Resilience b) Proof Resilience

c) Modulus of resilience d) None of the above

13) Diameter of Mohr's circle always represents

a) Maximum shear stress

b) Mean value of Principal stresses

c) Minimum Principal stress

d) The difference between two principal stresses

14) For body subjected to two perpendicular stresses only, the planes of maximum shear are inclined at _____ with the plane of major stress.

a) 0° and 90° b) 90° and 270°

c) 45° and 135° d) 0° and 180°

SLR-EP – 54

Seat No.	

S.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2016
ANALYSIS OF MECHANICAL ELEMENTS

Day and Date : Tuesday, 13-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Solve **any two** questions from **each** Section.*
*2) **Use** of calculator is **allowed**.*
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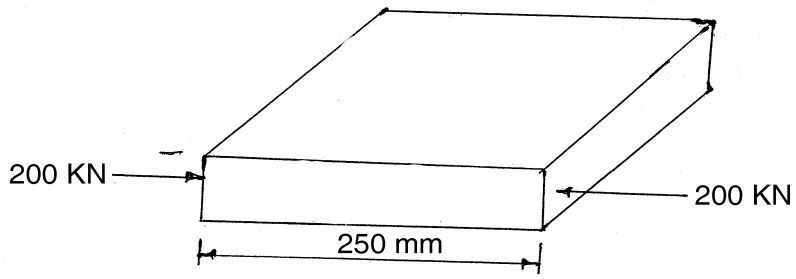
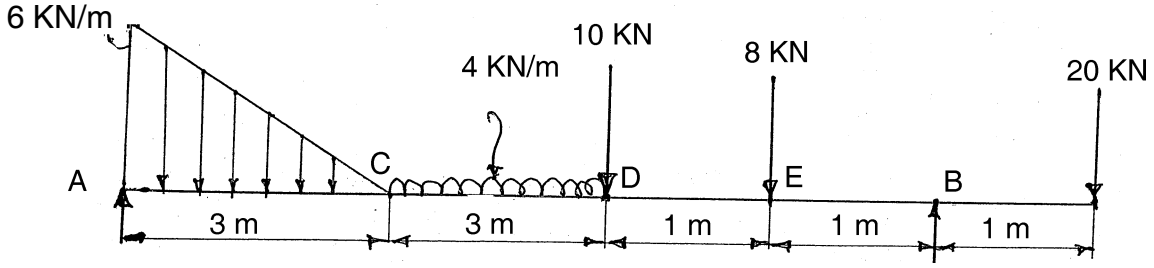
SECTION – I

2. a) A bar of steel has cross section 80 mm × 50 mm and is 250 mm long. It is subjected to axial compressive force of 200 kN. Find
   i) Change in length
   ii) Change in volume
   iii) If lateral strain is prevented by applying equal stresses in other two directions, find change in length. Take Poisson's ratio = 0.3 and E = 2×10^5 N/mm^2. **8**

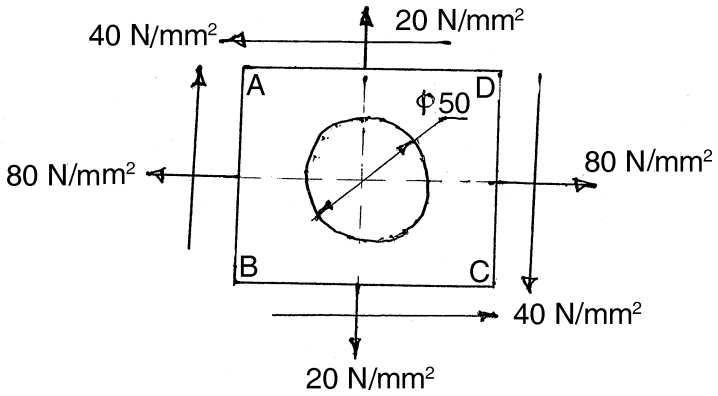


   b) The stresses at a point across two perpendicular planes are 75MN/m^2 (tensile) and 35MN/m^2 (tensile). Find the normal, tangential stresses, the resultant stress and its obliquity on a plane at 20° with the plane of major stress. **6**

3. a) Draw SFD and BMD for the beam shown in figure and indicate maximum bending moment. **9**



b) A circle of 50 mm diameter is inscribed on a MS plate, after stressing circle deform to an ellipse, calculate the length of major and minor axes of the ellipse as the result of deformation of the circle marked. Take E = 200 GPa, $\mu = 0.25$. **5**



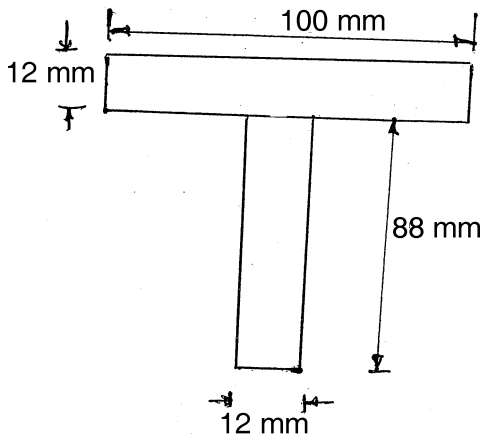
4. a) A hollow shaft is to transmit 300 KW at 80 rpm. If the shear stress is not to exceed 60 MN/m^2 and internal diameter is 0.6 of external diameter, find the external and internal diameters. Assume that maximum torque is 1.4 times the mean torque. **8**

b) Derive relationship between Young's modulus E and modulus of rigidity C. **6**

SECTION – II

5. a) The external diameter of hollow cylindrical column is 1.25 times its internal diameter. The length of column is 3 meter. When hinged at both ends it has a critical buckling load of 'P' KN, if same column is fixed is both ends, buckling load is increased by 300 KN. If E = 100 GPa, determine cross section of column. Use Euler's formula. **6**

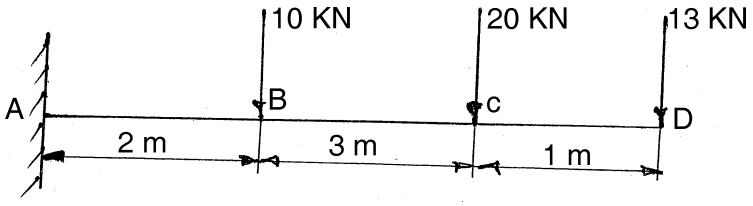
b) Figure shows the cross section of beam subjected to shear force 20 KN. Draw shear stress distribution diagram across the depth making values at salient points. **8**



6. a) A hollow mild steel tube 6 m long and having 4 cm internal diameter and 5 mm thick is used as strut with both ends hinged. Find the crippling load and safe load by taking factor safety as 3, Take E = 2×10^5 N/mm^2. Use Euler's Formula. **6**

   b) A bar 100 cm in length is subjected to an axial pull, such that maximum stress is 150 MN/m^2. It's area of cross section is 2 cm^2 over a length of 95 cm and for the middle 5 cm length, it is 1 cm^2. If E = 200 GN/m^2, calculate strain energy stored in bar. **8**

7. a) Determine slope and deflection at free end D for the beam as shown in figure. Take EI = 10 × 10^4KN – m^2(Use moments area method only). **10**



   b) Write the assumptions made in theory of pure bending. **4**

SLR-EP – 54

Seat No.	

Set Q

S.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2016
ANALYSIS OF MECHANICAL ELEMENTS

Day and Date : Tuesday, 13-12-2016 Max. Marks : 70

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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a) $\frac{W/}{2EI}$ b) $WL^2/2EI$

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a) Slope b) Bending moment

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3) The buckling in case of a column takes place about the axis having

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c) Either of above d) None of the above

4) Rankine's formula taken into account which of the following

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5) The strain energy stored by the body within elastic limit when loaded externally is called

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P.T.O.

6) Diameter of Mohr's circle always represents
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7) For body subjected to two perpendicular stresses only, the planes of maximum shear are inclined at _____ with the plane of major stress.
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SLR-EP – 54

Seat No.	

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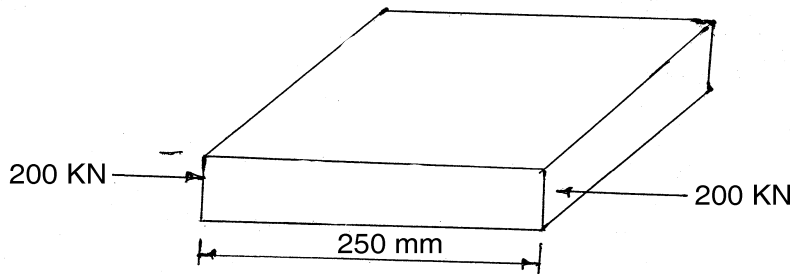

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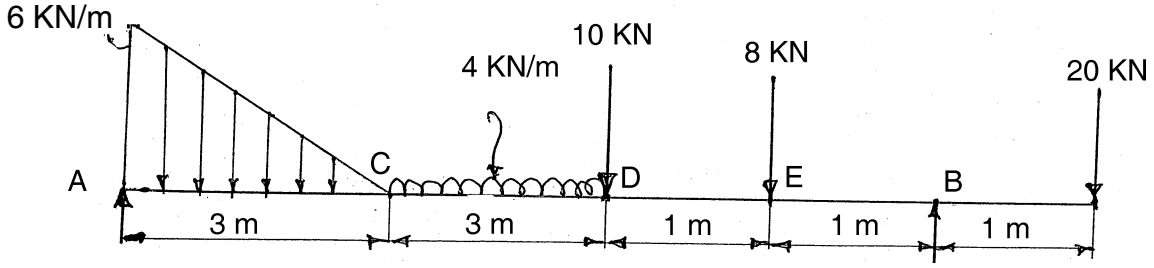

Set Q

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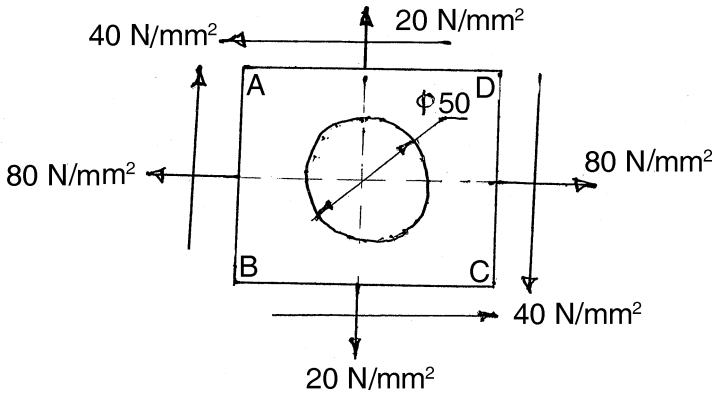

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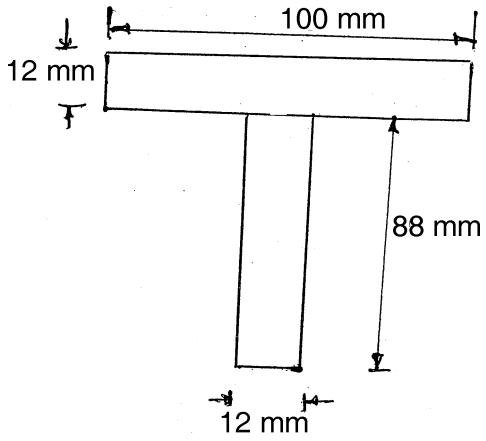

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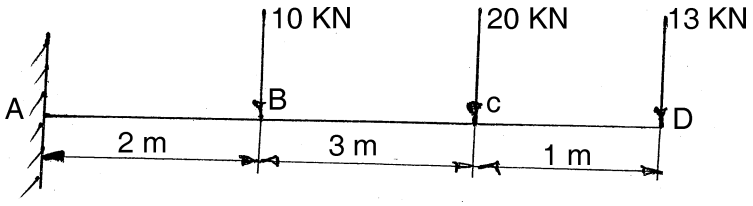

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Set Q

SLR-EP – 54

Seat No.	

Set R

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Duration : 30 Minutes Marks : 14

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P.T.O.

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_____

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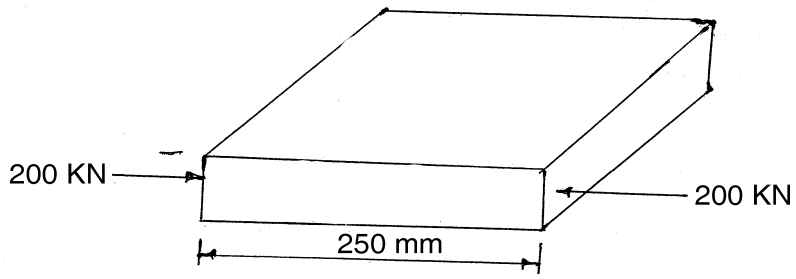

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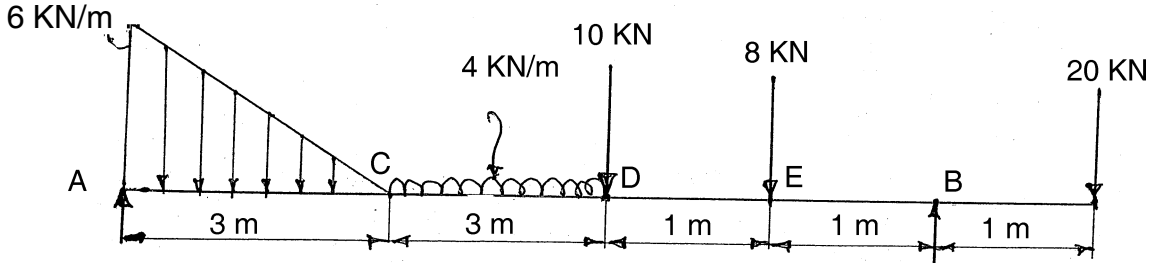

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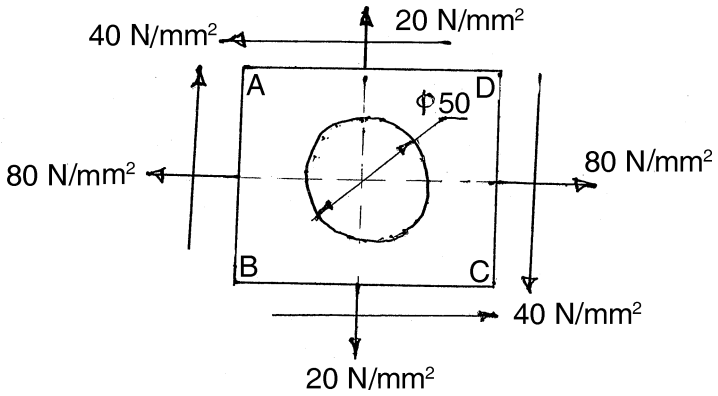

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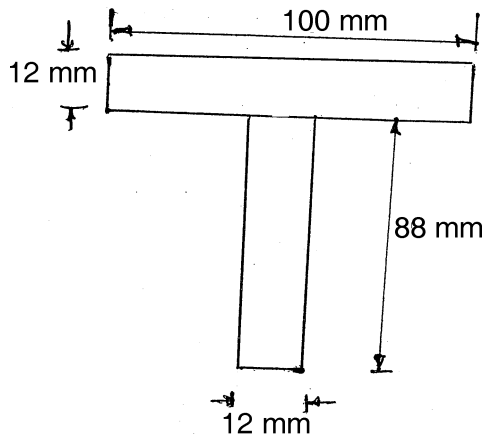

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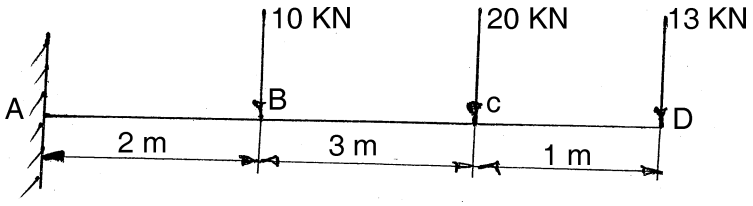

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SLR-EP – 54

Seat No.	

Set S

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a) 0° and 90° b) 90° and 270°

c) 45° and 135° d) 0° and 180°

P.T.O.

6) Bulk modulus is the ratio of
   a) Longitudinal stress/Longitudinal strain
   b) Shear stress/Shear strain
   c) Volumetric stress/Volumetric Strain
   d) Lateral Strain/Linear strain

7) Hooke's Law holds good upto
   a) Ultimate point
   b) Yield point
   c) Elastic Limit
   d) Plastic Limit

8) Under torsion, the strength of hollow shaft for the same length, material and weight is _____ a solid shaft.
   a) Less than
   b) More than
   c) Equal to
   d) None of the above

9) In a cantilever beam carrying a load where intensity varies uniformly from zero at the free end to 'w' per unit run at the fixed end. The shear force changes a following
   a) Linear law
   b) Parabolic law
   c) Cubic law
   d) None of the above

10) For a simply supported beam of span *l* carries a uniformly distributed load over the whole span, the SFD will be
   a) A rectangle
   b) Parabolic
   c) Two equal and opposite rectangles
   d) Two equal and opposite triangles

11) Strength of beam mainly depends on
   a) Bending moment
   b) Geometry of the section
   c) Section modulus
   d) It's weight

12) In case of rectangular section subjected to a shear force
   a) $\tau_{max} = \frac{1}{2}\tau_{mean}$
   b) $\tau_{max} = \frac{3}{2}\tau_{mean}$
   c) $\tau_{max} = \frac{5}{2}\tau_{mean}$
   d) $\tau_{max} = \tau_{mean}$

13) The deflection at the free end of cantilever of length (l) carrying point load 'w' at the free end is given by
   a) $\frac{W/}{2EI}$
   b) $WL^2/2EI$
   c) $WL^3/2EI$
   d) $WL^3/3EI$

14) In double integration method, second integration will be value of
   a) Slope
   b) Bending moment
   c) Deflection
   d) Shear force

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SLR-EP – 54

Seat No.	

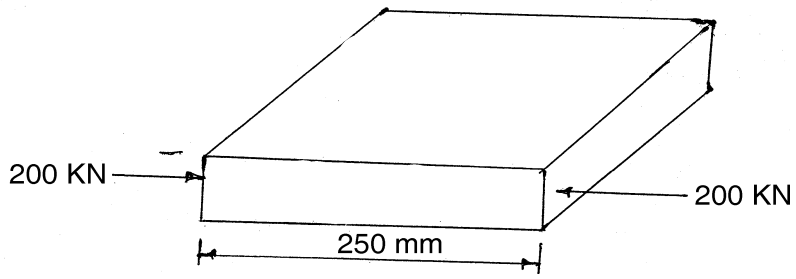
S.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2016
ANALYSIS OF MECHANICAL ELEMENTS

Day and Date : Tuesday, 13-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Solve **any two** questions from **each** Section.*
*2) **Use** of calculator is **allowed**.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Assume** additional suitable data, if necessary and mention **it clearly**.*

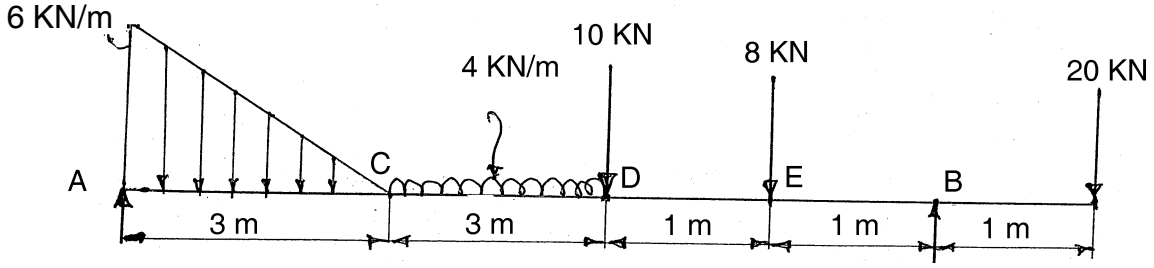
SECTION – I

2. a) A bar of steel has cross section 80 mm × 50 mm and is 250 mm long. It is subjected to axial compressive force of 200 kN. Find
   i) Change in length
   ii) Change in volume
   iii) If lateral strain is prevented by applying equal stresses in other two directions, find change in length. Take Poisson's ratio = 0.3 and E = 2×10^5 N/mm^2. **8**

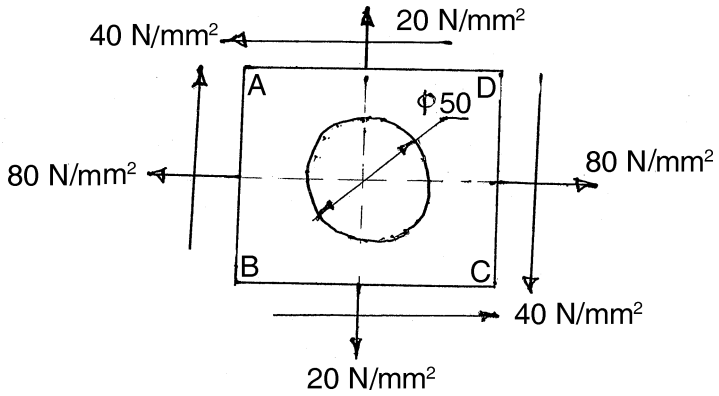


   b) The stresses at a point across two perpendicular planes are 75MN/m^2 (tensile) and 35MN/m^2 (tensile). Find the normal, tangential stresses, the resultant stress and its obliquity on a plane at 20° with the plane of major stress. **6**

3. a) Draw SFD and BMD for the beam shown in figure and indicate maximum bending moment. **9**



b) A circle of 50 mm diameter is inscribed on a MS plate, after stressing circle deform to an ellipse, calculate the length of major and minor axes of the ellipse as the result of deformation of the circle marked. Take E = 200 GPa, $\mu = 0.25$. **5**



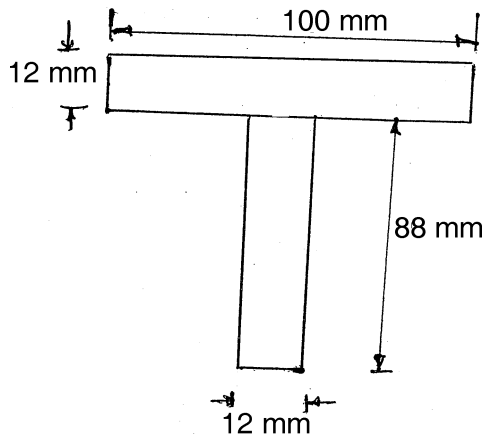
4. a) A hollow shaft is to transmit 300 KW at 80 rpm. If the shear stress is not to exceed 60 MN/m^2 and internal diameter is 0.6 of external diameter, find the external and internal diameters. Assume that maximum torque is 1.4 times the mean torque. **8**

b) Derive relationship between Young's modulus E and modulus of rigidity C. **6**

SECTION – II

5. a) The external diameter of hollow cylindrical column is 1.25 times its internal diameter. The length of column is 3 meter. When hinged at both ends it has a critical buckling load of 'P' KN, if same column is fixed is both ends, buckling load is increased by 300 KN. If E = 100 GPa, determine cross section of column. Use Euler's formula. **6**

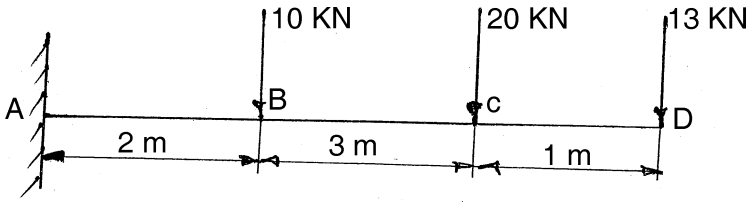
b) Figure shows the cross section of beam subjected to shear force 20 KN. Draw shear stress distribution diagram across the depth making values at salient points. **8**



6. a) A hollow mild steel tube 6 m long and having 4 cm internal diameter and 5 mm thick is used as strut with both ends hinged. Find the crippling load and safe load by taking factor safety as 3, Take E = 2×10^5 N/mm^2. Use Euler's Formula. **6**

   b) A bar 100 cm in length is subjected to an axial pull, such that maximum stress is 150 MN/m^2. It's area of cross section is 2 cm^2 over a length of 95 cm and for the middle 5 cm length, it is 1 cm^2. If E = 200 GN/m^2, calculate strain energy stored in bar. **8**

7. a) Determine slope and deflection at free end D for the beam as shown in figure. Take EI = 10×10^4KN – m^2(Use moments area method only). **10**



   b) Write the assumptions made in theory of pure bending. **4**

Set S

SLR-EP – 55

Seat No.	

Set **P**

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
APPLIED THERMODYNAMICS

Day and Date : Thursday, 15-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **Use** of steam tables and Mollier diagram is **allowed**.*
*2) **Use** of scientific 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.***
*5) Out of **remaining** questions solve **any two** questions from **each** Section.*
*6) Assume suitable data if **required** and state it **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) Coefficient of performance of heat pump is always
A) Less than unity B) Greater than unity
C) Equal to unity D) None of the above

2) Entropy of water at 0° C is assumed to be
A) 1 B) 0 C) – 1 D) 10

3) An ideal heat engine operates between 600 K and 900 K. The efficiency of engine is
A) 90% B) 45% C) 33% D) 70%

4) A device used to increase the temperature of saturated steam without raising its pressure, is called
A) Fusible plug B) Stop Valve C) Superheater D) Economiser

5) Which loss does present in actual vapour power cycle at the exit of the boiler and at the entry of the turbine ?
A) Friction loss
B) Constant pressure heat loss
C) Both A) and B)
D) None of the above

P.T.O.

6) What is the relation between efficiency of Rankine cycle (η Rankine) and efficiency of actual vapour power cycle (η Actual Cycle) ?
   A) $(\eta_{Rankine}) = (\eta_{Actual\ Cycle})$
   B) $(\eta_{Rankine}) > (\eta_{Actual\ Cycle})$
   C) $(\eta_{Rankine}) < (\eta_{Actual\ Cycle})$
   D) None of the above

7) Non flow energy equation for reversible process is
   A) $dQ = du + pdv$ B) $dv = dQ + pdu$
   C) $dp = dQ + udv$ D) $du = dQ + pdv$

8) The pressure during suction stroke is _____ atmospheric pressure.
   A) Equal to B) Less than C) More D) Higher

9) The volume of air sucked by compressor during suction stroke is called
   A) Free air delivery B) Compressor capacity
   C) Swept volume D) Clearance volume

10) The Steam leaves the nozzle at a
   A) High pressure and low velocity
   B) High pressure and high velocity
   C) Low pressure and low velocity
   D) Low pressure and high velocity

11) Effect of friction in nozzle _____ dryness fraction of steam.
   A) Increases B) Decreases
   C) No change D) None of the above

12) De Laval turbine is
   A) Impulse reaction turbine
   B) Reaction turbine
   C) Multi rotor impulse turbine
   D) Single rotor impulse turbine

13) The compounding of turbines is done in order to
   A) Reduce the speed of rotor
   B) Improve efficiency
   C) Reduce exit losses
   D) All of the above

14) The ratio of actual vacuum to the ideal vacuum in a condenser is called
   A) Condenser efficiency B) Vacuum efficiency
   C) Nozzle efficiency D) Evaporator efficiency

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SLR-EP – 55

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
APPLIED THERMODYNAMICS

Day and Date : Thursday, 15-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***Use*** *of steam tables and Mollier diagram is* ***allowed****.*
2) ***Use*** *of scientific calculator is* ***allowed****.*
3) Out of ***remaining*** *questions solve* ***any two*** *questions from* ***each*** *Section.*
4) Assume suitable data if ***required*** *and state it* ***clearly****.*

SECTION – I

2. A) What is throttling ? Explain with neat sketch throttling Calorimeter. **7**
   B) Calculate standard heat of reaction for the following reaction
   $C_5H_{12}(g) + 8\ O_2(g) \rightarrow 5\ CO_2(g) + 6\ H_2O(g)$
   Enthalpies of formation for
   $CO_2(g) = -393$ kJ/mol, $H_2O(g) = -242$ kJ/mol, $C_5H_{12}(g) = -146.5$ kJ/mol, $O_2(g) = 0$ kJ/mol. **7**

3. A) Prove that entropy is property of system. **7**
   B) Explain reheat cycle with block and T-S diagram. What are its advantages ? **7**

4. A) 1130 kg of heat supplied to engine from source at 292° C. The engine rejects heat to sink at 12° C. For which of the following cycle represents a reversible, irreversible or an impossible result.
      i) 282 kg of heat rejected
      ii) 855 kg of heat rejected
      iii) 570 kg of heat rejected. **7**
   B) Define and explain the term **7**
      i) Equivalent evaporation
      ii) Factor of evaporation
      iii) Boiler efficiency.

SECTION – II

5. a) Show that for maximum discharge through a nozzle, the ratio of throat pressure to inlet pressure is given as $(2/n + 1)^{n/n-1}$, where n is the index of isentropic expansion through nozzle. **5**

   b) In a De Laval turbine steam issues from nozzle at a velocity of 1200 m/s and nozzle angle is 20°. The blade velocity is 400 m/s. Inlet and outlet blade angles are equal. The mass of steam flowing through turbine is 1000 kg/hour. If relative velocity coefficient is 0.8, determine blade angles, power developed and blade efficiency. **5**

   c) What are the sources of air leakage in condenser ? Briefly explain the effects of air leakage in condenser. **4**

6. a) Dry saturated steam at 7 bar, is passed through a convergent – divergent nozzle. The throat cross sectional area is 4.5 cm^2. Find the maximum mass flow rate of steam passing through the nozzle per minute. **5**

   b) What do you mean by compounding of steam turbines ? Discuss various methods of compounding steam turbines. **5**

   c) Define condenser and explain with sketch the elements of steam condensing plants. **4**

7. a) Derive an expression for work done in single stage single acting reciprocating compressor without clearance. Assume polytropic compression process. **5**

   b) A single stage reciprocating compressor has a bore of 200 mm and stroke of 300 mm. It runs at speed of 480 rpm. The clearance volume is 6% of the swept volume and law for compression, expansion is $PV^{1.32} = C$. Intake pressure is 98 kPa and temp. is 27° C and compressor delivery pressure is 500 kPa. Determine
      a) Volumetric efficiency
      b) Power required to run compressor
      c) Isothermal power
      d) Isothermal efficiency. **5**

   c) Draw theoretical and actual indicator diagram of single stage reciprocating compressor. **4**

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SLR-EP – 55

Seat No.	

Set Q

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
APPLIED THERMODYNAMICS

Day and Date : Thursday, 15-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **Use** of steam tables and Mollier diagram is **allowed**.*
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*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.***
*5) Out of **remaining** questions solve **any two** questions from **each** Section.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) The pressure during suction stroke is _____ atmospheric pressure.
A) Equal to B) Less than C) More D) Higher

2) The volume of air sucked by compressor during suction stroke is called
A) Free air delivery B) Compressor capacity
C) Swept volume D) Clearance volume

3) The Steam leaves the nozzle at a
A) High pressure and low velocity
B) High pressure and high velocity
C) Low pressure and low velocity
D) Low pressure and high velocity

4) Effect of friction in nozzle _____ dryness fraction of steam.
A) Increases B) Decreases
C) No change D) None of the above

5) De Laval turbine is
A) Impulse reaction turbine B) Reaction turbine
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P.T.O.

6) The compounding of turbines is done in order to
   A) Reduce the speed of rotor
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9) Entropy of water at 0° C is assumed to be
   A) 1 B) 0 C) – 1 D) 10

10) An ideal heat engine operates between 600 K and 900 K. The efficiency of engine is
   A) 90% B) 45% C) 33% D) 70%

11) A device used to increase the temperature of saturated steam without raising its pressure, is called
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12) Which loss does present in actual vapour power cycle at the exit of the boiler and at the entry of the turbine ?
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13) What is the relation between efficiency of Rankine cycle (η Rankine) and efficiency of actual vapour power cycle (η Actual Cycle) ?
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   A) $dQ = du + pdv$ B) $dv = dQ + pdu$
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SLR-EP – 55

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
APPLIED THERMODYNAMICS

Day and Date : Thursday, 15-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***Use*** *of steam tables and Mollier diagram is* ***allowed****.*
2) ***Use*** *of scientific calculator is* ***allowed****.*
3) Out of ***remaining*** *questions solve* ***any two*** *questions from* ***each*** *Section.*
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SECTION – I

2. A) What is throttling ? Explain with neat sketch throttling Calorimeter. **7**
   B) Calculate standard heat of reaction for the following reaction
   $C_5H_{12}(g) + 8\ O_2(g) \rightarrow 5\ CO_2(g) + 6\ H_2O(g)$
   Enthalpies of formation for
   $CO_2(g) = -393$ kJ/mol, $H_2O(g) = -242$ kJ/mol, $C_5H_{12}(g) = -146.5$ kJ/mol, $O_2(g) = 0$ kJ/mol. **7**

3. A) Prove that entropy is property of system. **7**
   B) Explain reheat cycle with block and T-S diagram. What are its advantages ? **7**

4. A) 1130 kg of heat supplied to engine from source at 292° C. The engine rejects heat to sink at 12° C. For which of the following cycle represents a reversible, irreversible or an impossible result.
      i) 282 kg of heat rejected
      ii) 855 kg of heat rejected
      iii) 570 kg of heat rejected. **7**
   B) Define and explain the term **7**
      i) Equivalent evaporation
      ii) Factor of evaporation
      iii) Boiler efficiency.

SECTION – II

5. a) Show that for maximum discharge through a nozzle, the ratio of throat pressure to inlet pressure is given as $(2/n + 1)^{n/n-1}$, where n is the index of isentropic expansion through nozzle. **5**

   b) In a De Laval turbine steam issues from nozzle at a velocity of 1200 m/s and nozzle angle is 20°. The blade velocity is 400 m/s. Inlet and outlet blade angles are equal. The mass of steam flowing through turbine is 1000 kg/hour. If relative velocity coefficient is 0.8, determine blade angles, power developed and blade efficiency. **5**

   c) What are the sources of air leakage in condenser ? Briefly explain the effects of air leakage in condenser. **4**

6. a) Dry saturated steam at 7 bar, is passed through a convergent – divergent nozzle. The throat cross sectional area is 4.5 cm^2. Find the maximum mass flow rate of steam passing through the nozzle per minute. **5**

   b) What do you mean by compounding of steam turbines ? Discuss various methods of compounding steam turbines. **5**

   c) Define condenser and explain with sketch the elements of steam condensing plants. **4**

7. a) Derive an expression for work done in single stage single acting reciprocating compressor without clearance. Assume polytropic compression process. **5**

   b) A single stage reciprocating compressor has a bore of 200 mm and stroke of 300 mm. It runs at speed of 480 rpm. The clearance volume is 6% of the swept volume and law for compression, expansion is $PV^{1.32} = C$. Intake pressure is 98 kPa and temp. is 27° C and compressor delivery pressure is 500 kPa. Determine
      a) Volumetric efficiency
      b) Power required to run compressor
      c) Isothermal power
      d) Isothermal efficiency. **5**

   c) Draw theoretical and actual indicator diagram of single stage reciprocating compressor. **4**

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SLR-EP – 55

Seat No.	

Set R

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
APPLIED THERMODYNAMICS

Day and Date : Thursday, 15-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **Use** of steam tables and Mollier diagram is **allowed**.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) Which loss does present in actual vapour power cycle at the exit of the boiler and at the entry of the turbine ?
   A) Friction loss B) Constant pressure heat loss
   C) Both A) and B) D) None of the above

2) What is the relation between efficiency of Rankine cycle (η Rankine) and efficiency of actual vapour power cycle (η Actual Cycle) ?
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4) The pressure during suction stroke is _____ atmospheric pressure.
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   C) More D) Higher

P.T.O.

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   A) Reduce the speed of rotor B) Improve efficiency
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SLR-EP – 55

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
APPLIED THERMODYNAMICS

Day and Date : Thursday, 15-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***Use*** *of steam tables and Mollier diagram is* ***allowed****.*
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SECTION – I

2. A) What is throttling ? Explain with neat sketch throttling Calorimeter. **7**
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   $CO_2(g) = -393$ kJ/mol, $H_2O(g) = -242$ kJ/mol, $C_5H_{12}(g) = -146.5$ kJ/mol, $O_2(g) = 0$ kJ/mol. **7**

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SECTION – II

5. a) Show that for maximum discharge through a nozzle, the ratio of throat pressure to inlet pressure is given as $(2/n + 1)^{n/n-1}$, where n is the index of isentropic expansion through nozzle. **5**

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      a) Volumetric efficiency
      b) Power required to run compressor
      c) Isothermal power
      d) Isothermal efficiency. **5**

   c) Draw theoretical and actual indicator diagram of single stage reciprocating compressor. **4**

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SLR-EP – 55

Seat No.	

Set **S**

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
APPLIED THERMODYNAMICS

Day and Date : Thursday, 15-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) **Use** of steam tables and Mollier diagram is **allowed**.*
*2) **Use** of scientific 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.***
*5) Out of **remaining** questions solve **any two** questions from **each** Section.*
*6) Assume suitable data if **required** and state it **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) The Steam leaves the nozzle at a
   A) High pressure and low velocity
   B) High pressure and high velocity
   C) Low pressure and low velocity
   D) Low pressure and high velocity

2) Effect of friction in nozzle _____ dryness fraction of steam.
   A) Increases B) Decreases
   C) No change D) None of the above

3) De Laval turbine is
   A) Impulse reaction turbine B) Reaction turbine
   C) Multi rotor impulse turbine D) Single rotor impulse turbine

4) The compounding of turbines is done in order to
   A) Reduce the speed of rotor B) Improve efficiency
   C) Reduce exit losses D) All of the above

5) The ratio of actual vacuum to the ideal vacuum in a condenser is called
   A) Condenser efficiency B) Vacuum efficiency
   C) Nozzle efficiency D) Evaporator efficiency

P.T.O.

6) Coefficient of performance of heat pump is always
   A) Less than unity B) Greater than unity
   C) Equal to unity D) None of the above

7) Entropy of water at 0° C is assumed to be
   A) 1 B) 0 C) – 1 D) 10

8) An ideal heat engine operates between 600 K and 900 K. The efficiency of engine is
   A) 90% B) 45% C) 33% D) 70%

9) A device used to increase the temperature of saturated steam without raising its pressure, is called
   A) Fusible plug B) Stop Valve C) Superheater D) Economiser

10) Which loss does present in actual vapour power cycle at the exit of the boiler and at the entry of the turbine ?
   A) Friction loss
   B) Constant pressure heat loss
   C) Both A) and B)
   D) None of the above

11) What is the relation between efficiency of Rankine cycle (η Rankine) and efficiency of actual vapour power cycle (η Actual Cycle) ?
   A) $(\eta_{Rankine}) = (\eta_{Actual\ Cycle})$
   B) $(\eta_{Rankine}) > (\eta_{Actual\ Cycle})$
   C) $(\eta_{Rankine}) < (\eta_{Actual\ Cycle})$
   D) None of the above

12) Non flow energy equation for reversible process is
   A) dQ = du + pdv B) dv = dQ + pdu
   C) dp = dQ + udv D) du = dQ + pdv

13) The pressure during suction stroke is _____ atmospheric pressure.
   A) Equal to B) Less than C) More D) Higher

14) The volume of air sucked by compressor during suction stroke is called
   A) Free air delivery B) Compressor capacity
   C) Swept volume D) Clearance volume

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SLR-EP – 55

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
APPLIED THERMODYNAMICS

Day and Date : Thursday, 15-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1)* ***Use*** *of steam tables and Mollier diagram is* ***allowed****.*
2) ***Use*** *of scientific calculator is* ***allowed****.*
3) Out of ***remaining*** *questions solve* ***any two*** *questions from* ***each*** *Section.*
4) Assume suitable data if ***required*** *and state it* ***clearly****.*

SECTION – I

2. A) What is throttling ? Explain with neat sketch throttling Calorimeter. **7**
   B) Calculate standard heat of reaction for the following reaction
   $C_5H_{12}(g) + 8\ O_2(g) \rightarrow 5\ CO_2(g) + 6\ H_2O(g)$
   Enthalpies of formation for
   $CO_2(g) = -393$ kJ/mol, $H_2O(g) = -242$ kJ/mol, $C_5H_{12}(g) = -146.5$ kJ/mol, $O_2(g) = 0$ kJ/mol. **7**

3. A) Prove that entropy is property of system. **7**
   B) Explain reheat cycle with block and T-S diagram. What are its advantages ? **7**

4. A) 1130 kg of heat supplied to engine from source at 292° C. The engine rejects heat to sink at 12° C. For which of the following cycle represents a reversible, irreversible or an impossible result.
      i) 282 kg of heat rejected
      ii) 855 kg of heat rejected
      iii) 570 kg of heat rejected. **7**
   B) Define and explain the term **7**
      i) Equivalent evaporation
      ii) Factor of evaporation
      iii) Boiler efficiency.

SECTION – II

5. a) Show that for maximum discharge through a nozzle, the ratio of throat pressure to inlet pressure is given as $(2/n + 1)^{n/n-1}$, where n is the index of isentropic expansion through nozzle. **5**

   b) In a De Laval turbine steam issues from nozzle at a velocity of 1200 m/s and nozzle angle is 20°. The blade velocity is 400 m/s. Inlet and outlet blade angles are equal. The mass of steam flowing through turbine is 1000 kg/hour. If relative velocity coefficient is 0.8, determine blade angles, power developed and blade efficiency. **5**

   c) What are the sources of air leakage in condenser ? Briefly explain the effects of air leakage in condenser. **4**

6. a) Dry saturated steam at 7 bar, is passed through a convergent – divergent nozzle. The throat cross sectional area is 4.5 cm^2. Find the maximum mass flow rate of steam passing through the nozzle per minute. **5**

   b) What do you mean by compounding of steam turbines ? Discuss various methods of compounding steam turbines. **5**

   c) Define condenser and explain with sketch the elements of steam condensing plants. **4**

7. a) Derive an expression for work done in single stage single acting reciprocating compressor without clearance. Assume polytropic compression process. **5**

   b) A single stage reciprocating compressor has a bore of 200 mm and stroke of 300 mm. It runs at speed of 480 rpm. The clearance volume is 6% of the swept volume and law for compression, expansion is $PV^{1.32} = C$. Intake pressure is 98 kPa and temp. is 27° C and compressor delivery pressure is 500 kPa. Determine
      a) Volumetric efficiency
      b) Power required to run compressor
      c) Isothermal power
      d) Isothermal efficiency. **5**

   c) Draw theoretical and actual indicator diagram of single stage reciprocating compressor. **4**

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SLR-EP – 56

Seat No.	

Set **P**

S.E. (Part – I) (Mechanical Engg.) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 17-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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) *Attempt **any three** questions from **each** Section.*
4) ***Use** of calculator and statistical tables are allowed.*
5) *Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose correct alternative : **(1×14=14)**

1) The general solution of $(D^4 + 2D^2 + 1)y = 0$ is
   a) $y = c_1\cos x + c_2\sin x + c_3\cos x + c_4\sin x$
   b) $y = (c_1 + c_2x)\cos x + (c_3 + c_4x)\sin x$
   c) $y = (c_1 + c_2x)e^x$
   d) None of these

2) $\frac{1}{D^2}x^3$ is equal to
   a) $\frac{x^5}{20}$ b) $e^x x^2$ c) $e^{-x}x^3$ d) $e^x\left(x^2 + \frac{x^3}{3}\right)$

3) The P.I. of $x^2\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} = \frac{1}{x^2}$ is
   a) $c_1 + c_2x$ b) $x - \frac{1}{x^2}$ c) $\frac{1}{x^2}$ d) $\frac{1}{2x^2}$

4) $z = a(x + y) + c$ is the general solution of
   a) $pq = 1$ b) $p = 1 - q$ c) $p + q = 0$ d) $p = q$

5) The equation $x^2p^2 + y^2q^2 = z^2$ can be reduced to the form
   a) $f(q, p) = 0$ b) $f(p, q, z) = 0$
   c) $f_1(x, p) = f_2(y, q)$ d) None of these

P.T.O.

6) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, then $\nabla.\vec{r}$ =

a) 0 b) 1
c) 2 d) 3

7) The unit tangent vector to the curve x = t, y = t^2, z = t^3 at t = 1 is

a) $\frac{1}{\sqrt{14}}\left(\hat{i} - 2\hat{j} + 3\hat{k}\right)$ b) $\frac{1}{\sqrt{14}}\left(\hat{i} + 2\hat{j} + 3\hat{k}\right)$

c) $\frac{1}{\sqrt{3}}\left(\hat{i} + \hat{j} + \hat{k}\right)$ d) None of these

8) Find the value of k for which the function f(x, y) = 2x – x^2 + ky^2 is harmonic.

a) 1 b) 2 c) 3 d) 0

9) The value of $\int_C \frac{dz}{z-3}$ where C is the circle |z – 1| = 5 is

a) 0 b) πi c) $2\pi i$ d) None

10) If $\bar{x}$ is the mean of the sample size n drawn from the population with mean μ and standard deviation σ then $\bar{x}$ has the following distribution

a) Binomial b) Poisson c) Normal d) None

11) The t-statistic is defined as

a) $\frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$ b) $\frac{\bar{x} - \mu}{s/\sqrt{n}}$ c) $\frac{\bar{x} - \mu}{\sigma/n}$ d) $\frac{\bar{x} - \mu}{s/n}$

12) A continuous random variable has the following density function f(x) = kx, $0 \le x \le 2$. Then k =

a) $\frac{1}{2}$ b) $\frac{1}{4}$

c) $\frac{3}{2}$ d) $\frac{3}{4}$

13) If x denotes the binomial variate then the std. deviation of the distribution is given by

a) $\sqrt{npq}$ b) npq

c) np d) $\sqrt{np}$

14) The Poisson distribution is useful when

a) $n \to 0$ $p \to \infty$ b) $n \to \infty$ $p \to 0$

c) $n \to \infty$ $p \to \infty$ d) None of these

SLR-EP – 56

Seat No.	

S.E. (Part – I) (Mechanical Engg.) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 17-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
*2) **Use** of calculator and statistical tables are allowed.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Solve $\frac{d^3y}{dx^3} + 4\frac{dy}{dx} = \sin 2x$. **3**

   b) Solve $(D^2 - 4D + 4)y = e^{2x}x^2$. **3**

   c) Solve $y'' + 16y = x\sin 3x$. **3**

3. a) The differential equation of the body is $\frac{d^2x}{dt^2} + k^2x = k^2a \sin nt$. If at t = 0, x = 0, $\frac{dx}{dt} = 0$, show that $x = \frac{ka}{k^2 - n^2}\left[k\sin nt - n\sin kt\right]$. **5**

   b) Solve $(3x + 2)^2 \frac{d^2y}{dx^2} + 3(3x+2)\frac{dy}{dx} - 36y = 8x^2 + 4x + 1$. **5**

   OR

   b) Solve $x^3\frac{d^3y}{dx^3} + 2x^2\frac{d^2y}{dx^2} + 2y = 10\left(x + \frac{1}{x}\right)$ **5**

4. a) Solve the following partial differential equation $3x\frac{\partial z}{\partial x} - 5y\frac{\partial z}{\partial y} = 0$, by the method of separation of variables. **5**

   b) Solve $z^2(p^2 + q^2) = x^2 + y^2$. **4**

5. a) Prove that $\vec{F} = (x + 2y + az)\hat{i} + (bx - 3y - z)\hat{j} + (4x + cy + 2z)\hat{k}$ is solenoidal and determine the constant a, b, c if $\vec{F}$ is irrotational. **3**

   b) Find the angle between the surfaces $x^2y + 2xz = 4$ at(2, –2, 3) and to $x^3 + y^3 + 3xyz = 3$ at (1, 2, –1). **3**

   c) Find the velocity and acceleration of a particle moving along the curve x = 2sin3t, y = 2cos3t, z = 8t. Also find their magnitude. **3**

SECTION – II

6. a) Determine the analytic function whose imaginary part is e^x(xcosy – ysiny). **3**

   b) If 5 pieces of certain ribbon selected at random have mean breaking strength of 169.5 pounds with standard deviation of 5.7, do they confirm to the specification mean breaking strength of 180 pounds. (Critical value of t for one-tailed 1% level of significance is 3.747). **3**

   c) Evaluate $\int_c \frac{z^2+1}{z^2-1} dz$ if C is the circle of unit radius with centre at z = 1. **3**

7. a) Five dice are thrown together 96 times. The number of times 4, 5 or 6 was actually obtained is given below : **4**

   Fit a binomial distribution, if the nature of dice is not known.

No. of dice :	0	1	2	3	4	5
Showing 4, 5, 6 Frequency :	1	10	24	35	18	8

   b) Using Poisson distribution, find the probability that ace of spade will be drawn from a pack of well-shuffled cards atleast once in 104 consecutive draws. **3**

   c) It has previously been recorded that the average depth of ocean at a particular region is 67.4 fathoms. Is there reason to believe this at 0.01 level of significance if the readings at 40 random locations in that particular region showed a mean of 69.3 with std. deviation of 5.4 fathoms ? **3**

   (Critical value of z at 1% L.O.S. two tailed test is 2.58)

8. a) A military expert claims that the citizens of the district A are fitter than the citizens of district B. His claim is based on the findings that 96 out of 200 citizens of the district A passed a standard of fitness as against only 84 out of 200 citizen of B. Is his claim well founded ? (Critical value of z for one tailed test at 5% L.O.S. is 1.64) **3**

   b) A student answers by guess 32 questions correctly in an examination with 50 true or false questions, are the result significant at 0.05 L.O.S. ? **3**

   (Critical value of z at 5% L.O.S. one tailed test is 1.64)

   c) The income distribution of a group of 10000 persons was found to be normal with mean Rs. 750 and std. deviation is Rs. 50. What percentage of this group had income exceeding Rs. 668 ? **3**

   (Given : Area under S.N.C. curve between ordinates at ± 1.64 is 0.8990)

9. a) Evaluate : $\int_0^{2+i} z^2 dz$ along **4**

   i) The line x = 2y ii) Parabola $y^2 = \frac{x}{2}$.

   b) The number of car accidents in a metropolitan city was found to be 20, 17, 12, 6, 7, 15, 8, 5, 16 and 14 per month respectively. Use χ^2 - test to check whether these frequencies are in agreement with the belief that occurrence of accidents was the same during 10 months period. Test at 1% L.O.S. **5**

   (Critical value of χ^2 at 1% L.O.S. for 9 d.f. is 21.666)

SLR-EP – 56

Seat No.	

Set **Q**

S.E. (Part – I) (Mechanical Engg.) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 17-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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) *Attempt **any three** questions from **each** Section.*
4) ***Use** of calculator and statistical tables are allowed.*
5) *Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose correct alternative : **(1×14=14)**

1) Find the value of k for which the function $f(x, y) = 2x - x^2 + ky^2$ is harmonic.
a) 1 b) 2 c) 3 d) 0

2) The value of $\int_C \frac{dz}{z-3}$ where C is the circle $|z - 1| = 5$ is
a) 0 b) πi c) $2\pi i$ d) None

3) If $\bar{x}$ is the mean of the sample size n drawn from the population with mean μ and standard deviation σ then $\bar{x}$ has the following distribution
a) Binomial b) Poisson c) Normal d) None

4) The t-statistic is defined as
a) $\frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$ b) $\frac{\bar{x} - \mu}{s/\sqrt{n}}$ c) $\frac{\bar{x} - \mu}{\sigma/n}$ d) $\frac{\bar{x} - \mu}{s/n}$

5) A continuous random variable has the following density function $f(x) = kx$, $0 \le x \le 2$. Then k =
a) $\frac{1}{2}$ b) $\frac{1}{4}$ c) $\frac{3}{2}$ d) $\frac{3}{4}$

6) If x denotes the binomial variate then the std. deviation of the distribution is given by
a) $\sqrt{npq}$ b) npq
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P.T.O.

7) The Poisson distribution is useful when
   a) $n \to 0\ p \to \infty$ b) $n \to \infty\ p \to 0$
   c) $n \to \infty\ p \to \infty$ d) None of these

8) The general solution of $(D^4 + 2D^2 + 1)y = 0$ is
   a) $y = c_1\cos x + c_2\sin x + c_3\cos x + c_4\sin x$
   b) $y = (c_1 + c_2x)\cos x + (c_3 + c_4x)\sin x$
   c) $y = (c_1 + c_2x)e^x$
   d) None of these

9) $\frac{1}{D^2}x^3$ is equal to
   a) $\frac{x^5}{20}$ b) $e^x x^2$ c) $e^{-x}x^3$ d) $e^x\left(x^2 + \frac{x^3}{3}\right)$

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12) The equation $x^2p^2 + y^2q^2 = z^2$ can be reduced to the form
   a) $f(q, p) = 0$ b) $f(p, q, z) = 0$
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13) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, then $\nabla.\vec{r}$ =
   a) 0 b) 1
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14) The unit tangent vector to the curve $x = t$, $y = t^2$, $z = t^3$ at $t = 1$ is
   a) $\frac{1}{\sqrt{14}}\left(\hat{i} - 2\hat{j} + 3\hat{k}\right)$ b) $\frac{1}{\sqrt{14}}\left(\hat{i} + 2\hat{j} + 3\hat{k}\right)$
   c) $\frac{1}{\sqrt{3}}\left(\hat{i} + \hat{j} + \hat{k}\right)$ d) None of these

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SLR-EP – 56

Seat No.	

S.E. (Part – I) (Mechanical Engg.) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 17-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
*2) **Use** of calculator and statistical tables are allowed.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Solve $\frac{d^3y}{dx^3} + 4\frac{dy}{dx} = \sin 2x$. **3**

   b) Solve $(D^2 - 4D + 4)y = e^{2x}x^2$. **3**

   c) Solve $y'' + 16y = x\sin 3x$. **3**

3. a) The differential equation of the body is $\frac{d^2x}{dt^2} + k^2x = k^2a \sin nt$. If at t = 0, x = 0, $\frac{dx}{dt} = 0$, show that $x = \frac{ka}{k^2 - n^2}\left[k\sin nt - n\sin kt\right]$. **5**

   b) Solve $(3x + 2)^2 \frac{d^2y}{dx^2} + 3(3x + 2)\frac{dy}{dx} - 36y = 8x^2 + 4x + 1$. **5**

   OR

   b) Solve $x^3\frac{d^3y}{dx^3} + 2x^2\frac{d^2y}{dx^2} + 2y = 10\left(x + \frac{1}{x}\right)$ **5**

4. a) Solve the following partial differential equation $3x\frac{\partial z}{\partial x} - 5y\frac{\partial z}{\partial y} = 0$, by the method of separation of variables. **5**

   b) Solve $z^2(p^2 + q^2) = x^2 + y^2$. **4**

5. a) Prove that $\vec{F} = (x + 2y + az)\hat{i} + (bx - 3y - z)\hat{j} + (4x + cy + 2z)\hat{k}$ is solenoidal and determine the constant a, b, c if $\vec{F}$ is irrotational. **3**

   b) Find the angle between the surfaces $x^2y + 2xz = 4$ at(2, –2, 3) and to $x^3 + y^3 + 3xyz = 3$ at (1, 2, –1). **3**

   c) Find the velocity and acceleration of a particle moving along the curve x = 2sin3t, y = 2cos3t, z = 8t. Also find their magnitude. **3**

SECTION – II

6. a) Determine the analytic function whose imaginary part is $e^x(x\cos y - y\sin y)$. **3**

   b) If 5 pieces of certain ribbon selected at random have mean breaking strength of 169.5 pounds with standard deviation of 5.7, do they confirm to the specification mean breaking strength of 180 pounds. (Critical value of t for one-tailed 1% level of significance is 3.747). **3**

   c) Evaluate $\int_c \frac{z^2+1}{z^2-1} dz$ if C is the circle of unit radius with centre at z = 1. **3**

7. a) Five dice are thrown together 96 times. The number of times 4, 5 or 6 was actually obtained is given below : **4**

   Fit a binomial distribution, if the nature of dice is not known.

No. of dice :	0	1	2	3	4	5
Showing 4, 5, 6 Frequency :	1	10	24	35	18	8

   b) Using Poisson distribution, find the probability that ace of spade will be drawn from a pack of well-shuffled cards atleast once in 104 consecutive draws. **3**

   c) It has previously been recorded that the average depth of ocean at a particular region is 67.4 fathoms. Is there reason to believe this at 0.01 level of significance if the readings at 40 random locations in that particular region showed a mean of 69.3 with std. deviation of 5.4 fathoms ? **3**

   (Critical value of z at 1% L.O.S. two tailed test is 2.58)

8. a) A military expert claims that the citizens of the district A are fitter than the citizens of district B. His claim is based on the findings that 96 out of 200 citizens of the district A passed a standard of fitness as against only 84 out of 200 citizen of B. Is his claim well founded ? (Critical value of z for one tailed test at 5% L.O.S. is 1.64) **3**

   b) A student answers by guess 32 questions correctly in an examination with 50 true or false questions, are the result significant at 0.05 L.O.S. ? **3**

   (Critical value of z at 5% L.O.S. one tailed test is 1.64)

   c) The income distribution of a group of 10000 persons was found to be normal with mean Rs. 750 and std. deviation is Rs. 50. What percentage of this group had income exceeding Rs. 668 ? **3**

   (Given : Area under S.N.C. curve between ordinates at ± 1.64 is 0.8990)

9. a) Evaluate : $\int_0^{2+i} z^2 dz$ along **4**

   i) The line x = 2y ii) Parabola $y^2 = \frac{x}{2}$.

   b) The number of car accidents in a metropolitan city was found to be 20, 17, 12, 6, 7, 15, 8, 5, 16 and 14 per month respectively. Use χ^2 - test to check whether these frequencies are in agreement with the belief that occurrence of accidents was the same during 10 months period. Test at 1% L.O.S. **5**

   (Critical value of χ^2 at 1% L.O.S. for 9 d.f. is 21.666)

SLR-EP – 56

Seat No.	

Set R

S.E. (Part – I) (Mechanical Engg.) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 17-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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) *Attempt **any three** questions from **each** Section.*
4) ***Use** of calculator and statistical tables are allowed.*
5) *Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose correct alternative : **(1×14=14)**

1) The equation $x^2p^2 + y^2q^2 = z^2$ can be reduced to the form
   a) f(q, p) = 0 b) f(p, q, z) = 0
   c) $f_1(x, p) = f_2(y, q)$ d) None of these

2) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, then $\nabla.\vec{r}$ =
   a) 0 b) 1
   c) 2 d) 3

3) The unit tangent vector to the curve x = t, $y = t^2$, $z = t^3$ at t = 1 is
   a) $\frac{1}{\sqrt{14}}\left(\hat{i} - 2\hat{j} + 3\hat{k}\right)$ b) $\frac{1}{\sqrt{14}}\left(\hat{i} + 2\hat{j} + 3\hat{k}\right)$
   c) $\frac{1}{\sqrt{3}}\left(\hat{i} + \hat{j} + \hat{k}\right)$ d) None of these

4) Find the value of k for which the function $f(x, y) = 2x - x^2 + ky^2$ is harmonic.
   a) 1 b) 2 c) 3 d) 0

5) The value of $\int_c \frac{dz}{z-3}$ where C is the circle $|z - 1| = 5$ is
   a) 0 b) πi c) $2\pi i$ d) None

6) If $\bar{x}$ is the mean of the sample size n drawn from the population with mean μ and standard deviation σ then $\bar{x}$ has the following distribution
   a) Binomial b) Poisson c) Normal d) None

P.T.O.

7) The t-statistic is defined as

a) $\frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$ b) $\frac{\bar{x} - \mu}{s/\sqrt{n}}$ c) $\frac{\bar{x} - \mu}{\sigma/n}$ d) $\frac{\bar{x} - \mu}{s/n}$

8) A continuous random variable has the following density function f(x) = kx, $0 \le x \le 2$. Then k =

a) $\frac{1}{2}$ b) $\frac{1}{4}$

c) $\frac{3}{2}$ d) $\frac{3}{4}$

9) If x denotes the binomial variate then the std. deviation of the distribution is given by

a) $\sqrt{npq}$ b) npq

c) np d) $\sqrt{np}$

10) The Poisson distribution is useful when

a) $n \to 0$ $p \to \infty$ b) $n \to \infty$ $p \to 0$

c) $n \to \infty$ $p \to \infty$ d) None of these

11) The general solution of $(D^4 + 2D^2 + 1)y = 0$ is

a) $y = c_1\cos x + c_2\sin x + c_3\cos x + c_4\sin x$

b) $y = (c_1 + c_2x)\cos x + (c_3 + c_4x)\sin x$

c) $y = (c_1 + c_2x)e^x$

d) None of these

12) $\frac{1}{D^2}x^3$ is equal to

a) $\frac{x^5}{20}$ b) $e^x x^2$ c) $e^{-x}x^3$ d) $e^x\left(x^2 + \frac{x^3}{3}\right)$

13) The P.I. of $x^2\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} = \frac{1}{x^2}$ is

a) $c_1 + c_2x$ b) $x - \frac{1}{x^2}$ c) $\frac{1}{x^2}$ d) $\frac{1}{2x^2}$

14) z = a(x + y) + c is the general solution of

a) pq = 1 b) p = 1 – q c) p + q = 0 d) p = q

SLR-EP – 56

Seat No.	

S.E. (Part – I) (Mechanical Engg.) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 17-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
*2) **Use** of calculator and statistical tables are allowed.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Solve $\frac{d^3y}{dx^3} + 4\frac{dy}{dx} = \sin 2x$. **3**

   b) Solve $(D^2 - 4D + 4)y = e^{2x}x^2$. **3**

   c) Solve $y'' + 16y = x\sin 3x$. **3**

3. a) The differential equation of the body is $\frac{d^2x}{dt^2} + k^2x = k^2a \sin nt$. If at t = 0, x = 0, $\frac{dx}{dt} = 0$, show that $x = \frac{ka}{k^2 - n^2}\left[k\sin nt - n\sin kt\right]$. **5**

   b) Solve $(3x + 2)^2 \frac{d^2y}{dx^2} + 3(3x+2)\frac{dy}{dx} - 36y = 8x^2 + 4x + 1$. **5**

   OR

   b) Solve $x^3\frac{d^3y}{dx^3} + 2x^2\frac{d^2y}{dx^2} + 2y = 10\left(x + \frac{1}{x}\right)$ **5**

4. a) Solve the following partial differential equation $3x\frac{\partial z}{\partial x} - 5y\frac{\partial z}{\partial y} = 0$, by the method of separation of variables. **5**

   b) Solve $z^2(p^2 + q^2) = x^2 + y^2$. **4**

5. a) Prove that $\vec{F} = (x + 2y + az)\hat{i} + (bx - 3y - z)\hat{j} + (4x + cy + 2z)\hat{k}$ is solenoidal and determine the constant a, b, c if $\vec{F}$ is irrotational. **3**

   b) Find the angle between the surfaces $x^2y + 2xz = 4$ at(2, –2, 3) and to $x^3 + y^3 + 3xyz = 3$ at (1, 2, –1). **3**

   c) Find the velocity and acceleration of a particle moving along the curve x = 2sin3t, y = 2cos3t, z = 8t. Also find their magnitude. **3**

SECTION – II

6. a) Determine the analytic function whose imaginary part is e^x(xcosy – ysiny). **3**

   b) If 5 pieces of certain ribbon selected at random have mean breaking strength of 169.5 pounds with standard deviation of 5.7, do they confirm to the specification mean breaking strength of 180 pounds. (Critical value of t for one-tailed 1% level of significance is 3.747). **3**

   c) Evaluate $\int_c \frac{z^2+1}{z^2-1} dz$ if C is the circle of unit radius with centre at z = 1. **3**

7. a) Five dice are thrown together 96 times. The number of times 4, 5 or 6 was actually obtained is given below : **4**

   Fit a binomial distribution, if the nature of dice is not known.

No. of dice :	0	1	2	3	4	5
Showing 4, 5, 6 Frequency :	1	10	24	35	18	8

   b) Using Poisson distribution, find the probability that ace of spade will be drawn from a pack of well-shuffled cards atleast once in 104 consecutive draws. **3**

   c) It has previously been recorded that the average depth of ocean at a particular region is 67.4 fathoms. Is there reason to believe this at 0.01 level of significance if the readings at 40 random locations in that particular region showed a mean of 69.3 with std. deviation of 5.4 fathoms ? **3**

   (Critical value of z at 1% L.O.S. two tailed test is 2.58)

8. a) A military expert claims that the citizens of the district A are fitter than the citizens of district B. His claim is based on the findings that 96 out of 200 citizens of the district A passed a standard of fitness as against only 84 out of 200 citizen of B. Is his claim well founded ? (Critical value of z for one tailed test at 5% L.O.S. is 1.64) **3**

   b) A student answers by guess 32 questions correctly in an examination with 50 true or false questions, are the result significant at 0.05 L.O.S. ? **3**

   (Critical value of z at 5% L.O.S. one tailed test is 1.64)

   c) The income distribution of a group of 10000 persons was found to be normal with mean Rs. 750 and std. deviation is Rs. 50. What percentage of this group had income exceeding Rs. 668 ? **3**

   (Given : Area under S.N.C. curve between ordinates at ± 1.64 is 0.8990)

9. a) Evaluate : $\int_0^{2+i} z^2 dz$ along **4**

   i) The line x = 2y ii) Parabola $y^2 = \frac{x}{2}$.

   b) The number of car accidents in a metropolitan city was found to be 20, 17, 12, 6, 7, 15, 8, 5, 16 and 14 per month respectively. Use χ^2 - test to check whether these frequencies are in agreement with the belief that occurrence of accidents was the same during 10 months period. Test at 1% L.O.S. **5**

   (Critical value of χ^2 at 1% L.O.S. for 9 d.f. is 21.666)

SLR-EP – 56

Seat No.	

Set S

S.E. (Part – I) (Mechanical Engg.) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 17-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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) *Attempt **any three** questions from **each** Section.*
4) ***Use** of calculator and statistical tables are allowed.*
5) *Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose correct alternative : **(1×14=14)**

1) If $\bar{x}$ is the mean of the sample size n drawn from the population with mean μ and standard deviation σ then $\bar{x}$ has the following distribution
   a) Binomial b) Poisson c) Normal d) None

2) The t-statistic is defined as
   a) $\frac{\bar{x}-\mu}{\sigma/\sqrt{n}}$ b) $\frac{\bar{x}-\mu}{s/\sqrt{n}}$ c) $\frac{\bar{x}-\mu}{\sigma/n}$ d) $\frac{\bar{x}-\mu}{s/n}$

3) A continuous random variable has the following density function f(x) = kx, $0 \le x \le 2$. Then k =
   a) $\frac{1}{2}$ b) $\frac{1}{4}$
   c) $\frac{3}{2}$ d) $\frac{3}{4}$

4) If x denotes the binomial variate then the std. deviation of the distribution is given by
   a) $\sqrt{npq}$ b) npq
   c) np d) $\sqrt{np}$

5) The Poisson distribution is useful when
   a) $n \to 0$ $p \to \infty$ b) $n \to \infty$ $p \to 0$
   c) $n \to \infty$ $p \to \infty$ d) None of these

P.T.O.

6) The general solution of $(D^4 + 2D^2 + 1)y = 0$ is

a) $y = c_1\cos x + c_2\sin x + c_3\cos x + c_4\sin x$

b) $y = (c_1 + c_2x)\cos x + (c_3 + c_4x)\sin x$

c) $y = (c_1 + c_2x)e^x$

d) None of these

7) $\frac{1}{D^2}x^3$ is equal to

a) $\frac{x^5}{20}$ b) $e^x x^2$ c) $e^{-x}x^3$ d) $e^x\left(x^2 + \frac{x^3}{3}\right)$

8) The P.I. of $x^2\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} = \frac{1}{x^2}$ is

a) $c_1 + c_2x$ b) $x - \frac{1}{x^2}$ c) $\frac{1}{x^2}$ d) $\frac{1}{2x^2}$

9) $z = a(x + y) + c$ is the general solution of

a) $pq = 1$ b) $p = 1 - q$ c) $p + q = 0$ d) $p = q$

10) The equation $x^2p^2 + y^2q^2 = z^2$ can be reduced to the form

a) $f(q, p) = 0$ b) $f(p, q, z) = 0$

c) $f_1(x, p) = f_2(y, q)$ d) None of these

11) If $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, then $\nabla.\vec{r}$ =

a) 0 b) 1

c) 2 d) 3

12) The unit tangent vector to the curve $x = t$, $y = t^2$, $z = t^3$ at $t = 1$ is

a) $\frac{1}{\sqrt{14}}\left(\hat{i} - 2\hat{j} + 3\hat{k}\right)$ b) $\frac{1}{\sqrt{14}}\left(\hat{i} + 2\hat{j} + 3\hat{k}\right)$

c) $\frac{1}{\sqrt{3}}\left(\hat{i} + \hat{j} + \hat{k}\right)$ d) None of these

13) Find the value of k for which the function $f(x, y) = 2x - x^2 + ky^2$ is harmonic.

a) 1 b) 2 c) 3 d) 0

14) The value of $\int_C \frac{dz}{z - 3}$ where C is the circle $|z - 1| = 5$ is

a) 0 b) πi c) $2\pi i$ d) None

SLR-EP – 56

Seat No.	

S.E. (Part – I) (Mechanical Engg.) (CGPA) Examination, 2016
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 17-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
*2) **Use** of calculator and statistical tables are allowed.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Solve $\frac{d^3y}{dx^3} + 4\frac{dy}{dx} = \sin 2x$. **3**

   b) Solve $(D^2 - 4D + 4)y = e^{2x}x^2$. **3**

   c) Solve $y'' + 16y = x\sin 3x$. **3**

3. a) The differential equation of the body is $\frac{d^2x}{dt^2} + k^2x = k^2a \sin nt$. If at t = 0, x = 0, $\frac{dx}{dt} = 0$, show that $x = \frac{ka}{k^2 - n^2}\left[k\sin nt - n\sin kt\right]$. **5**

   b) Solve $(3x + 2)^2 \frac{d^2y}{dx^2} + 3(3x+2)\frac{dy}{dx} - 36y = 8x^2 + 4x + 1$. **5**

   OR

   b) Solve $x^3\frac{d^3y}{dx^3} + 2x^2\frac{d^2y}{dx^2} + 2y = 10\left(x + \frac{1}{x}\right)$ **5**

4. a) Solve the following partial differential equation $3x\frac{\partial z}{\partial x} - 5y\frac{\partial z}{\partial y} = 0$, by the method of separation of variables. **5**

   b) Solve $z^2(p^2 + q^2) = x^2 + y^2$. **4**

5. a) Prove that $\vec{F} = (x + 2y + az)\hat{i} + (bx - 3y - z)\hat{j} + (4x + cy + 2z)\hat{k}$ is solenoidal and determine the constant a, b, c if $\vec{F}$ is irrotational. **3**

   b) Find the angle between the surfaces $x^2y + 2xz = 4$ at(2, –2, 3) and to $x^3 + y^3 + 3xyz = 3$ at (1, 2, –1). **3**

   c) Find the velocity and acceleration of a particle moving along the curve x = 2sin3t, y = 2cos3t, z = 8t. Also find their magnitude. **3**

SECTION – II

6. a) Determine the analytic function whose imaginary part is $e^x(x\cos y - y\sin y)$. **3**

   b) If 5 pieces of certain ribbon selected at random have mean breaking strength of 169.5 pounds with standard deviation of 5.7, do they confirm to the specification mean breaking strength of 180 pounds. (Critical value of t for one-tailed 1% level of significance is 3.747). **3**

   c) Evaluate $\int_c \frac{z^2+1}{z^2-1} dz$ if C is the circle of unit radius with centre at z = 1. **3**

7. a) Five dice are thrown together 96 times. The number of times 4, 5 or 6 was actually obtained is given below : **4**

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No. of dice :	0	1	2	3	4	5
Showing 4, 5, 6 Frequency :	1	10	24	35	18	8

   b) Using Poisson distribution, find the probability that ace of spade will be drawn from a pack of well-shuffled cards atleast once in 104 consecutive draws. **3**

   c) It has previously been recorded that the average depth of ocean at a particular region is 67.4 fathoms. Is there reason to believe this at 0.01 level of significance if the readings at 40 random locations in that particular region showed a mean of 69.3 with std. deviation of 5.4 fathoms ? **3**

   (Critical value of z at 1% L.O.S. two tailed test is 2.58)

8. a) A military expert claims that the citizens of the district A are fitter than the citizens of district B. His claim is based on the findings that 96 out of 200 citizens of the district A passed a standard of fitness as against only 84 out of 200 citizen of B. Is his claim well founded ? (Critical value of z for one tailed test at 5% L.O.S. is 1.64) **3**

   b) A student answers by guess 32 questions correctly in an examination with 50 true or false questions, are the result significant at 0.05 L.O.S. ? **3**

   (Critical value of z at 5% L.O.S. one tailed test is 1.64)

   c) The income distribution of a group of 10000 persons was found to be normal with mean Rs. 750 and std. deviation is Rs. 50. What percentage of this group had income exceeding Rs. 668 ? **3**

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9. a) Evaluate : $\int_0^{2+i} z^2 dz$ along **4**

   i) The line x = 2y ii) Parabola $y^2 = \frac{x}{2}$.

   b) The number of car accidents in a metropolitan city was found to be 20, 17, 12, 6, 7, 15, 8, 5, 16 and 14 per month respectively. Use χ^2 - test to check whether these frequencies are in agreement with the belief that occurrence of accidents was the same during 10 months period. Test at 1% L.O.S. **5**

   (Critical value of χ^2 at 1% L.O.S. for 9 d.f. is 21.666)

SLR-EP – 57

Seat No.	

Set P

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
MACHINE TOOLS AND PROCESSES

Day and Date : Tuesday, 20-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***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 answer :

1) Which of the following operations are performed on a lathe machine ?
   a) Boring b) Parting-off c) Reaming d) All of the above

2) A flat surface can be produced by a lathe machine, if the cutting tool moves
   a) parallel to the axis of rotation of workpiece
   b) perpendicular to the axis of rotation of workpiece
   c) at an angle of 45°
   d) none of the above

3) An auxiliary slide is provided on
   a) Capstan lathe b) Turret lathe c) Centre lathe d) Boring machine

4) On drilling machine, which process is known as reaming
   a) Enlargement of existing hole
   b) Hole made by removal of metal along the hole circumference
   c) Smoothly finishing and accurately sizing a drilled hole
   d) All of the above

5) What is the motion of cutting tool and its cutting phenomenon in shaper machine ?
   a) Cutting tool in shaper machine has a spinning motion and it cuts only in one direction of rotation
   b) Cutting tool in shaper machine has a spinning motion and it cuts in both the clockwise and anticlockwise direction of rotation
   c) Cutting tool in shaper machine has a reciprocating motion and it cuts only in forward direction of stroke
   d) Cutting tool in shaper machine has a reciprocating motion and it cuts only in backward direction of stroke

P.T.O.

6) i) There is no direct contact between job and tool in un-conventional machining

ii) Material removal rate is faster in conventional machining processes

a) Both statements i and ii are correct
b) Statement i is correct ii is incorrect
c) Statement i is incorrect ii is correct
d) Both statements i & ii are incorrect

7) Dividing head is used for

a) Holding the job
b) Indexing the job at required angle
c) Holding the tool
d) Rotating the job

8) A 46K5V in this statement K indicates

a) Strength of the wheel
b) Grit of wheel
c) Structure of wheel
d) Grade of wheel

9) Internal gears can be manufactured by

a) Lathe
b) Capstan Lathe
c) Turret lathe
d) Broaching Machine

10) Removal of loaded particles from grinding wheel is done by

a) Wheel mounting
b) Wheel balancing
c) Wheel dressing
d) Wheel glazing

11) When number of columns are placed side by side on a common base for drilling, the machine is called as

a) Gang drilling machine
b) Pillar drilling machine
c) Multiple spindle drilling machine
d) Deep hole drilling machine

12) A drill is held in following, while drilling on lathe machine

a) Headstock
b) Tailstock
c) Tool post
d) Carriage

13) In a lathe machine

a) Job rotates
b) Job reciprocates
c) Job is stationary
d) None of the above

14) Turret indexing mechanism is associated with

a) Lathe
b) Capstan & Turret lathe
c) Shaper
d) Slotting machine

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SLR-EP – 57

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
MECHINE TOOLS AND PROCESSES

Day and Date : Tuesday, 20-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***N.B.** : Solve **any three** questions from **each** Section.*

SECTION – I

2. a) Explain the classification of manufacturing processes, giving examples of each type. **4**
   b) Explain in detail setting over the tailstock method for taper turning. **5**

3. a) Differentiate clearly between engine lathe and a capstan lathe. **5**
   b) Explain the construction and working of round column upright drilling machine. **5**

4. a) Compare between a Shaper and a Planer. **4**
   b) Giving advantages and applications explain EDM. **5**

5. Write short notes on **(any three)** : **9**
   a) Tool holders on capstan and turret lathe
   b) Classification of drilling machines
   c) Slotting machine
   d) Need and significance of unconventional machining
   e) Lathe attachments.

SECTION – II

6. a) Explain construction and working of column and knee type milling machine. **5**
   b) Explain with neat diagram vertical turret lathe. **5**

7. a) Explain gear cutting on hobbing machine. **5**
   b) With respect to grinding wheel, explain grit and structure. **4**

Set P

8. a) Explain advantages and limitations of broaching processes. **4**

   b) Explain floor type of horizontal boring machine. **5**

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

   a) Compound Indexing

   b) CNC machines

   c) Gear burnishing

   d) Push vs Pull broaching

   e) Centreless grinding machine.

SLR-EP – 57

Seat No.	

Set Q

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
MACHINE TOOLS AND PROCESSES

Day and Date : Tuesday, 20-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***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 answer :

1) A 46K5V in this statement K indicates
   a) Strength of the wheel b) Grit of wheel
   c) Structure of wheel d) Grade of wheel

2) Internal gears can be manufactured by
   a) Lathe b) Capstan Lathe
   c) Turret lathe d) Broaching Machine

3) Removal of loaded particles from grinding wheel is done by
   a) Wheel mounting b) Wheel balancing
   c) Wheel dressing d) Wheel glazing

4) When number of columns are placed side by side on a common base for drilling, the machine is called as
   a) Gang drilling machine b) Pillar drilling machine
   c) Multiple spindle drilling machine d) Deep hole drilling machine

5) A drill is held in following, while drilling on lathe machine
   a) Headstock b) Tailstock
   c) Tool post d) Carriage

6) In a lathe machine
   a) Job rotates b) Job reciprocates
   c) Job is stationary d) None of the above

P.T.O.

7) Turret indexing mechanism is associated with
   a) Lathe
   b) Capstan & Turret lathe
   c) Shaper
   d) Slotting machine

8) Which of the following operations are performed on a lathe machine ?
   a) Boring b) Parting-off c) Reaming d) All of the above

9) A flat surface can be produced by a lathe machine, if the cutting tool moves
   a) parallel to the axis of rotation of workpiece
   b) perpendicular to the axis of rotation of workpiece
   c) at an angle of 45°
   d) none of the above

10) An auxiliary slide is provided on
   a) Capstan lathe b) Turret lathe c) Centre lathe d) Boring machine

11) On drilling machine, which process is known as reaming
   a) Enlargement of existing hole
   b) Hole made by removal of metal along the hole circumference
   c) Smoothly finishing and accurately sizing a drilled hole
   d) All of the above

12) What is the motion of cutting tool and its cutting phenomenon in shaper machine ?
   a) Cutting tool in shaper machine has a spinning motion and it cuts only in one direction of rotation
   b) Cutting tool in shaper machine has a spinning motion and it cuts in both the clockwise and anticlockwise direction of rotation
   c) Cutting tool in shaper machine has a reciprocating motion and it cuts only in forward direction of stroke
   d) Cutting tool in shaper machine has a reciprocating motion and it cuts only in backward direction of stroke

13) i) There is no direct contact between job and tool in un-conventional machining
   ii) Material removal rate is faster in conventional machining processes
   a) Both statements i and ii are correct
   b) Statement i is correct ii is incorrect
   c) Statement i is incorrect ii is correct
   d) Both statements i & ii are incorrect

14) Dividing head is used for
   a) Holding the job
   b) Indexing the job at required angle
   c) Holding the tool
   d) Rotating the job

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SLR-EP – 57

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
MECHINE TOOLS AND PROCESSES

Day and Date : Tuesday, 20-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***N.B.** : Solve **any three** questions from **each** Section.*

SECTION – I

2. a) Explain the classification of manufacturing processes, giving examples of each type. **4**
   b) Explain in detail setting over the tailstock method for taper turning. **5**

3. a) Differentiate clearly between engine lathe and a capstan lathe. **5**
   b) Explain the construction and working of round column upright drilling machine. **5**

4. a) Compare between a Shaper and a Planer. **4**
   b) Giving advantages and applications explain EDM. **5**

5. Write short notes on **(any three)** : **9**
   a) Tool holders on capstan and turret lathe
   b) Classification of drilling machines
   c) Slotting machine
   d) Need and significance of unconventional machining
   e) Lathe attachments.

SECTION – II

6. a) Explain construction and working of column and knee type milling machine. **5**
   b) Explain with neat diagram vertical turret lathe. **5**

7. a) Explain gear cutting on hobbing machine. **5**
   b) With respect to grinding wheel, explain grit and structure. **4**

Set Q

8. a) Explain advantages and limitations of broaching processes. **4**

   b) Explain floor type of horizontal boring machine. **5**

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

   a) Compound Indexing

   b) CNC machines

   c) Gear burnishing

   d) Push vs Pull broaching

   e) Centreless grinding machine.

SLR-EP – 57

Seat No.	

Set R

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
MACHINE TOOLS AND PROCESSES

Day and Date : Tuesday, 20-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***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 answer :

1) What is the motion of cutting tool and its cutting phenomenon in shaper machine ?
   a) Cutting tool in shaper machine has a spinning motion and it cuts only in one direction of rotation
   b) Cutting tool in shaper machine has a spinning motion and it cuts in both the clockwise and anticlockwise direction of rotation
   c) Cutting tool in shaper machine has a reciprocating motion and it cuts only in forward direction of stroke
   d) Cutting tool in shaper machine has a reciprocating motion and it cuts only in backward direction of stroke

2) i) There is no direct contact between job and tool in un-conventional machining
   ii) Material removal rate is faster in conventional machining processes
   a) Both statements i and ii are correct
   b) Statement i is correct ii is incorrect
   c) Statement i is incorrect ii is correct
   d) Both statements i & ii are incorrect

3) Dividing head is used for
   a) Holding the job
   b) Indexing the job at required angle
   c) Holding the tool
   d) Rotating the job

4) A 46K5V in this statement K indicates
   a) Strength of the wheel
   b) Grit of wheel
   c) Structure of wheel
   d) Grade of wheel

P.T.O.

5) Internal gears can be manufactured by
   a) Lathe b) Capstan Lathe
   c) Turret lathe d) Broaching Machine

6) Removal of loaded particles from grinding wheel is done by
   a) Wheel mounting b) Wheel balancing
   c) Wheel dressing d) Wheel glazing

7) When number of columns are placed side by side on a common base for drilling, the machine is called as
   a) Gang drilling machine b) Pillar drilling machine
   c) Multiple spindle drilling machine d) Deep hole drilling machine

8) A drill is held in following, while drilling on lathe machine
   a) Headstock b) Tailstock
   c) Tool post d) Carriage

9) In a lathe machine
   a) Job rotates b) Job reciprocates
   c) Job is stationary d) None of the above

10) Turret indexing mechanism is associated with
   a) Lathe b) Capstan & Turret lathe
   c) Shaper d) Slotting machine

11) Which of the following operations are performed on a lathe machine ?
   a) Boring b) Parting-off c) Reaming d) All of the above

12) A flat surface can be produced by a lathe machine, if the cutting tool moves
   a) parallel to the axis of rotation of workpiece
   b) perpendicular to the axis of rotation of workpiece
   c) at an angle of 45°
   d) none of the above

13) An auxiliary slide is provided on
   a) Capstan lathe b) Turret lathe c) Centre lathe d) Boring machine

14) On drilling machine, which process is known as reaming
   a) Enlargement of existing hole
   b) Hole made by removal of metal along the hole circumference
   c) Smoothly finishing and accurately sizing a drilled hole
   d) All of the above

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SLR-EP – 57

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
MECHINE TOOLS AND PROCESSES

Day and Date : Tuesday, 20-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***N.B.** : Solve **any three** questions from **each** Section.*

SECTION – I

2. a) Explain the classification of manufacturing processes, giving examples of each type. **4**
   b) Explain in detail setting over the tailstock method for taper turning. **5**

3. a) Differentiate clearly between engine lathe and a capstan lathe. **5**
   b) Explain the construction and working of round column upright drilling machine. **5**

4. a) Compare between a Shaper and a Planer. **4**
   b) Giving advantages and applications explain EDM. **5**

5. Write short notes on **(any three)** : **9**
   a) Tool holders on capstan and turret lathe
   b) Classification of drilling machines
   c) Slotting machine
   d) Need and significance of unconventional machining
   e) Lathe attachments.

SECTION – II

6. a) Explain construction and working of column and knee type milling machine. **5**
   b) Explain with neat diagram vertical turret lathe. **5**

7. a) Explain gear cutting on hobbing machine. **5**
   b) With respect to grinding wheel, explain grit and structure. **4**

Set R

8. a) Explain advantages and limitations of broaching processes. **4**

   b) Explain floor type of horizontal boring machine. **5**

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

   a) Compound Indexing

   b) CNC machines

   c) Gear burnishing

   d) Push vs Pull broaching

   e) Centreless grinding machine.

SLR-EP – 57

Seat No.	

Set S

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
MACHINE TOOLS AND PROCESSES

Day and Date : Tuesday, 20-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***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 answer :

1) Removal of loaded particles from grinding wheel is done by
   a) Wheel mounting b) Wheel balancing
   c) Wheel dressing d) Wheel glazing

2) When number of columns are placed side by side on a common base for drilling, the machine is called as
   a) Gang drilling machine b) Pillar drilling machine
   c) Multiple spindle drilling machine d) Deep hole drilling machine

3) A drill is held in following, while drilling on lathe machine
   a) Headstock b) Tailstock
   c) Tool post d) Carriage

4) In a lathe machine
   a) Job rotates b) Job reciprocates
   c) Job is stationary d) None of the above

5) Turret indexing mechanism is associated with
   a) Lathe b) Capstan & Turret lathe
   c) Shaper d) Slotting machine

6) Which of the following operations are performed on a lathe machine ?
   a) Boring b) Parting-off c) Reaming d) All of the above

P.T.O.

7) A flat surface can be produced by a lathe machine, if the cutting tool moves
   a) parallel to the axis of rotation of workpiece
   b) perpendicular to the axis of rotation of workpiece
   c) at an angle of 45°
   d) none of the above

8) An auxiliary slide is provided on
   a) Capstan lathe b) Turret lathe c) Centre lathe d) Boring machine

9) On drilling machine, which process is known as reaming
   a) Enlargement of existing hole
   b) Hole made by removal of metal along the hole circumference
   c) Smoothly finishing and accurately sizing a drilled hole
   d) All of the above

10) What is the motion of cutting tool and its cutting phenomenon in shaper machine ?
   a) Cutting tool in shaper machine has a spinning motion and it cuts only in one direction of rotation
   b) Cutting tool in shaper machine has a spinning motion and it cuts in both the clockwise and anticlockwise direction of rotation
   c) Cutting tool in shaper machine has a reciprocating motion and it cuts only in forward direction of stroke
   d) Cutting tool in shaper machine has a reciprocating motion and it cuts only in backward direction of stroke

11) i) There is no direct contact between job and tool in un-conventional machining

   ii) Material removal rate is faster in conventional machining processes
   a) Both statements i and ii are correct
   b) Statement i is correct ii is incorrect
   c) Statement i is incorrect ii is correct
   d) Both statements i & ii are incorrect

12) Dividing head is used for
   a) Holding the job b) Indexing the job at required angle
   c) Holding the tool d) Rotating the job

13) A 46K5V in this statement K indicates
   a) Strength of the wheel b) Grit of wheel
   c) Structure of wheel d) Grade of wheel

14) Internal gears can be manufactured by
   a) Lathe b) Capstan Lathe
   c) Turret lathe d) Broaching Machine

———————

SLR-EP – 57

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2016
MECHINE TOOLS AND PROCESSES

Day and Date : Tuesday, 20-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***N.B.** : Solve **any three** questions from **each** Section.*

SECTION – I

2. a) Explain the classification of manufacturing processes, giving examples of each type. **4**
   b) Explain in detail setting over the tailstock method for taper turning. **5**

3. a) Differentiate clearly between engine lathe and a capstan lathe. **5**
   b) Explain the construction and working of round column upright drilling machine. **5**

4. a) Compare between a Shaper and a Planer. **4**
   b) Giving advantages and applications explain EDM. **5**

5. Write short notes on **(any three)** : **9**
   a) Tool holders on capstan and turret lathe
   b) Classification of drilling machines
   c) Slotting machine
   d) Need and significance of unconventional machining
   e) Lathe attachments.

SECTION – II

6. a) Explain construction and working of column and knee type milling machine. **5**
   b) Explain with neat diagram vertical turret lathe. **5**

7. a) Explain gear cutting on hobbing machine. **5**
   b) With respect to grinding wheel, explain grit and structure. **4**

Set S

8. a) Explain advantages and limitations of broaching processes. **4**

   b) Explain floor type of horizontal boring machine. **5**

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

   a) Compound Indexing

   b) CNC machines

   c) Gear burnishing

   d) Push vs Pull broaching

   e) Centreless grinding machine.

SLR-EP – 58

Seat No.	

Set **P**

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2016
MACHINE DRAWING

Day and Date : Thursday, 22-12-2016 Max. Marks : 70

Time : 10.00 a.m. to 2.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*

2) Only first angle method of projection should be used.

*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*

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. Objective Question (**All** type questions i.e. **I** to **IV** are **compulsory**) : **14**

Type I : Match the Pairs (**Each** bit **one** mark **each**) **3**

Column A	Column B
A) Journal Bearing	p. Vertical Shaft with axial loads
B) Collar Bearing	q. Horizontal shafts with radial loads
C) Pivot Bearing	r. Horizontal shaft with axial loads

Type II : Correct OR Incorrect (Attempt **any two**) (**Each** bit **one** mark **each**) : **2**

A) Standard sheet size of A2 is having width 420 mm and length 594 mm.

B) The extension line should extend about 3 mm beyond dimension line.

C) The standard taper in the key is 1 in 30 (1 mm per 30 mm length).

Type III : Multiple correct answer type (**Each** correct bit **2** marks **each**) **4**

A) Which of the following, delivers clearance type of fit ?

p) $\varnothing\ 88\ H_7P_6$ q) $\varnothing\ 88H_7g_6$ r) $\varnothing\ 88H_7r_6$ s) $\varnothing\ 88H_7f_7$

B) Which of the following, delivers transition type of fit ?

p) $\varnothing\ 44H_8p_6$ q) $\varnothing\ 44H_7g_6$ r) $\varnothing\ 44H_7r_6$ s) $\varnothing\ 44H_8f_7$

P.T.O.

Type IV : Straight Objective Type/Classical MCQ (**Each** bit **one** mark **each**). **5**

A) In split muff coupling the number of bolts will always be

p) Odd q) Even r) Four s) Three

B) Included angle for acme thread is

p) 29° q) 55° r) 60° s) None of the above

C) The size across flat in hexagonal nut is

p) 1.5 D q) 0.9 D r) 1.5 D + 3 s) 1.2 D

D) _____ is example of the sunk key.

p) Woodruff key q) GIB Headed key

r) Flat saddle key s) Hollow saddle key

E) $\varnothing 100^{+0.10}_{-0.10}$ is example of _____ tolerance.

p) Unilateral q) Bilateral

r) Geometrical s) None of the above

_____

SLR-EP – 58

Seat No.	

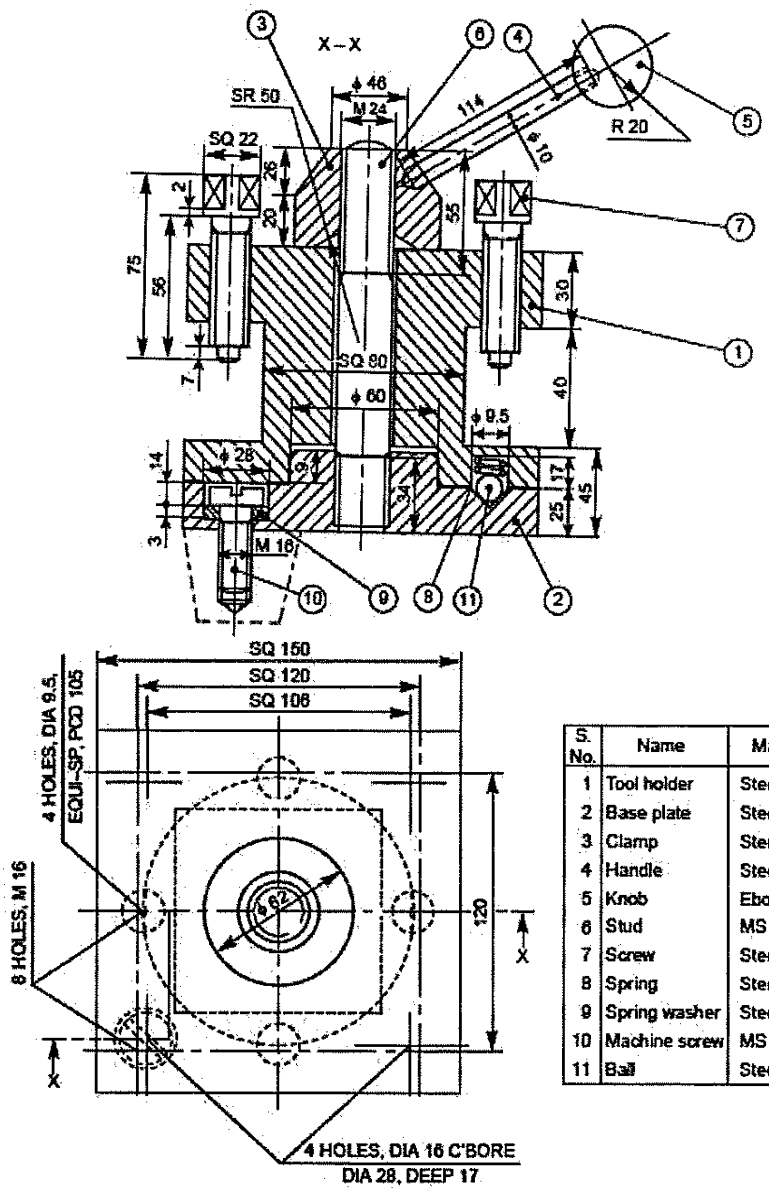
S.E. (Mechanical) (Part – I) (CGPA) Examination, 2016
MACHINE DRAWING

Day and Date : Thursday, 22-12-2016 Marks : 56

Time : 10.00 a.m. to 2.00 p.m.

Instructions : *1) Retain **all** the constructional details.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable dimensions **whenever** necessary.*
*4) Q. No. **2** is **compulsory** question.*
*5) Attempt **any three** questions out of Q. No. **3** to Q. No. **6***
*6) **Whenever** necessary, refer the tolerance table, provided with the question paper.*

2. Figure 1.0 showing the assembly drawing of 'SQUARE TOOL POST'. Draw the details of the following parts also giving dimensions. **23**
1) Tool Holder (Sectional Front View and Top View), 2) Base Plate (Sectional Front View and Top View),
3) Clamp (Sectional Front View and Top View), 4) Screw (One View), 5) Stud (One View)



S. No.	Name	Material	Qty
1	Tool holder	Steel	1
2	Base plate	Steel	1
3	Clamp	Steel	1
4	Handle	Steel	1
5	Knob	Ebonite	1
6	Stud	MS	1
7	Screw	Steel	8
8	Spring	Steel	4
9	Spring washer	Steel	4
10	Machine screw	MS	4
11	Ball	Steel	4

Figure 1 Assembly drawing of 'SQUARE TOOL POST'

3. Draw conventions **(any 3)** : **11**
   1) Worm and worm wheel. **4**
   2) Spiral spring. **3**
   3) Serrated shaft and spline shaft. **4**
   4) Roller bearing. **3**

4. Fig. shows two views of an object. Draw the given views and show the following : **11**
   a) Tolerance grade of $\varnothing$ 20 hole is H7.
   b) Bilateral tolerances for $\varnothing$ 30 is $\pm$ 15 Minutes
   c) Unilateral tolerance for length 60 mm is $\pm$ 50 microns
   d) Surface B is perpendicular to surface A within 40 microns
   e) Flatness of surface C is 20 microns.

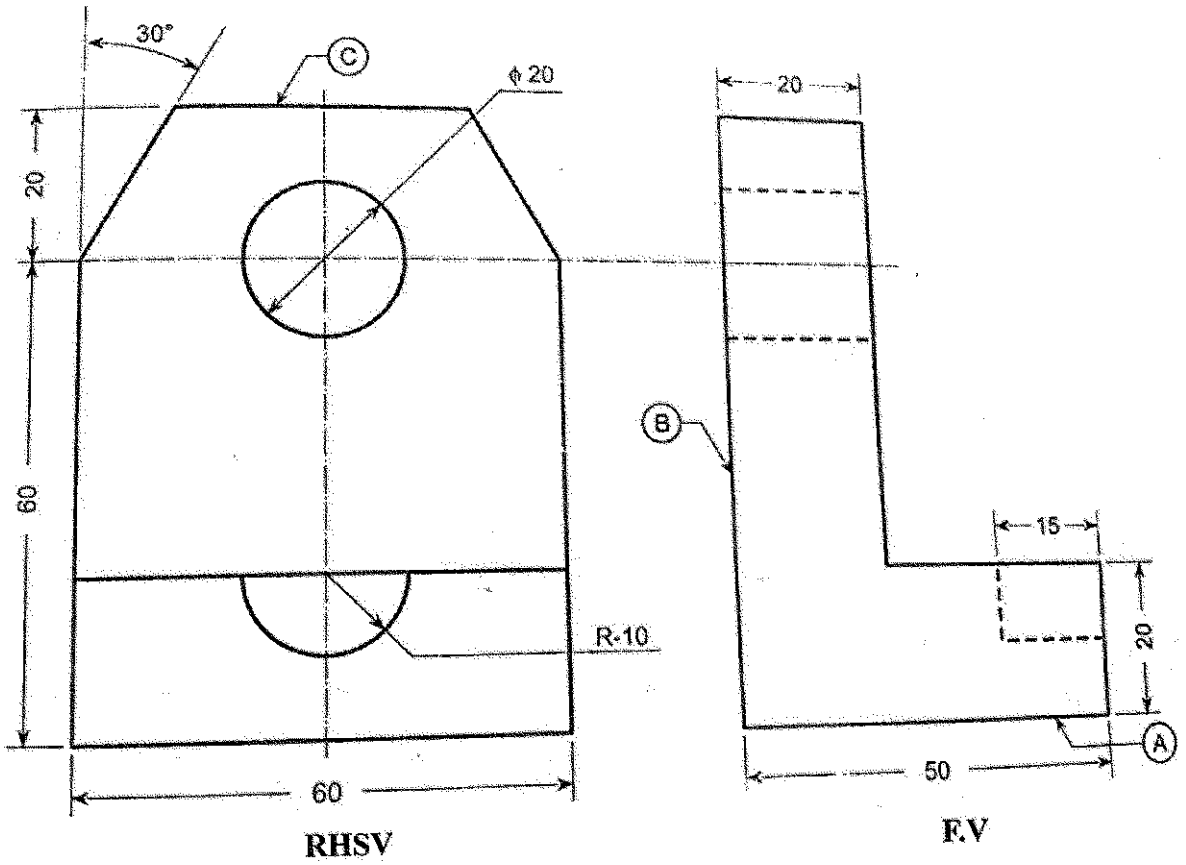


Figure 2

Set P

5. Draw free hand sketches of following two view each **(any 3)** : **11**
   1) Single Riveted butt Joint (Double Strap). **4**
   2) Fast and Loose Pulley. **3**
   3) Socket and Spigot Pipe Joint. **3**
   4) Castle Nut and Revolved Section. **4**

6. Figure 03 shows F.V, Auxiliary T.V, and incomplete S.V. of the object. Redraw the Aux. T.V, F.V views and complete the side View from direction X. First angle projection Method. **11**

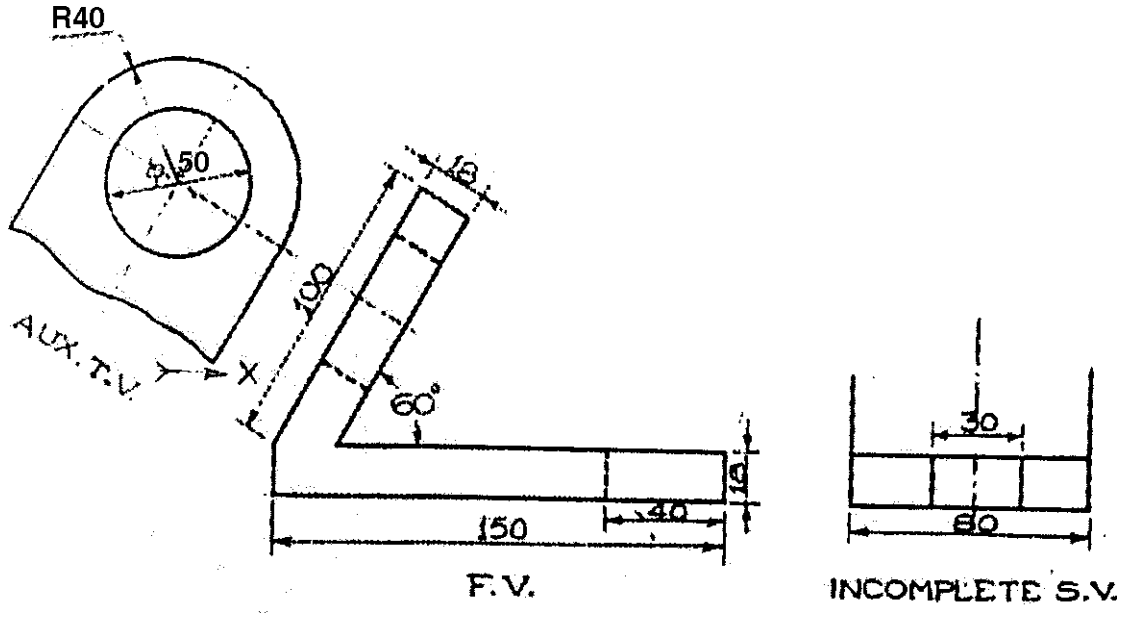


Figure 3

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	J6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 +33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	C11	N7	P7	R7	S7	r6	s6	t6	u6	u6
From 1 Upto 3	+120 + 60	− 4 −14	− 6 −16	− 10 − 20	− 1 − 24	+ 16 + 10	+ 20 + 14	–	+ 24 + 10	+ 28 + 18
Over 3 Upto 6	+145 + 70	− 4 −16	− 8 −20	− 11 − 23	− 15 − 27	+ 23 + 15	+ 27 + 19	–	+ 31 + 23	+ 35 + 23
Over 6 Upto 10	+170 + 80	− 4 −19	− 9 −24	− 13 − 28	− 17 − 32	+ 28 + 19	+ 32 + 28	–	+ 37 + 28	+ 43 + 28
Over 10 Upto 18	+205 + 95	− 5 −23	−11 −29	− 16 − 34	− 21 − 39	+ 34 + 23	+ 39 + 28	–	+ 44 + 33	+ 51 + 33
Over 18 Upto 30	+240 +110	− 7 −28	−14 −35	− 20 − 41	− 27 − 48	+ 41 + 28	+ 48 + 35	+ 54 + 41	+ 61 + 41	+ 62 + 41
Over 30 Upto 40	+280 +120	− 8	−17	− 25	− 34	+ 50	+ 59	+ 64 + 48	+ 76 + 60	+ 85 + 60
Over 40 Upto 50	+290 +130	−33	−42	− 50	− 59	+ 34	+ 43	+ 70 + 54	+ 86 + 70	+ 95 + 70
Over 50 Upto 65	+330 +140	− 9	−21	− 30 − 60	− 42 − 72	+ 60 + 41	+ 72 + 53	+ 85 + 66	+106 + 87	+117 + 87
Over 65 Upto 80	+340 +150	−39	−51	− 32 − 62	− 48 − 78	+ 62 + 43	+ 78 + 59	+ 94 + 75	+121 +102	+132 +102
Over 80 Upto 100	+390 +170	−10	−24	− 38 − 73	− 58 − 93	+ 73 + 51	+ 93 + 71	+113 + 91	+146 +124	+159 +124
Over 100 Upto 120	+400 +180	−45	−59	− 41 − 76	− 66 −101	+ 76 + 54	+101 + 79	+126 +104	+166 +144	+175 +144
Over 120 Upto 140	+450 +200	−12	−28	− 48 − 88	− 77 −117	+ 88 + 63	+117 + 92	+147 +122	+195 +170	+230 +170
Over 140 Upto 180	+480 +210	−52	−68	− 50 − 93	− 85 −133	+ 93 + 65	+133 +100	+171 +134	+235 +190	+250 +190
Over 180 Upto 250	+570 +240	−14 −60	−33 −79	− 60 −113	−105 −169	+113 + 77	+169 +122	+225 +166	+330 +236	+330 +236
Over 250 Upto 315	+650 +300	−14 −66	−36 −88	− 74 −130	−138 −202	+130 + 94	+202 +158	+272 +218	+382 +350	+402 +315
Over 315 Upto 400	+760 +360	−16 −73	−41 −98	− 87 −150	−169 −224	+150 +108	+244 +190	+330 +268	+471 +390	+492 +390
Over 400 Upto 500	+880 +440	−17 −80	−45 −108	−103 −172	−209 −292	+172 +126	+292 +232	+400 +330	+580 +490	+603 +490

(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	– 20 – 45	– 14 – 28	– 6 – 16	– 2 – 8	0 – 6
Over 3 Upto 6	+12 0	+18 0	+ 30 0	+ 45 0	+ 75 0	– 30 – 60	– 20 – 38	– 10 – 22	– 4 –12	0 – 8
Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	– 40 – 75	– 25 – 47	– 13 – 28	– 5 –14	0 – 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	– 50 – 93	– 32 – 59	– 16 – 34	– 6 –17	0 –11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	– 65 –117	– 40 – 73	– 20 – 41	– 7 –20	0 –13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	–80 –142	– 50 – 89	– 25 – 50	– 9 –25	0 –16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	–100 –174	– 60 –105	– 30 – 60	–10 –29	0 –19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	–120 –207	– 72 –126	– 36 – 71	–12 –34	0 –22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	–145 –245	–85 –148	– 43 – 83	–14 –39	0 –25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	–170 –285	–100 –172	– 50 – 96	–15 –44	0 –29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	–190 –320	–110 –191	– 56 –108	–17 –49	0 –32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	–210 –350	–125 –214	– 62 –119	–18 –54	0 –35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	–230 –385	–135 –232	– 68 –131	–20 –60	0 –40

Set P

SLR-EP – 58

Seat No.	

Set **Q**

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2016
MACHINE DRAWING

Day and Date : Thursday, 22-12-2016 Max. Marks : 70

Time : 10.00 a.m. to 2.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*

2) Only first angle method of projection should be used.

*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*

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. Objective Question (**All** type questions i.e. **I** to **IV** are **compulsory**) : **14**

Type I : Straight Objective Type/Classical MCQ (**Each** bit **one** mark **each**). **5**

A) In split muff coupling the number of bolts will always be

p) Odd q) Even r) Four s) Three

B) Included angle for acme thread is

p) 29° q) 55° r) 60° s) None of the above

C) The size across flat in hexagonal nut is

p) 1.5 D q) 0.9 D r) 1.5 D + 3 s) 1.2 D

D) _____ is example of the sunk key.

p) Woodruff key q) GIB Headed key

r) Flat saddle key s) Hollow saddle key

E) $\varnothing 100^{+0.10}_{-0.10}$ is example of _____ tolerance.

p) Unilateral q) Bilateral

r) Geometrical s) None of the above

Type II : Match the Pairs (**Each** bit **one** mark **each**) **3**

Column A	**Column B**
A) Journal Bearing	p. Vertical Shaft with axial loads
B) Collar Bearing	q. Horizontal shafts with radial loads
C) Pivot Bearing	r. Horizontal shaft with axial loads

Type III : Correct OR Incorrect (Attempt **any two**) (**Each** bit **one** mark **each**) : **2**

A) Standard sheet size of A2 is having width 420 mm and length 594 mm.

B) The extension line should extend about 3 mm beyond dimension line.

C) The standard taper in the key is 1 in 30 (1 mm per 30 mm length).

Type IV : Multiple correct answer type (**Each** correct bit **2** marks **each**) **4**

A) Which of the following, delivers clearance type of fit ?

p) $\varnothing\ 88\ H_7P_6$ q) $\varnothing\ 88H_7g_6$ r) $\varnothing\ 88H_7r_6$ s) $\varnothing\ 88H_7f_7$

B) Which of the following, delivers transition type of fit ?

p) $\varnothing\ 44H_8p_6$ q) $\varnothing\ 44H_7g_6$ r) $\varnothing\ 44H_7r_6$ s) $\varnothing\ 44H_8f_7$

SLR-EP – 58

Seat No.	

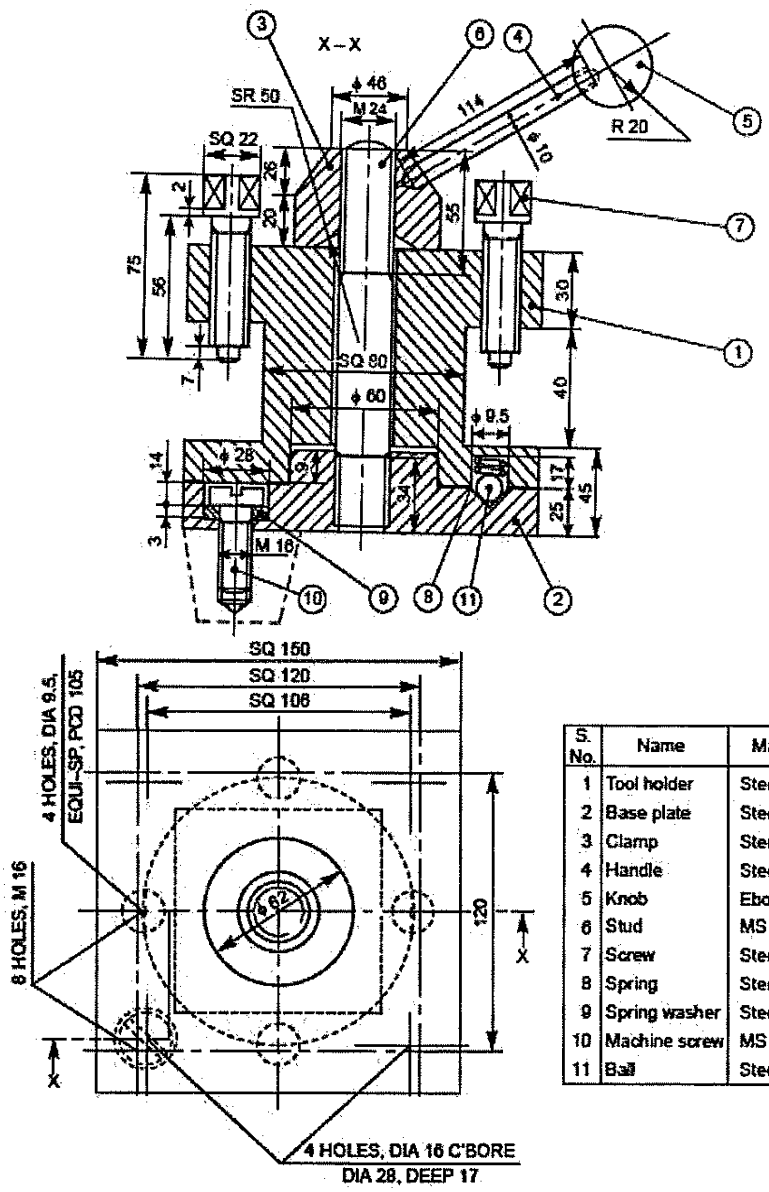
S.E. (Mechanical) (Part – I) (CGPA) Examination, 2016
MACHINE DRAWING

Day and Date : Thursday, 22-12-2016 Marks : 56

Time : 10.00 a.m. to 2.00 p.m.

Instructions : *1) Retain **all** the constructional details.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable dimensions **whenever** necessary.*
*4) Q. No. **2** is **compulsory** question.*
*5) Attempt **any three** questions out of Q. No. **3** to Q. No. **6***
*6) **Whenever** necessary, refer the tolerance table, provided with the question paper.*

2. Figure 1.0 showing the assembly drawing of 'SQUARE TOOL POST'. Draw the details of the following parts also giving dimensions. **23**
1) Tool Holder (Sectional Front View and Top View), 2) Base Plate (Sectional Front View and Top View),
3) Clamp (Sectional Front View and Top View), 4) Screw (One View), 5) Stud (One View)



S. No.	Name	Material	Qty
1	Tool holder	Steel	1
2	Base plate	Steel	1
3	Clamp	Steel	1
4	Handle	Steel	1
5	Knob	Ebonite	1
6	Stud	MS	1
7	Screw	Steel	8
8	Spring	Steel	4
9	Spring washer	Steel	4
10	Machine screw	MS	4
11	Ball	Steel	4

Figure 1 Assembly drawing of 'SQUARE TOOL POST'

Set Q

3. Draw conventions **(any 3)** : **11**
   1) Worm and worm wheel. **4**
   2) Spiral spring. **3**
   3) Serrated shaft and spline shaft. **4**
   4) Roller bearing. **3**

4. Fig. shows two views of an object. Draw the given views and show the following : **11**
   a) Tolerance grade of $\varnothing$ 20 hole is H7.
   b) Bilateral tolerances for $\varnothing$ 30 is $\pm$ 15 Minutes
   c) Unilateral tolerance for length 60 mm is $\pm$ 50 microns
   d) Surface B is perpendicular to surface A within 40 microns
   e) Flatness of surface C is 20 microns.

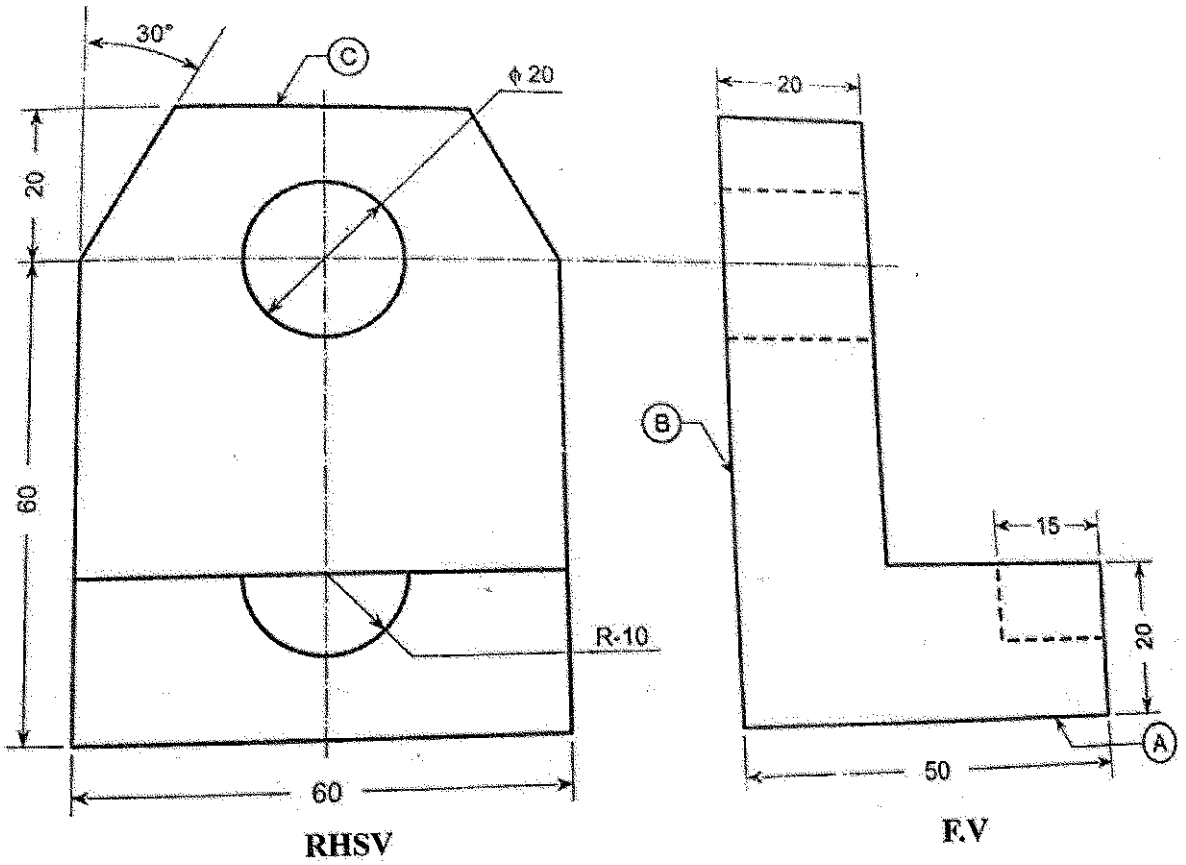


Figure 2

Set Q

5. Draw free hand sketches of following two view each **(any 3)** : **11**
   1) Single Riveted butt Joint (Double Strap). **4**
   2) Fast and Loose Pulley. **3**
   3) Socket and Spigot Pipe Joint. **3**
   4) Castle Nut and Revolved Section. **4**

6. Figure 03 shows F.V, Auxiliary T.V, and incomplete S.V. of the object. Redraw the Aux. T.V, F.V views and complete the side View from direction X. First angle projection Method. **11**

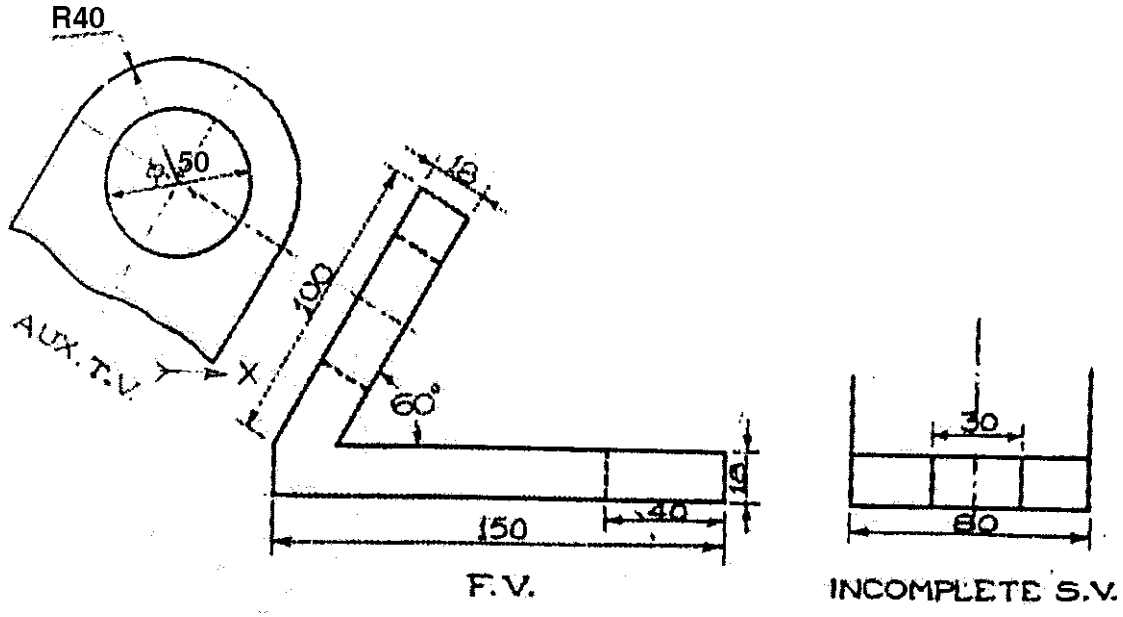


Figure 3

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	J6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 +33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	C11	N7	P7	R7	S7	r6	s6	t6	u6	u6
From 1 Upto 3	+120 + 60	− 4 −14	− 6 −16	− 10 − 20	− 14 − 24	+ 16 + 10	+ 20 + 14	–	+ 24 + 10	+ 28 + 18
Over 3 Upto 6	+145 + 70	− 4 −16	− 8 −20	− 11 − 23	− 15 − 27	+ 23 + 15	+ 27 + 19	–	+ 31 + 23	+ 35 + 23
Over 6 Upto 10	+170 + 80	− 4 −19	− 9 −24	− 13 − 28	− 17 − 32	+ 28 + 19	+ 32 + 28	–	+ 37 + 28	+ 43 + 28
Over 10 Upto 18	+205 + 95	− 5 −23	−11 −29	− 16 − 34	− 21 − 39	+ 34 + 23	+ 39 + 28	–	+ 44 + 33	+ 51 + 33
Over 18 Upto 30	+240 +110	− 7 −28	−14 −35	− 20 − 41	− 27 − 48	+ 41 + 28	+ 48 + 35	+ 54 + 41	+ 61 + 41	+ 62 + 41
Over 30 Upto 40	+280 +120	− 8	−17	− 25	− 34	+ 50	+ 59	+ 64 + 48	+ 76 + 60	+ 85 + 60
Over 40 Upto 50	+290 +130	−33	−42	− 50	− 59	+ 34	+ 43	+ 70 + 54	+ 86 + 70	+ 95 + 70
Over 50 Upto 65	+330 +140	− 9	−21	− 30 − 60	− 42 − 72	+ 60 + 41	+ 72 + 53	+ 85 + 66	+106 + 87	+117 + 87
Over 65 Upto 80	+340 +150	−39	−51	− 32 − 62	− 48 − 78	+ 62 + 43	+ 78 + 59	+ 94 + 75	+121 +102	+132 +102
Over 80 Upto 100	+390 +170	−10	−24	− 38 − 73	− 58 − 93	+ 73 + 51	+ 93 + 71	+113 + 91	+146 +124	+159 +124
Over 100 Upto 120	+400 +180	−45	−59	− 41 − 76	− 66 −101	+ 76 + 54	+101 + 79	+126 +104	+166 +144	+175 +144
Over 120 Upto 140	+450 +200	−12	−28	− 48 − 88	− 77 −117	+ 88 + 63	+117 + 92	+147 +122	+195 +170	+230 +170
Over 140 Upto 180	+480 +210	−52	−68	− 50 − 93	− 85 −133	+ 93 + 65	+133 +100	+171 +134	+235 +190	+250 +190
Over 180 Upto 250	+570 +240	−14 −60	−33 −79	− 60 −113	−105 −169	+113 + 77	+169 +122	+225 +166	+330 +236	+330 +236
Over 250 Upto 315	+650 +300	−14 −66	−36 −88	− 74 −130	−138 −202	+130 + 94	+202 +158	+272 +218	+382 +350	+402 +315
Over 315 Upto 400	+760 +360	−16 −73	−41 −98	− 87 −150	−169 −224	+150 +108	+244 +190	+330 +268	+471 +390	+492 +390
Over 400 Upto 500	+880 +440	−17 −80	−45 −108	−103 −172	−209 −292	+172 +126	+292 +232	+400 +330	+580 +490	+603 +490

(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	– 20 – 45	– 14 – 28	– 6 – 16	– 2 – 8	0 – 6
Over 3 Upto 6	+12 0	+18 0	+ 30 0	+ 45 0	+ 75 0	– 30 – 60	– 20 – 38	– 10 – 22	– 4 –12	0 – 8
Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	– 40 – 75	– 25 – 47	– 13 – 28	– 5 –14	0 – 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	– 50 – 93	– 32 – 59	– 16 – 34	– 6 –17	0 –11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	– 65 –117	– 40 – 73	– 20 – 41	– 7 –20	0 –13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	–80 –142	– 50 – 89	– 25 – 50	– 9 –25	0 –16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	–100 –174	– 60 –105	– 30 – 60	–10 –29	0 –19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	–120 –207	– 72 –126	– 36 – 71	–12 –34	0 –22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	–145 –245	–85 –148	– 43 – 83	–14 –39	0 –25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	–170 –285	–100 –172	– 50 – 96	–15 –44	0 –29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	–190 –320	–110 –191	– 56 –108	–17 –49	0 –32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	–210 –350	–125 –214	– 62 –119	–18 –54	0 –35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	–230 –385	–135 –232	– 68 –131	–20 –60	0 –40

Set Q

SLR-EP – 58

Seat No.	

Set **R**

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2016
MACHINE DRAWING

Day and Date : Thursday, 22-12-2016 Max. Marks : 70

Time : 10.00 a.m. to 2.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*

2) Only first angle method of projection should be used.

*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*

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. Objective Question (**All** type questions i.e. **I** to **IV** are **compulsory**) : **14**

Type I : Correct OR Incorrect (Attempt **any two**) (**Each** bit **one** mark **each**) : **2**

A) Standard sheet size of A2 is having width 420 mm and length 594 mm.

B) The extension line should extend about 3 mm beyond dimension line.

C) The standard taper in the key is 1 in 30 (1 mm per 30 mm length).

Type II : Multiple correct answer type (**Each** correct bit **2** marks **each**) **4**

A) Which of the following, delivers clearance type of fit ?

p) $\varnothing\ 88\ H_7P_6$ q) $\varnothing\ 88H_7g_6$ r) $\varnothing\ 88H_7r_6$ s) $\varnothing\ 88H_7f_7$

B) Which of the following, delivers transition type of fit ?

p) $\varnothing\ 44H_8p_6$ q) $\varnothing\ 44H_7g_6$ r) $\varnothing\ 44H_7r_6$ s) $\varnothing\ 44H_8f_7$

Type III : Straight Objective Type/Classical MCQ (**Each** bit **one** mark **each**). **5**

A) In split muff coupling the number of bolts will always be

p) Odd q) Even r) Four s) Three

B) Included angle for acme thread is

p) 29° q) 55° r) 60° s) None of the above

C) The size across flat in hexagonal nut is

p) 1.5 D q) 0.9 D r) 1.5 D + 3 s) 1.2 D

P.T.O.

D) _____ is example of the sunk key.

p) Woodruff key q) GIB Headed key

r) Flat saddle key s) Hollow saddle key

E) $\varnothing 100^{+0.10}_{-0.10}$ is example of _____ tolerance.

p) Unilateral q) Bilateral

r) Geometrical s) None of the above

Type IV : Match the Pairs (**Each** bit **one** mark **each**) **3**

Column A	**Column B**
A) Journal Bearing	p. Vertical Shaft with axial loads
B) Collar Bearing	q. Horizontal shafts with radial loads
C) Pivot Bearing	r. Horizontal shaft with axial loads

_____

SLR-EP – 58

Seat No.	

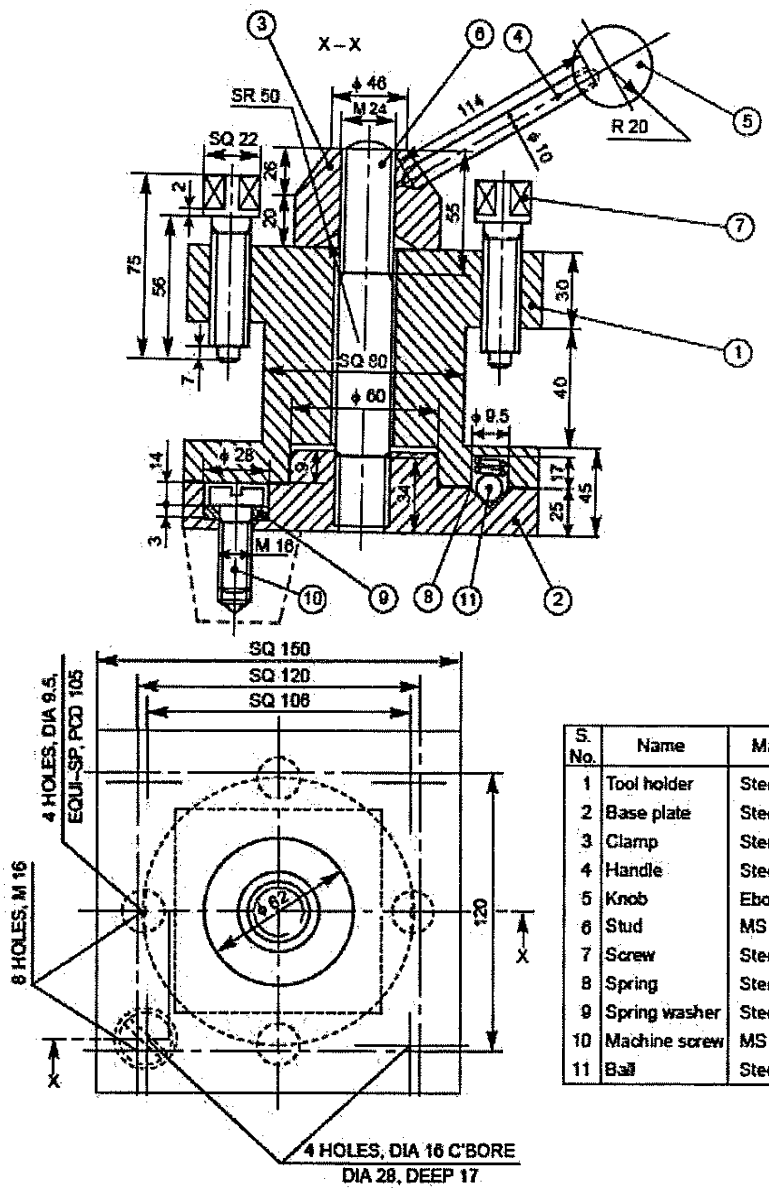
S.E. (Mechanical) (Part – I) (CGPA) Examination, 2016
MACHINE DRAWING

Day and Date : Thursday, 22-12-2016 Marks : 56

Time : 10.00 a.m. to 2.00 p.m.

Instructions : *1) Retain **all** the constructional details.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable dimensions **whenever** necessary.*
*4) Q. No. **2** is **compulsory** question.*
*5) Attempt **any three** questions out of Q. No. **3** to Q. No. **6***
*6) **Whenever** necessary, refer the tolerance table, provided with the question paper.*

2. Figure 1.0 showing the assembly drawing of 'SQUARE TOOL POST'. Draw the details of the following parts also giving dimensions. **23**
1) Tool Holder (Sectional Front View and Top View), 2) Base Plate (Sectional Front View and Top View),
3) Clamp (Sectional Front View and Top View), 4) Screw (One View), 5) Stud (One View)



S. No.	Name	Material	Qty
1	Tool holder	Steel	1
2	Base plate	Steel	1
3	Clamp	Steel	1
4	Handle	Steel	1
5	Knob	Ebonite	1
6	Stud	MS	1
7	Screw	Steel	8
8	Spring	Steel	4
9	Spring washer	Steel	4
10	Machine screw	MS	4
11	Ball	Steel	4

Figure 1 Assembly drawing of 'SQUARE TOOL POST'

3. Draw conventions **(any 3)** : **11**
   1) Worm and worm wheel. **4**
   2) Spiral spring. **3**
   3) Serrated shaft and spline shaft. **4**
   4) Roller bearing. **3**

4. Fig. shows two views of an object. Draw the given views and show the following : **11**
   a) Tolerance grade of $\varnothing$ 20 hole is H7.
   b) Bilateral tolerances for $\varnothing$ 30 is $\pm$ 15 Minutes
   c) Unilateral tolerance for length 60 mm is $\pm$ 50 microns
   d) Surface B is perpendicular to surface A within 40 microns
   e) Flatness of surface C is 20 microns.

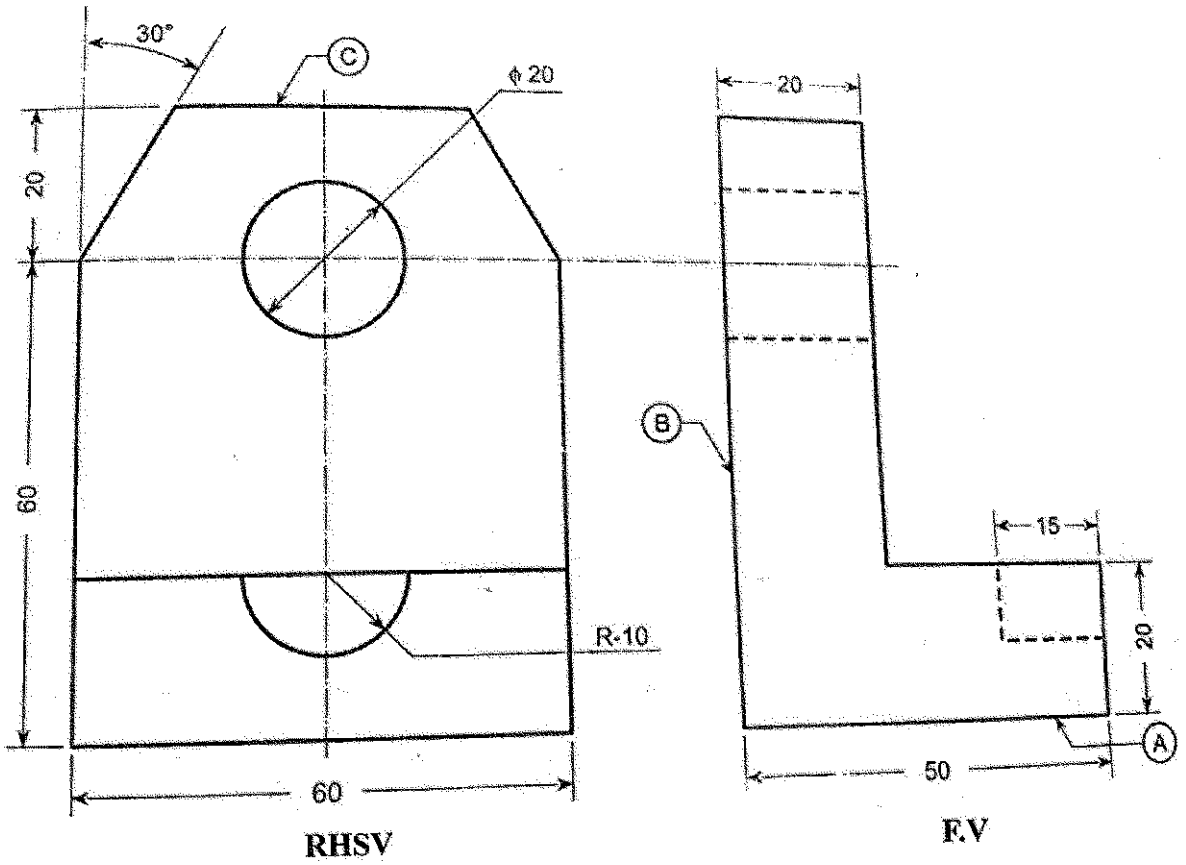


Figure 2

5. Draw free hand sketches of following two view each **(any 3)** : **11**
   1) Single Riveted butt Joint (Double Strap). **4**
   2) Fast and Loose Pulley. **3**
   3) Socket and Spigot Pipe Joint. **3**
   4) Castle Nut and Revolved Section. **4**

6. Figure 03 shows F.V, Auxiliary T.V, and incomplete S.V. of the object. Redraw the Aux. T.V, F.V views and complete the side View from direction X. First angle projection Method. **11**

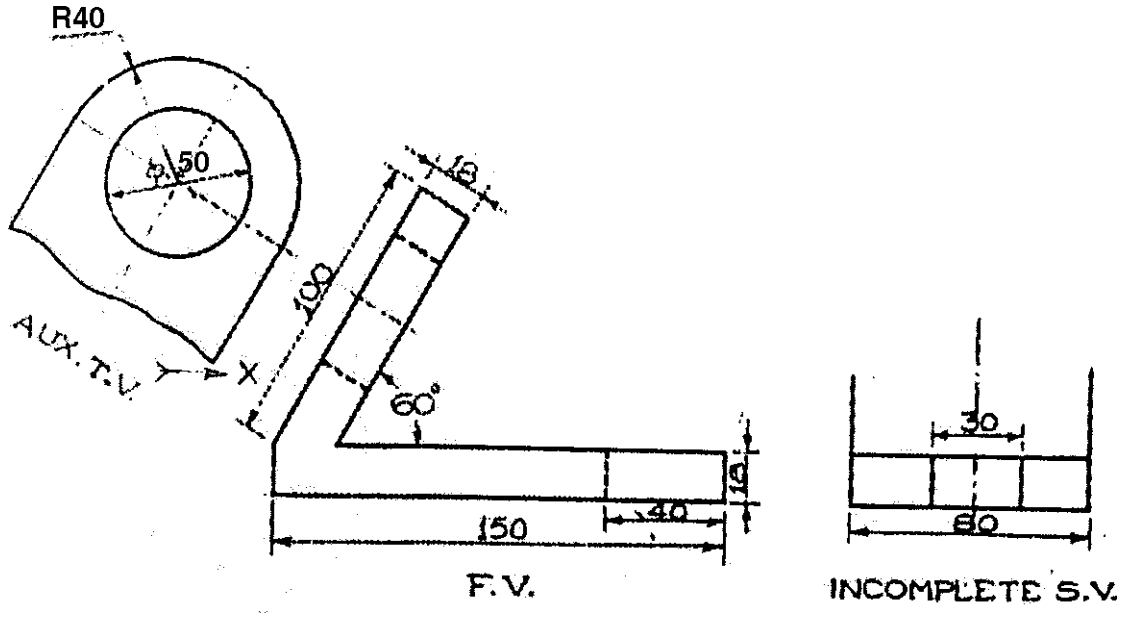


Figure 3

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	J6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 +33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	C11	N7	P7	R7	S7	r6	s6	t6	u6	u6
From 1 Upto 3	+120 + 60	− 4 −14	− 6 −16	− 10 − 20	− 1 − 24	+ 16 + 10	+ 20 + 14	–	+ 24 + 10	+ 28 + 18
Over 3 Upto 6	+145 + 70	− 4 −16	− 8 −20	− 11 − 23	− 15 − 27	+ 23 + 15	+ 27 + 19	–	+ 31 + 23	+ 35 + 23
Over 6 Upto 10	+170 + 80	− 4 −19	− 9 −24	− 13 − 28	− 17 − 32	+ 28 + 19	+ 32 + 28	–	+ 37 + 28	+ 43 + 28
Over 10 Upto 18	+205 + 95	− 5 −23	−11 −29	− 16 − 34	− 21 − 39	+ 34 + 23	+ 39 + 28	–	+ 44 + 33	+ 51 + 33
Over 18 Upto 30	+240 +110	− 7 −28	−14 −35	− 20 − 41	− 27 − 48	+ 41 + 28	+ 48 + 35	+ 54 + 41	+ 61 + 41	+ 62 + 41
Over 30 Upto 40	+280 +120	− 8	−17	− 25	− 34	+ 50	+ 59	+ 64 + 48	+ 76 + 60	+ 85 + 60
Over 40 Upto 50	+290 +130	−33	−42	− 50	− 59	+ 34	+ 43	+ 70 + 54	+ 86 + 70	+ 95 + 70
Over 50 Upto 65	+330 +140	− 9	−21	− 30 − 60	− 42 − 72	+ 60 + 41	+ 72 + 53	+ 85 + 66	+106 + 87	+117 + 87
Over 65 Upto 80	+340 +150	−39	−51	− 32 − 62	− 48 − 78	+ 62 + 43	+ 78 + 59	+ 94 + 75	+121 +102	+132 +102
Over 80 Upto 100	+390 +170	−10	−24	− 38 − 73	− 58 − 93	+ 73 + 51	+ 93 + 71	+113 + 91	+146 +124	+159 +124
Over 100 Upto 120	+400 +180	−45	−59	− 41 − 76	− 66 −101	+ 76 + 54	+101 + 79	+126 +104	+166 +144	+175 +144
Over 120 Upto 140	+450 +200	−12	−28	− 48 − 88	− 77 −117	+ 88 + 63	+117 + 92	+147 +122	+195 +170	+230 +170
Over 140 Upto 180	+480 +210	−52	−68	− 50 − 93	− 85 −133	+ 93 + 65	+133 +100	+171 +134	+235 +190	+250 +190
Over 180 Upto 250	+570 +240	−14 −60	−33 −79	− 60 −113	−105 −169	+113 + 77	+169 +122	+225 +166	+330 +236	+330 +236
Over 250 Upto 315	+650 +300	−14 −66	−36 −88	− 74 −130	−138 −202	+130 + 94	+202 +158	+272 +218	+382 +350	+402 +315
Over 315 Upto 400	+760 +360	−16 −73	−41 −98	− 87 −150	−169 −224	+150 +108	+244 +190	+330 +268	+471 +390	+492 +390
Over 400 Upto 500	+880 +440	−17 −80	−45 −108	−103 −172	−209 −292	+172 +126	+292 +232	+400 +330	+580 +490	+603 +490

(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	– 20 – 45	– 14 – 28	– 6 – 16	– 2 – 8	0 – 6
Over 3 Upto 6	+12 0	+18 0	+ 30 0	+ 45 0	+ 75 0	– 30 – 60	– 20 – 38	– 10 – 22	– 4 –12	0 – 8
Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	– 40 – 75	– 25 – 47	– 13 – 28	– 5 –14	0 – 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	– 50 – 93	– 32 – 59	– 16 – 34	– 6 –17	0 –11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	– 65 –117	– 40 – 73	– 20 – 41	– 7 –20	0 –13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	–80 –142	– 50 – 89	– 25 – 50	– 9 –25	0 –16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	–100 –174	– 60 –105	– 30 – 60	–10 –29	0 –19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	–120 –207	– 72 –126	– 36 – 71	–12 –34	0 –22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	–145 –245	–85 –148	– 43 – 83	–14 –39	0 –25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	–170 –285	–100 –172	– 50 – 96	–15 –44	0 –29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	–190 –320	–110 –191	– 56 –108	–17 –49	0 –32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	–210 –350	–125 –214	– 62 –119	–18 –54	0 –35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	–230 –385	–135 –232	– 68 –131	–20 –60	0 –40

Set R

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Seat No.	

Set **S**

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2016
MACHINE DRAWING

Day and Date : Thursday, 22-12-2016 Max. Marks : 70

Time : 10.00 a.m. to 2.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*

2) Only first angle method of projection should be used.

*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*

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. Objective Question (**All** type questions i.e. **I** to **IV** are **compulsory**) : **14**

Type I : Multiple correct answer type (**Each** correct bit **2** marks **each**) **4**

A) Which of the following, delivers clearance type of fit ?

p) $\varnothing\ 88\ H_7P_6$ q) $\varnothing\ 88H_7g_6$ r) $\varnothing\ 88H_7r_6$ s) $\varnothing\ 88H_7f_7$

B) Which of the following, delivers transition type of fit ?

p) $\varnothing\ 44H_8p_6$ q) $\varnothing\ 44H_7g_6$ r) $\varnothing\ 44H_7r_6$ s) $\varnothing\ 44H_8f_7$

Type II : Straight Objective Type/Classical MCQ (**Each** bit **one** mark **each**). **5**

A) In split muff coupling the number of bolts will always be

p) Odd q) Even r) Four s) Three

B) Included angle for acme thread is

p) 29° q) 55° r) 60° s) None of the above

C) The size across flat in hexagonal nut is

p) 1.5 D q) 0.9 D r) 1.5 D + 3 s) 1.2 D

D) _____ is example of the sunk key.

p) Woodruff key q) GIB Headed key

r) Flat saddle key s) Hollow saddle key

E) $\varnothing 100^{+0.10}_{-0.10}$ is example of _____ tolerance.

p) Unilateral q) Bilateral

r) Geometrical s) None of the above

P.T.O.

Type III : Match the Pairs (**Each** bit **one** mark **each**) **3**

Column A	**Column B**
A) Journal Bearing	p. Vertical Shaft with axial loads
B) Collar Bearing	q. Horizontal shafts with radial loads
C) Pivot Bearing	r. Horizontal shaft with axial loads

Type IV : Correct OR Incorrect (Attempt **any two**) (**Each** bit **one** mark **each**) : **2**

A) Standard sheet size of A2 is having width 420 mm and length 594 mm.

B) The extension line should extend about 3 mm beyond dimension line.

C) The standard taper in the key is 1 in 30 (1 mm per 30 mm length).

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Seat No.	

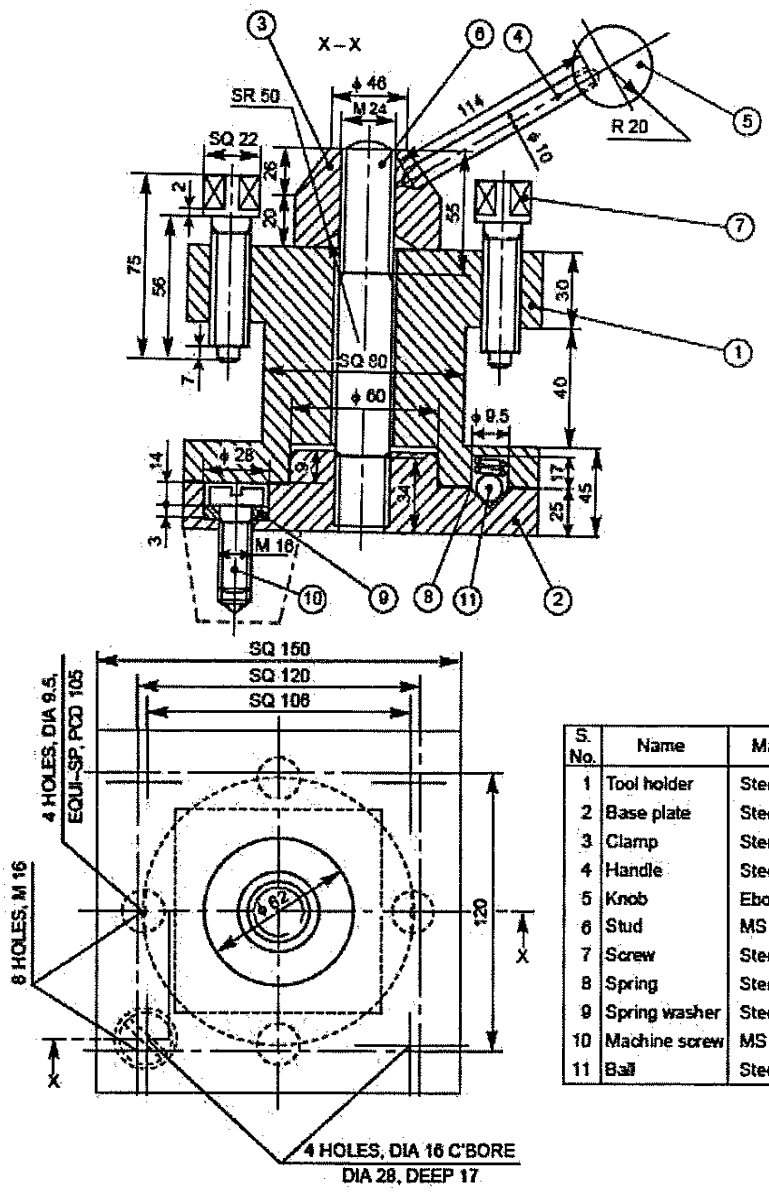
S.E. (Mechanical) (Part – I) (CGPA) Examination, 2016
MACHINE DRAWING

Day and Date : Thursday, 22-12-2016 Marks : 56

Time : 10.00 a.m. to 2.00 p.m.

Instructions : *1) Retain **all** the constructional details.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable dimensions **whenever** necessary.*
*4) Q. No. **2** is **compulsory** question.*
*5) Attempt **any three** questions out of Q. No. **3** to Q. No. **6***
*6) **Whenever** necessary, refer the tolerance table, provided with the question paper.*

2. Figure 1.0 showing the assembly drawing of 'SQUARE TOOL POST'. Draw the details of the following parts also giving dimensions. **23**
1) Tool Holder (Sectional Front View and Top View), 2) Base Plate (Sectional Front View and Top View),
3) Clamp (Sectional Front View and Top View), 4) Screw (One View), 5) Stud (One View)



S. No.	Name	Material	Qty
1	Tool holder	Steel	1
2	Base plate	Steel	1
3	Clamp	Steel	1
4	Handle	Steel	1
5	Knob	Ebonite	1
6	Stud	MS	1
7	Screw	Steel	8
8	Spring	Steel	4
9	Spring washer	Steel	4
10	Machine screw	MS	4
11	Ball	Steel	4

Figure 1 Assembly drawing of 'SQUARE TOOL POST'

3. Draw conventions **(any 3)** : **11**
   1) Worm and worm wheel. **4**
   2) Spiral spring. **3**
   3) Serrated shaft and spline shaft. **4**
   4) Roller bearing. **3**

4. Fig. shows two views of an object. Draw the given views and show the following : **11**
   a) Tolerance grade of ∅ 20 hole is H7.
   b) Bilateral tolerances for ∅ 30 is ± 15 Minutes
   c) Unilateral tolerance for length 60 mm is ± 50 microns
   d) Surface B is perpendicular to surface A within 40 microns
   e) Flatness of surface C is 20 microns.

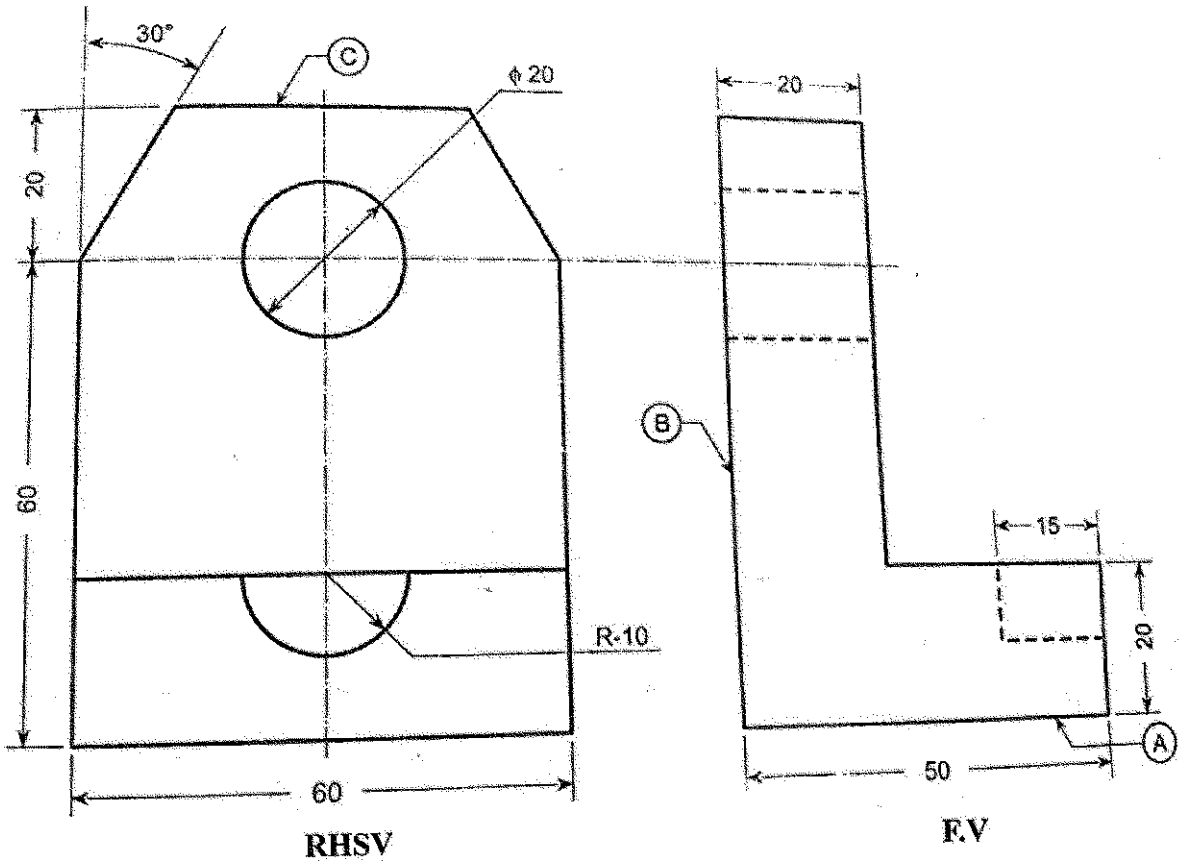


Figure 2

5. Draw free hand sketches of following two view each **(any 3)** : **11**
   1) Single Riveted butt Joint (Double Strap). **4**
   2) Fast and Loose Pulley. **3**
   3) Socket and Spigot Pipe Joint. **3**
   4) Castle Nut and Revolved Section. **4**

6. Figure 03 shows F.V, Auxiliary T.V, and incomplete S.V. of the object. Redraw the Aux. T.V, F.V views and complete the side View from direction X. First angle projection Method. **11**

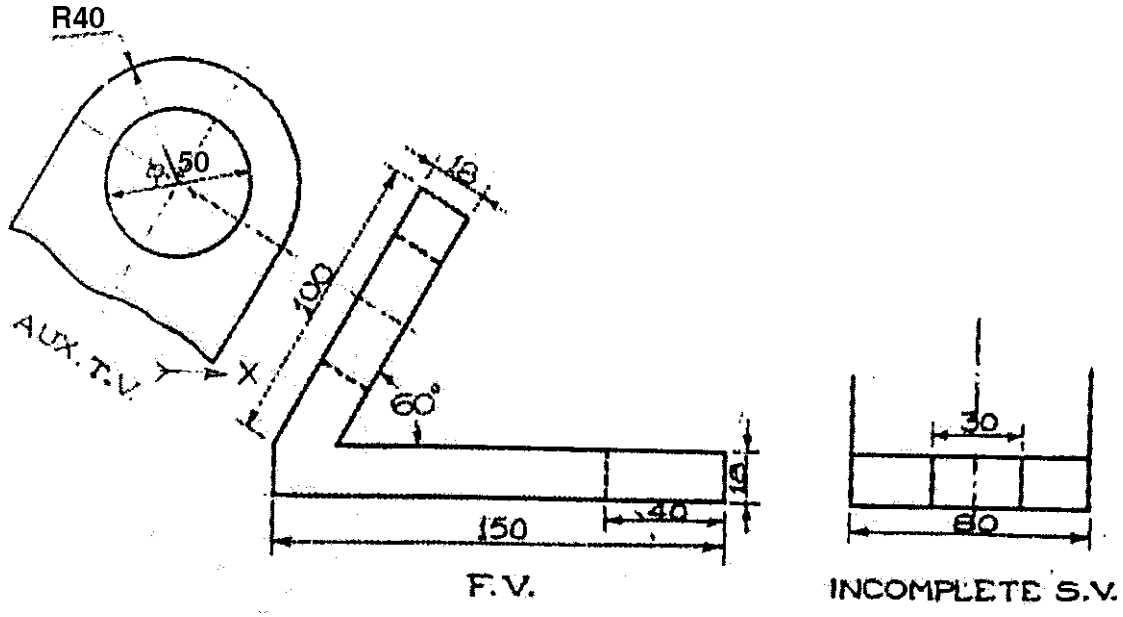


Figure 3

(Values in microns)

Nominal sizes	Tolerances of holes						Tolerances of shafts			
	D10	E9	F8	G7	JS7	K7	J6	k6	n6	p6
From 1 Upto 3	+ 60 + 20	+ 39 + 14	+ 20 + 6	+12 + 2	+ 5 − 5	0 −10	+ 3 − 3	+ 6 0	+10 + 4	+ 12 + 6
Over 3 Upto 6	+ 78 + 30	+ 50 + 20	+ 28 + 10	+16 + 4	+ 6 − 6	+ 3 − 9	+ 4 − 4	+ 9 + 1	+16 + 8	+ 20 + 12
Over 6 Upto 10	+ 98 + 40	+ 61 + 25	+ 35 + 13	+20 + 5	+ 7.5 − 7.5	+ 5 −10	+ 4.5 − 4.5	+10 + 1	+19 +10	+ 24 + 15
Over 10 Upto 18	+120 + 50	+ 75 + 32	+ 43 + 16	+24 + 6	+ 9 − 9	+ 6 −12	+ 5.5 − 5.5	+12 + 1	+23 +12	+ 29 + 18
Over 18 Upto 30	+149 + 65	+ 92 + 40	+ 53 + 20	+28 + 7	+10.5 −10.5	+6 −15	+ 6.5 − 6.5	+15 + 2	+28 +15	+ 35 + 22
Over 30 Upto 50	+180 + 80	+112 + 50	+ 64 + 25	+34 + 9	+12.5 −12.5	+ 7 −18	+ 8 − 8	+18 + 2	+33 +17	+ 42 + 26
Over 50 Upto 80	+220 +100	+134 + 60	+ 76 + 30	+40 +10	+15 −15	+ 9 −21	+ 9.5 − 9.5	+21 + 2	+39 +20	+ 51 + 32
Over 80 Upto 120	+260 +120	+159 + 72	+ 90 + 36	+47 +12	+17.5 −17.5	+10 −25	+11 −11	+25 + 3	+45 +23	+ 59 + 37
Over 120 Upto 180	+305 +145	+185 + 85	+106 + 43	+54 +14	+20 −20	+12 −28	+12.5 −12.5	+28 + 3	+52 +27	+ 68 + 43
Over 180 Upto 250	+355 +170	+215 +100	+122 + 50	+61 +15	+23 −23	+13 +33	+14.5 −14.5	+33 + 4	+60 +31	+ 79 + 50
Over 250 Upto 315	+400 +190	+240 +110	+135 + 55	+69 +17	+26 −26	+16 −36	+16 −16	+36 + 4	+66 +34	+ 88 + 56
Over 315 Upto 400	+440 +210	+265 +125	+151 + 69	+75 +18	+28.5 −28.5	+17 −40	+18 −18	+40 + 4	+73 +37	+ 98 + 62
Over 400 Upto 500	+480 +230	+290 +135	+165 + 68	+83 +20	+31.5 −31.5	+18 −45	+20 −20	+45 + 5	+80 +40	+108 + 68

(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	C11	N7	P7	R7	S7	r6	s6	t6	u6	u6
From 1 Upto 3	+120 + 60	− 4 −14	− 6 −16	− 10 − 20	− 14 − 24	+ 16 + 10	+ 20 + 14	–	+ 24 + 10	+ 28 + 18
Over 3 Upto 6	+145 + 70	− 4 −16	− 8 −20	− 11 − 23	− 15 − 27	+ 23 + 15	+ 27 + 19	–	+ 31 + 23	+ 35 + 23
Over 6 Upto 10	+170 + 80	− 4 −19	− 9 −24	− 13 − 28	− 17 − 32	+ 28 + 19	+ 32 + 28	–	+ 37 + 28	+ 43 + 28
Over 10 Upto 18	+205 + 95	− 5 −23	−11 −29	− 16 − 34	− 21 − 39	+ 34 + 23	+ 39 + 28	–	+ 44 + 33	+ 51 + 33
Over 18 Upto 30	+240 +110	− 7 −28	−14 −35	− 20 − 41	− 27 − 48	+ 41 + 28	+ 48 + 35	+ 54 + 41	+ 61 + 41	+ 62 + 41
Over 30 Upto 40	+280 +120	− 8	−17	− 25	− 34	+ 50	+ 59	+ 64 + 48	+ 76 + 60	+ 85 + 60
Over 40 Upto 50	+290 +130	−33	−42	− 50	− 59	+ 34	+ 43	+ 70 + 54	+ 86 + 70	+ 95 + 70
Over 50 Upto 65	+330 +140	− 9	−21	− 30 − 60	− 42 − 72	+ 60 + 41	+ 72 + 53	+ 85 + 66	+106 + 87	+117 + 87
Over 65 Upto 80	+340 +150	−39	−51	− 32 − 62	− 48 − 78	+ 62 + 43	+ 78 + 59	+ 94 + 75	+121 +102	+132 +102
Over 80 Upto 100	+390 +170	−10	−24	− 38 − 73	− 58 − 93	+ 73 + 51	+ 93 + 71	+113 + 91	+146 +124	+159 +124
Over 100 Upto 120	+400 +180	−45	−59	− 41 − 76	− 66 −101	+ 76 + 54	+101 + 79	+126 +104	+166 +144	+175 +144
Over 120 Upto 140	+450 +200	−12	−28	− 48 − 88	− 77 −117	+ 88 + 63	+117 + 92	+147 +122	+195 +170	+230 +170
Over 140 Upto 180	+480 +210	−52	−68	− 50 − 93	− 85 −133	+ 93 + 65	+133 +100	+171 +134	+235 +190	+250 +190
Over 180 Upto 250	+570 +240	−14 −60	−33 −79	− 60 −113	−105 −169	+113 + 77	+169 +122	+225 +166	+330 +236	+330 +236
Over 250 Upto 315	+650 +300	−14 −66	−36 −88	− 74 −130	−138 −202	+130 + 94	+202 +158	+272 +218	+382 +350	+402 +315
Over 315 Upto 400	+760 +360	−16 −73	−41 −98	− 87 −150	−169 −224	+150 +108	+244 +190	+330 +268	+471 +390	+492 +390
Over 400 Upto 500	+880 +440	−17 −80	−45 −108	−103 −172	−209 −292	+172 +126	+292 +232	+400 +330	+580 +490	+603 +490

(Values in microns)

Nominal sizes	Tolerances of holes					Tolerances of shafts				
	H7	H8	H9	H10	H11	d9	e8	f7	g6	h6
From 1 Upto 3	+10 0	+14 0	+ 25 0	+ 40 0	+ 60 0	– 20 – 45	– 14 – 28	– 6 – 16	– 2 – 8	0 – 6
Over 3 Upto 6	+12 0	+18 0	+ 30 0	+ 45 0	+ 75 0	– 30 – 60	– 20 – 38	– 10 – 22	– 4 –12	0 – 8
Over 6 Upto 10	+15 0	+22 0	+ 36 0	+ 58 0	+ 90 0	– 40 – 75	– 25 – 47	– 13 – 28	– 5 –14	0 – 9
Over 10 Upto 18	+18 0	+27 0	+ 43 0	+ 70 0	+110 0	– 50 – 93	– 32 – 59	– 16 – 34	– 6 –17	0 –11
Over 18 Upto 30	+21 0	+33 0	+ 52 0	+ 84 0	+130 0	– 65 –117	– 40 – 73	– 20 – 41	– 7 –20	0 –13
Over 30 Upto 50	+25 0	+39 0	+ 62 0	+100 0	+160 0	–80 –142	– 50 – 89	– 25 – 50	– 9 –25	0 –16
Over 50 Upto 80	+30 0	+46 0	+ 76 0	+120 0	+190 0	–100 –174	– 60 –105	– 30 – 60	–10 –29	0 –19
Over 80 Upto 120	+35 0	+54 0	+ 87 0	+140 0	+220 0	–120 –207	– 72 –126	– 36 – 71	–12 –34	0 –22
Over 120 Upto 180	+40 0	+63 0	+100 0	+160 0	+250 0	–145 –245	–85 –148	– 43 – 83	–14 –39	0 –25
Over 180 Upto 250	+45 0	+72 0	+115 0	+185 0	+290 0	–170 –285	–100 –172	– 50 – 96	–15 –44	0 –29
Over 250 Upto 315	+52 0	+81 0	+130 0	+210 0	+320 0	–190 –320	–110 –191	– 56 –108	–17 –49	0 –32
Over 315 Upto 400	+57 0	+89 0	+140 0	+230 0	+360 0	–210 –350	–125 –214	– 62 –119	–18 –54	0 –35
Over 400 Upto 500	+63 0	+97 0	+155 0	+250 0	+400 0	–230 –385	–135 –232	– 68 –131	–20 –60	0 –40

Set S

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Seat No.	

Set P

S.E. (Mech.) (Part – II) (CGPA) Examination, 2016
FLUID MECHANICS

Day and Date : Monday, 21-11-2016 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 **any two** questions from **each** Section.*
*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.***
*4) Assume **suitable** data if necessary and state 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=14)**

1) A floating body is in stable equilibrium when
   a) The metacentric height is zero
   b) Its centre of gravity is below the centre of buoyancy
   c) The metacentre is above its centre of gravity
   d) The metacentre is below its centre of gravity

2) The pressure _____ as the depth of the liquid increases.
   a) Increases b) Decreases
   c) Remains unchanged d) None of the above

3) Continuity equation deals with the law of conservation of
   a) Mass b) Momentum c) Energy d) All of these

4) In a steady flow the velocity
   a) Does not change from place to place
   b) At a given point does not change with time
   c) May change its direction but the magnitude remains unchanged
   d) None of the above

5) In which of the following measuring devices Bernoulli's equation is used ?
   a) Venturimeter b) Orifice meter
   c) Pitot tube d) All of the above

P.T.O.

6) The piezometric head is the summation of
   a) Velocity head and pressure head b) Pressure head and elevation head
   c) Velocity head and elevation head d) None of the above
7) The flow is said to be laminar when
   a) The fluid particles move in a zig-zag way
   b) The Reynolds number is high
   c) The fluid particles move in a layers parallel to the boundary
   d) None of these
8) Loss of head at exit of a pipe is given as
   a) $V^2/2g$ b) $V^3/2g$ c) $V/2g$ d) None of these
9) At what value of head lost due to friction in pipe, will the power transmitted through the pipe be maximum ?
   a) 1/2 of the total supply head b) $1/3^{rd}$ of the total supply head
   c) $1/4^{th}$ of the total supply head d) $1/8^{th}$ of the total supply head
10) Chezy's formula is given as
   a) $V = C\sqrt{m^2 i}$ b) $V = C^2\sqrt{mi^2}$ c) $V = C\sqrt{mi}$ d) $V = C\sqrt{m^2 i^3}$
11) How can the separation of boundary prevented ?
   a) Providing the bypass in the slotted wing
   b) Providing small divergence in a diffuser
   c) Suction of the slow moving fluid by a suction slot
   d) All of these
12) Momentum thickness is given by which of the following relations ?
   a) $\int_0^{\delta} \left(1-\frac{u}{U}\right) dy$ b) $\int_0^{\delta} \frac{u}{U}\left(1-\frac{u}{U}\right) dy$
   c) $\int_0^{\delta} \frac{u}{U}\left(1-\frac{u^2}{U^2}\right) dy$ d) None of the above
13) The viscous drag is primarily due to
   a) Weight component in the direction of flow
   b) Shear stresses generated due to viscous action
   c) Separation of boundary layer
   d) None of these
14) The drag and lift forces experienced by an object placed in a fluid stream are due to
   a) Pressure and gravity b) Pressure and turbulence
   c) Pressure and viscosity d) Viscosity and turbulence

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Seat No.	

S.E. (Mech.) (Part – II) (CGPA) Examination, 2016
FLUID MECHANICS

Day and Date : Monday, 21-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume ***suitable*** *data if necessary and state it* ***clearly****.*
3) Use of Non-programmable calculator is ***allowed****.*

SECTION – I

2. a) Define the equation for continuity. Obtain an expression for continuity equation for three dimensional flow in Cartesian co-ordinates. **5**

   b) A circular plate 1.5 m diameter is immersed in water, its greatest and least depth below free surface being 2 m and 0.75 m respectively. Find
   i) The total pressure on one face of the plate.
   ii) Position of centre of pressure. **5**

   c) With neat sketch explain the conditions of the equilibrium for floating bodies. **4**

3. a) If for a 2-D potential flow the velocity potential is given by $\Phi = X(2y - 1)$ determine the velocity at the point P(4, 5). Determine also the value of stream function ψ at the point 'P'. **5**

   b) What is Venturimeter ? Derive an expression for the discharge through a Venturimeter. **5**

   c) A pipe through which water is flowing, is having diameter 40 cm and 20 cm at the cross section 1 and 2 respectively. The velocity of water at a section 1 is 5.0 m/sec. Find the velocity head at section 1 and 2 and also rate of discharge. **4**

4. a) The head of water over an orifice of diameter 100 mm is 10 m. The water coming out from orifice is collected in a circular tank of diameter 1.5 m. The rise of water level in this tank is 1 in 25 sec. Also the co-ordinates of a point on the jet measured from venacontracta are 4.3 m horizontal and 0.5 m vertical. Find the co-efficients Cd, Cv and Cc. **5**

   b) Derive an expression for the velocity distribution for laminar flow in a circular pipe and show that velocity at centre of pipe is twice the average velocity. **5**

   c) What are different types of fluid flow ? Explain with an example. **4**

SECTION – II

5. a) Explain the various types of losses for fluid flow through pipe in detail. **5**

   b) Determine the difference in elevation between water surfaces in two tanks which are connected by horizontal pipe of diameter of 300 mm and length 400 m. The rate of flow of water through the pipe is 300 lit/s. Consider all the losses. Take coefficient of friction (f) = 0.008. **5**

   c) What do you mean by equivalent pipe ? Obtain an expression of Dupuits' equation. **4**

6. a) The resisting force (R) of supersonic plane during the flight can be considered as dependent upon the length of aircraft (L), velocity (V), dynamic viscosity (μ), air density (ρ) and bulk modulus of air (K). Express the functional relationship between these variables and resisting force. **5**

   b) Find the displacement thickness, the momentum thickness and energy thickness for the velocity of distribution in the boundary layer given by

   $$\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2 .$$ **5**

   c) A pipe of diameter 300 mm and length 3500 m is used for transmission of power by water. The total head at inlet of pipe is 500 m. Find maximum power available at outlet of the pipe. Take coefficient of friction (f) = 0.006. **4**

7. a) Derive an expression for drag and lift of stationary body kept in moving fluid. **5**

   b) A truck having a projected area of 6.5 square metres travelling as 70 km/hour has a total resistance of 2000 N. Of this 20 per cent is due to rolling friction and 10 per cent is due to surface friction. The rest is due to form drag. Calculate the co-efficient of form drag. Take density of air = 1.25 kg/m^3. **5**

   c) Write a short note on applications of CFD. **4**

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Set Q

S.E. (Mech.) (Part – II) (CGPA) Examination, 2016
FLUID MECHANICS

Day and Date : Monday, 21-11-2016 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 ***any two*** *questions from* ***each*** *Section.*
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.***
4) Assume ***suitable*** *data if necessary and state 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=14)**

1) Loss of head at exit of a pipe is given as
a) $V^2/2g$ b) $V^3/2g$ c) $V/2g$ d) None of these

2) At what value of head lost due to friction in pipe, will the power transmitted through the pipe be maximum ?
a) 1/2 of the total supply head b) $1/3^{rd}$ of the total supply head
c) $1/4^{th}$ of the total supply head d) $1/8^{th}$ of the total supply head

3) Chezy's formula is given as
a) $V = C\sqrt{m^2 i}$ b) $V = C^2\sqrt{mi^2}$ c) $V = C\sqrt{mi}$ d) $V = C\sqrt{m^2 i^3}$

4) How can the separation of boundary prevented ?
a) Providing the bypass in the slotted wing
b) Providing small divergence in a diffuser
c) Suction of the slow moving fluid by a suction slot
d) All of these

5) Momentum thickness is given by which of the following relations ?
a) $\int_0^{\delta}\left(1-\frac{u}{U}\right)dy$ b) $\int_0^{\delta}\frac{u}{U}\left(1-\frac{u}{U}\right)dy$
c) $\int_0^{\delta}\frac{u}{U}\left(1-\frac{u^2}{U^2}\right)dy$ d) None of the above

P.T.O.

6) The viscous drag is primarily due to
   a) Weight component in the direction of flow
   b) Shear stresses generated due to viscous action
   c) Separation of boundary layer
   d) None of these

7) The drag and lift forces experienced by an object placed in a fluid stream are due to
   a) Pressure and gravity
   b) Pressure and turbulence
   c) Pressure and viscosity
   d) Viscosity and turbulence

8) A floating body is in stable equilibrium when
   a) The metacentric height is zero
   b) Its centre of gravity is below the centre of buoyancy
   c) The metacentre is above its centre of gravity
   d) The metacentre is below its centre of gravity

9) The pressure _____ as the depth of the liquid increases.
   a) Increases
   b) Decreases
   c) Remains unchanged
   d) None of the above

10) Continuity equation deals with the law of conservation of
   a) Mass b) Momentum c) Energy d) All of these

11) In a steady flow the velocity
   a) Does not change from place to place
   b) At a given point does not change with time
   c) May change its direction but the magnitude remains unchanged
   d) None of the above

12) In which of the following measuring devices Bernoulli's equation is used ?
   a) Venturimeter
   b) Orifice meter
   c) Pitot tube
   d) All of the above

13) The piezometric head is the summation of
   a) Velocity head and pressure head
   b) Pressure head and elevation head
   c) Velocity head and elevation head
   d) None of the above

14) The flow is said to be laminar when
   a) The fluid particles move in a zig-zag way
   b) The Reynolds number is high
   c) The fluid particles move in a layers parallel to the boundary
   d) None of these

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Seat No.	

S.E. (Mech.) (Part – II) (CGPA) Examination, 2016
FLUID MECHANICS

Day and Date : Monday, 21-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume ***suitable*** *data if necessary and state it* ***clearly****.*
3) Use of Non-programmable calculator is ***allowed****.*

SECTION – I

2. a) Define the equation for continuity. Obtain an expression for continuity equation for three dimensional flow in Cartesian co-ordinates. **5**

   b) A circular plate 1.5 m diameter is immersed in water, its greatest and least depth below free surface being 2 m and 0.75 m respectively. Find
   i) The total pressure on one face of the plate.
   ii) Position of centre of pressure. **5**

   c) With neat sketch explain the conditions of the equilibrium for floating bodies. **4**

3. a) If for a 2-D potential flow the velocity potential is given by $\Phi = X(2y - 1)$ determine the velocity at the point P(4, 5). Determine also the value of stream function ψ at the point 'P'. **5**

   b) What is Venturimeter ? Derive an expression for the discharge through a Venturimeter. **5**

   c) A pipe through which water is flowing, is having diameter 40 cm and 20 cm at the cross section 1 and 2 respectively. The velocity of water at a section 1 is 5.0 m/sec. Find the velocity head at section 1 and 2 and also rate of discharge. **4**

4. a) The head of water over an orifice of diameter 100 mm is 10 m. The water coming out from orifice is collected in a circular tank of diameter 1.5 m. The rise of water level in this tank is 1 in 25 sec. Also the co-ordinates of a point on the jet measured from venacontracta are 4.3 m horizontal and 0.5 m vertical. Find the co-efficients Cd, Cv and Cc. **5**

   b) Derive an expression for the velocity distribution for laminar flow in a circular pipe and show that velocity at centre of pipe is twice the average velocity. **5**

   c) What are different types of fluid flow ? Explain with an example. **4**

SECTION – II

5. a) Explain the various types of losses for fluid flow through pipe in detail. **5**

   b) Determine the difference in elevation between water surfaces in two tanks which are connected by horizontal pipe of diameter of 300 mm and length 400 m. The rate of flow of water through the pipe is 300 lit/s. Consider all the losses. Take coefficient of friction (f) = 0.008. **5**

   c) What do you mean by equivalent pipe ? Obtain an expression of Dupuits' equation. **4**

6. a) The resisting force (R) of supersonic plane during the flight can be considered as dependent upon the length of aircraft (L), velocity (V), dynamic viscosity (μ), air density (ρ) and bulk modulus of air (K). Express the functional relationship between these variables and resisting force. **5**

   b) Find the displacement thickness, the momentum thickness and energy thickness for the velocity of distribution in the boundary layer given by

   $$\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2 .$$ **5**

   c) A pipe of diameter 300 mm and length 3500 m is used for transmission of power by water. The total head at inlet of pipe is 500 m. Find maximum power available at outlet of the pipe. Take coefficient of friction (f) = 0.006. **4**

7. a) Derive an expression for drag and lift of stationary body kept in moving fluid. **5**

   b) A truck having a projected area of 6.5 square metres travelling as 70 km/hour has a total resistance of 2000 N. Of this 20 per cent is due to rolling friction and 10 per cent is due to surface friction. The rest is due to form drag. Calculate the co-efficient of form drag. Take density of air = 1.25 kg/m^3. **5**

   c) Write a short note on applications of CFD. **4**

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SLR-EP – 59

Seat No.	

Set **R**

S.E. (Mech.) (Part – II) (CGPA) Examination, 2016
FLUID MECHANICS

Day and Date : Monday, 21-11-2016 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 **any two** questions from **each** Section.*
*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.***
*4) Assume **suitable** data if necessary and state 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=14)**

1) In which of the following measuring devices Bernoulli's equation is used ?
   a) Venturimeter b) Orifice meter
   c) Pitot tube d) All of the above
2) The piezometric head is the summation of
   a) Velocity head and pressure head b) Pressure head and elevation head
   c) Velocity head and elevation head d) None of the above
3) The flow is said to be laminar when
   a) The fluid particles move in a zig-zag way
   b) The Reynolds number is high
   c) The fluid particles move in a layers parallel to the boundary
   d) None of these
4) Loss of head at exit of a pipe is given as
   a) $V^2/2g$ b) $V^3/2g$
   c) V/2g d) None of these
5) At what value of head lost due to friction in pipe, will the power transmitted through the pipe be maximum ?
   a) 1/2 of the total supply head b) $1/3^{rd}$ of the total supply head
   c) $1/4^{th}$ of the total supply head d) $1/8^{th}$ of the total supply head

P.T.O.

6) Chezy's formula is given as

a) $V = C\sqrt{m^2 i}$ b) $V = C^2\sqrt{mi^2}$ c) $V = C\sqrt{mi}$ d) $V = C\sqrt{m^2 i^3}$

7) How can the separation of boundary prevented ?
   a) Providing the bypass in the slotted wing
   b) Providing small divergence in a diffuser
   c) Suction of the slow moving fluid by a suction slot
   d) All of these

8) Momentum thickness is given by which of the following relations ?

a) $\int_0^{\delta} \left(1 - \frac{u}{U}\right) dy$ b) $\int_0^{\delta} \frac{u}{U}\left(1 - \frac{u}{U}\right) dy$

c) $\int_0^{\delta} \frac{u}{U}\left(1 - \frac{u^2}{U^2}\right) dy$ d) None of the above

9) The viscous drag is primarily due to
   a) Weight component in the direction of flow
   b) Shear stresses generated due to viscous action
   c) Separation of boundary layer
   d) None of these

10) The drag and lift forces experienced by an object placed in a fluid stream are due to
   a) Pressure and gravity b) Pressure and turbulence
   c) Pressure and viscosity d) Viscosity and turbulence

11) A floating body is in stable equilibrium when
   a) The metacentric height is zero
   b) Its centre of gravity is below the centre of buoyancy
   c) The metacentre is above its centre of gravity
   d) The metacentre is below its centre of gravity

12) The pressure _____ as the depth of the liquid increases.
   a) Increases b) Decreases
   c) Remains unchanged d) None of the above

13) Continuity equation deals with the law of conservation of
   a) Mass b) Momentum c) Energy d) All of these

14) In a steady flow the velocity
   a) Does not change from place to place
   b) At a given point does not change with time
   c) May change its direction but the magnitude remains unchanged
   d) None of the above

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SLR-EP – 59

Seat No.	

S.E. (Mech.) (Part – II) (CGPA) Examination, 2016
FLUID MECHANICS

Day and Date : Monday, 21-11-2016 Marks : 56
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SECTION – I

2. a) Define the equation for continuity. Obtain an expression for continuity equation for three dimensional flow in Cartesian co-ordinates. **5**

   b) A circular plate 1.5 m diameter is immersed in water, its greatest and least depth below free surface being 2 m and 0.75 m respectively. Find
   i) The total pressure on one face of the plate.
   ii) Position of centre of pressure. **5**

   c) With neat sketch explain the conditions of the equilibrium for floating bodies. **4**

3. a) If for a 2-D potential flow the velocity potential is given by $\Phi = X(2y - 1)$ determine the velocity at the point P(4, 5). Determine also the value of stream function ψ at the point 'P'. **5**

   b) What is Venturimeter ? Derive an expression for the discharge through a Venturimeter. **5**

   c) A pipe through which water is flowing, is having diameter 40 cm and 20 cm at the cross section 1 and 2 respectively. The velocity of water at a section 1 is 5.0 m/sec. Find the velocity head at section 1 and 2 and also rate of discharge. **4**

4. a) The head of water over an orifice of diameter 100 mm is 10 m. The water coming out from orifice is collected in a circular tank of diameter 1.5 m. The rise of water level in this tank is 1 in 25 sec. Also the co-ordinates of a point on the jet measured from venacontracta are 4.3 m horizontal and 0.5 m vertical. Find the co-efficients Cd, Cv and Cc. **5**

   b) Derive an expression for the velocity distribution for laminar flow in a circular pipe and show that velocity at centre of pipe is twice the average velocity. **5**

   c) What are different types of fluid flow ? Explain with an example. **4**

Set R

SECTION – II

5. a) Explain the various types of losses for fluid flow through pipe in detail. **5**

   b) Determine the difference in elevation between water surfaces in two tanks which are connected by horizontal pipe of diameter of 300 mm and length 400 m. The rate of flow of water through the pipe is 300 lit/s. Consider all the losses. Take coefficient of friction (f) = 0.008. **5**

   c) What do you mean by equivalent pipe ? Obtain an expression of Dupuits' equation. **4**

6. a) The resisting force (R) of supersonic plane during the flight can be considered as dependent upon the length of aircraft (L), velocity (V), dynamic viscosity (μ), air density (ρ) and bulk modulus of air (K). Express the functional relationship between these variables and resisting force. **5**

   b) Find the displacement thickness, the momentum thickness and energy thickness for the velocity of distribution in the boundary layer given by

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   c) A pipe of diameter 300 mm and length 3500 m is used for transmission of power by water. The total head at inlet of pipe is 500 m. Find maximum power available at outlet of the pipe. Take coefficient of friction (f) = 0.006. **4**

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   b) A truck having a projected area of 6.5 square metres travelling as 70 km/hour has a total resistance of 2000 N. Of this 20 per cent is due to rolling friction and 10 per cent is due to surface friction. The rest is due to form drag. Calculate the co-efficient of form drag. Take density of air = 1.25 kg/m^3. **5**

   c) Write a short note on applications of CFD. **4**

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SLR-EP – 59

Seat No.	

Set S

S.E. (Mech.) (Part – II) (CGPA) Examination, 2016
FLUID MECHANICS

Day and Date : Monday, 21-11-2016 Max. Marks : 70
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MCQ/Objective Type Questions

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P.T.O.

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SLR-EP – 59

Seat No.	

S.E. (Mech.) (Part – II) (CGPA) Examination, 2016
FLUID MECHANICS

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SECTION – I

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SECTION – II

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   b) A truck having a projected area of 6.5 square metres travelling as 70 km/hour has a total resistance of 2000 N. Of this 20 per cent is due to rolling friction and 10 per cent is due to surface friction. The rest is due to form drag. Calculate the co-efficient of form drag. Take density of air = 1.25 kg/m^3. **5**

   c) Write a short note on applications of CFD. **4**

SLR-EP – 60

Seat No.	

Set **P**

S.E. (Mechanical Engineering) Part – II (CGPA) Examination, 2016
THEORY OF MACHINES – I

Day and Date : Tuesday, 22-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions:
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answers : **(14×1=14)**

1) In a mechanism which one is true ?
   a) All links fixed
   b) One link is fixed
   c) All links free
   d) None of above

2) Oldham's coupling is used to connect two shafts which are
   a) Intersecting
   b) Parallel
   c) Perpendicular
   d) Co-axial

3) The magnitude of linear velocity of a point B on a link AB relative to point A is
   a) $\omega . AB$
   b) $\omega (AB)^2$
   c) $\omega^2 . AB$
   d) $(\omega . AB)^2$

   where ω = angular velocity of link AB.

4) When a slider moves on a fixed link having curved surface, its instantaneous center lies
   a) At the pin joint
   b) At the center of curvature
   c) At the center of circle
   d) At infinity

5) The driving and driven shaft connected by a Hooke's joint will have equal speeds if
   a) $\cos\theta = \sin\alpha$
   b) $\sin\theta = \pm\sqrt{\tan\alpha}$
   c) $\tan\theta = \pm\sqrt{\cos\alpha}$
   d) $\cot\theta = \cot\alpha$

   where, θ = angle turned by driving shaft, α = angle between driving and driven shaft

6) A Hart mechanism consist of
   a) 4 links
   b) 6 links
   c) 8 links
   d) 10 links

7) Crank effort is the net force applied at the crankpin to the crank which gives the required turning moment on the crankshaft
   a) Parallel
   b) Perpendicular
   c) At 45°
   d) At 135°

P.T.O.

8) The reference point on the follower to lay the cam profile is known as the
   a) Cam centre
   b) Pitch point
   c) Trace point
   d) Prime point

9) The maximum distance travelled by the follower from the lowest point to the highest point during one rotation of the cam is known as
   a) Lift
   b) Dwell
   c) Descent
   d) Ascent

10) The maximum efficiency of a screw jack is given by

   a) $\eta = \frac{1 + \sin\phi}{1 - \sin\phi}$
   b) $\eta = \frac{1 - \sin\phi}{1 + \sin\phi}$
   c) $\eta = \frac{1 - \sin\phi}{1 + \cos\phi}$
   d) $\eta = \frac{1 + \sin\phi}{1 + \cos\phi}$

11) The frictional torque transmitted by a cone clutch is same as that of
   a) Flat pivot bearing
   b) Flat collar bearing
   c) Conical pivot bearing
   d) Trapezoidal pivot bearing

12) In a self-locking brake, the force required to apply the brake is
   a) Minimum
   b) Zero
   c) Maximum
   d) Equal to load applied at the end of lever

13) A hunting governor is
   a) More stable
   b) Less sensitive
   c) More sensitive
   d) None of these

14) The force resisting the outward movement of balls is known as _____ of the governor.
   a) Effort
   b) Centripetal force
   c) Controlling force
   d) Inertia force

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Seat No.	

S.E. (Mechanical Engineering) Part – II (CGPA) Examination, 2016
THEORY OF MACHINES – I

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) *Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of calculator is* ***allowed****.*
3) *Figures to the* ***right*** *indicate* ***full*** *marks.*
4) *Draw* ***neat*** *sketches* ***wherever*** *necessary.*
5) *Assume suitable data* ***if*** *necessary and state it* ***clearly****.*

SECTION – I

2. a) Define Kinematic Pair. Explain its classification. **6**

b) The crank and connecting rod of a reciprocating engine are 150 mm and 600 mm respectively. The crank makes an angle of 50° with the inner dead center and revolves at a uniform speed of 300 r.p.m. Find, by Klein's construction, 1. Velocity and acceleration of the piston, 2. Velocity and acceleration of the mid-point D of the connecting rod. **8**

3. a) In the toggle mechanism shown in Fig. III (a), the slider D is constrained to move on a horizontal path. The crank OA is rotating in the counter-clockwise direction at a speed of 180 r.p.m. increasing at the rate of 50 rad/s^2. The dimensions of the various links are as follows :

OA = 180 mm; CB = 240 mm; AB = 360 mm; and BD = 540 mm.

For the given configuration, find : 1) Velocity of slider D and angular velocity of BD, and 2) Acceleration of slider D and angular acceleration of BD. **10**

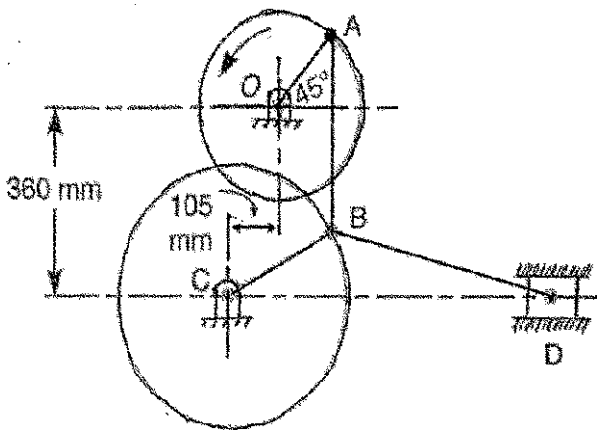


Fig. III (a)

b) Explain with neat sketch Grasshopper mechanism. **4**

4. a) Two shafts are connected by a universal joint. The driving shaft rotates at a uniform speed of 1400 r.p.m. Determine the greatest permissible angle between the shaft axes so that the total fluctuation of speed does not exceed 120 r.p.m.
Also calculate the maximum and minimum speeds of the driven shaft. **6**

b) A single cylinder vertical engine has a bore of 30 cm and a stroke of 40 cm. The connecting rod is 100 cm long. The mass of the reciprocating parts is 140 kg. On the expansion stroke with the crank at 30° from top dead center the gas pressure is 0.7 MPa. If the engine runs at 250 r.p.m., determine :
i) Net force acting on the piston
ii) Resultant load on the gudgeon pin
iii) Thrust on the cylinder walls. **8**

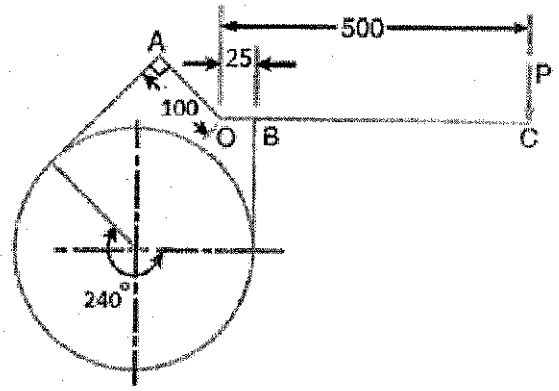
SECTION – II

5. a) Draw the profile of the cam when the roller follower moves with cycloidal motion as given below :
   a) Outstroke with maximum displacement of 44 mm during 180° of cam rotation.
   b) Return stroke for the next 150° of cam rotation.
   c) Dwell for the remaining 30° of cam rotation.

   The minimum radius of the cam is 20 mm and the diameter of the roller is 10 mm. The axis of the roller follower passes through the cam shaft axis. **8**

   b) Derive the expression for torque transmitted by conical pivot bearing considering uniform pressure and uniform wear. **6**

6. a) A differential band brake, as shown in Fig. VI(a), has an angle of contact of 240°. The band has a compressed woven lining and bears against a cast iron drum of 350 mm diameter. The brake is to sustain a torque of 350 N-m and the coefficient of friction between the band and the drum is 0.3. Find :
   1) The necessary force (P) for the clockwise and anticlockwise rotation of the drum and
   2) The value of 'OA' for the brake to be self locking, when the drum rotates clockwise. **6**



All dimensions in mm.

Fig.VI (a)

   b) A single plate clutch is required to transmit 8 KW at 1000 r.p.m. The axial pressure is limited to 70 KPa. The mean radius of the plate is 4.5 times the radial width of the friction surface. If both the sides of the plate are effective and the coefficient of friction is 0.25, find the
   i) Inner and outer radii of the plate and the mean radius. ii)Width of the friction lining. **8**

7. a) In a spring loaded Hartnell governor, the lengths of the horizontal and vertical arms of the bell crank lever are 40 mm and 80 mm respectively. The mass of each ball is 1.2 kg. The extreme radii of rotations of the balls are 70 mm and 105 mm. The distance of fulcrum of each bell crank lever is 75 mm from the governor axis. The minimum equilibrium speed is 420 rpm and the maximum equilibrium speed is 4% higher than this. Neglecting obliquity of the arms, determine the
   i) Spring stiffness
   ii) Initial compression
   iii) Equilibrium speed corresponding to radius of rotation of 95 mm. **8**

   b) Define the following terms related to cam
   i) Base circle ii) Pitch point
   iii) Pitch curve iv) Prime circle
   v) Pressure angle vi) Lift. **6**

Set P

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Seat No.	

Set Q

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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 answers : **(14×1=14)**

1) The reference point on the follower to lay the cam profile is known as the
   a) Cam centre b) Pitch point
   c) Trace point d) Prime point

2) The maximum distance travelled by the follower from the lowest point to the highest point during one rotation of the cam is known as
   a) Lift b) Dwell
   c) Descent d) Ascent

3) The maximum efficiency of a screw jack is given by
   a) $\eta = \frac{1+\sin\phi}{1-\sin\phi}$ b) $\eta = \frac{1-\sin\phi}{1+\sin\phi}$
   c) $\eta = \frac{1-\sin\phi}{1+\cos\phi}$ d) $\eta = \frac{1+\sin\phi}{1+\cos\phi}$

4) The frictional torque transmitted by a cone clutch is same as that of
   a) Flat pivot bearing b) Flat collar bearing
   c) Conical pivot bearing d) Trapezoidal pivot bearing

5) In a self-locking brake, the force required to apply the brake is
   a) Minimum
   b) Zero
   c) Maximum
   d) Equal to load applied at the end of lever

6) A hunting governor is
   a) More stable b) Less sensitive
   c) More sensitive d) None of these

7) The force resisting the outward movement of balls is known as _____ of the governor.
   a) Effort b) Centripetal force
   c) Controlling force d) Inertia force

P.T.O.

8) In a mechanism which one is true ?
   a) All links fixed
   b) One link is fixed
   c) All links free
   d) None of above

9) Oldham's coupling is used to connect two shafts which are
   a) Intersecting
   b) Parallel
   c) Perpendicular
   d) Co-axial

10) The magnitude of linear velocity of a point B on a link AB relative to point A is
   a) $\omega . AB$
   b) $\omega \left(AB \right)^2$
   c) $\omega^2 . AB$
   d) $\left(\omega . AB \right)^2$

   where ω = angular velocity of link AB.

11) When a slider moves on a fixed link having curved surface, its instantaneous center lies
   a) At the pin joint
   b) At the center of curvature
   c) At the center of circle
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12) The driving and driven shaft connected by a Hooke's joint will have equal speeds if
   a) $\cos\theta = \sin\alpha$
   b) $\sin\theta = \pm\sqrt{\tan\alpha}$
   c) $\tan\theta = \pm\sqrt{\cos\alpha}$
   d) $\cot\theta = \cot\alpha$

   where, θ = angle turned by driving shaft, α = angle between driving and driven shaft

13) A Hart mechanism consist of
   a) 4 links
   b) 6 links
   c) 8 links
   d) 10 links

14) Crank effort is the net force applied at the crankpin to the crank which gives the required turning moment on the crankshaft
   a) Parallel
   b) Perpendicular
   c) At 45°
   d) At 135°

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SLR-EP – 60

Seat No.	

S.E. (Mechanical Engineering) Part – II (CGPA) Examination, 2016
THEORY OF MACHINES – I

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) *Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of calculator is* ***allowed****.*
3) *Figures to the* ***right*** *indicate* ***full*** *marks.*
4) *Draw* ***neat*** *sketches* ***wherever*** *necessary.*
5) *Assume suitable data* ***if*** *necessary and state it* ***clearly****.*

SECTION – I

2. a) Define Kinematic Pair. Explain its classification. **6**

b) The crank and connecting rod of a reciprocating engine are 150 mm and 600 mm respectively. The crank makes an angle of 50° with the inner dead center and revolves at a uniform speed of 300 r.p.m. Find, by Klein's construction, 1. Velocity and acceleration of the piston, 2. Velocity and acceleration of the mid-point D of the connecting rod. **8**

3. a) In the toggle mechanism shown in Fig. III (a), the slider D is constrained to move on a horizontal path. The crank OA is rotating in the counter-clockwise direction at a speed of 180 r.p.m. increasing at the rate of 50 rad/s^2. The dimensions of the various links are as follows :

OA = 180 mm; CB = 240 mm; AB = 360 mm; and BD = 540 mm.

For the given configuration, find : 1) Velocity of slider D and angular velocity of BD, and 2) Acceleration of slider D and angular acceleration of BD. **10**

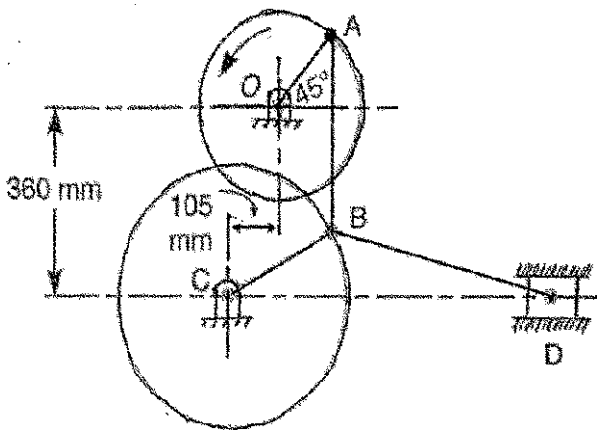


Fig. III (a)

b) Explain with neat sketch Grasshopper mechanism. **4**

4. a) Two shafts are connected by a universal joint. The driving shaft rotates at a uniform speed of 1400 r.p.m. Determine the greatest permissible angle between the shaft axes so that the total fluctuation of speed does not exceed 120 r.p.m.
Also calculate the maximum and minimum speeds of the driven shaft. **6**

b) A single cylinder vertical engine has a bore of 30 cm and a stroke of 40 cm. The connecting rod is 100 cm long. The mass of the reciprocating parts is 140 kg. On the expansion stroke with the crank at 30° from top dead center the gas pressure is 0.7 MPa. If the engine runs at 250 r.p.m., determine :
i) Net force acting on the piston
ii) Resultant load on the gudgeon pin
iii) Thrust on the cylinder walls. **8**

Set Q

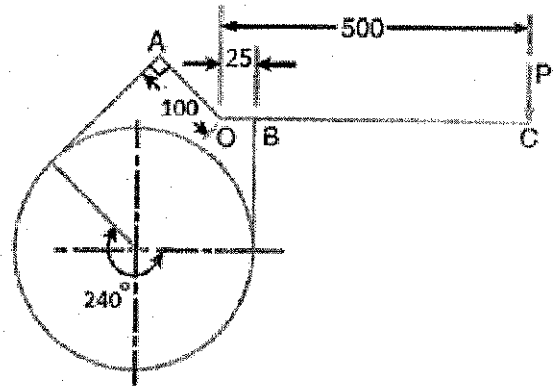
SECTION – II

5. a) Draw the profile of the cam when the roller follower moves with cycloidal motion as given below :
   a) Outstroke with maximum displacement of 44 mm during 180° of cam rotation.
   b) Return stroke for the next 150° of cam rotation.
   c) Dwell for the remaining 30° of cam rotation.

   The minimum radius of the cam is 20 mm and the diameter of the roller is 10 mm. The axis of the roller follower passes through the cam shaft axis. **8**

   b) Derive the expression for torque transmitted by conical pivot bearing considering uniform pressure and uniform wear. **6**

6. a) A differential band brake, as shown in Fig. VI(a), has an angle of contact of 240°. The band has a compressed woven lining and bears against a cast iron drum of 350 mm diameter. The brake is to sustain a torque of 350 N-m and the coefficient of friction between the band and the drum is 0.3. Find :
   1) The necessary force (P) for the clockwise and anticlockwise rotation of the drum and
   2) The value of 'OA' for the brake to be self locking, when the drum rotates clockwise. **6**



All dimensions in mm.

Fig.VI (a)

   b) A single plate clutch is required to transmit 8 KW at 1000 r.p.m. The axial pressure is limited to 70 KPa. The mean radius of the plate is 4.5 times the radial width of the friction surface. If both the sides of the plate are effective and the coefficient of friction is 0.25, find the
   i) Inner and outer radii of the plate and the mean radius. ii)Width of the friction lining. **8**

7. a) In a spring loaded Hartnell governor, the lengths of the horizontal and vertical arms of the bell crank lever are 40 mm and 80 mm respectively. The mass of each ball is 1.2 kg. The extreme radii of rotations of the balls are 70 mm and 105 mm. The distance of fulcrum of each bell crank lever is 75 mm from the governor axis. The minimum equilibrium speed is 420 rpm and the maximum equilibrium speed is 4% higher than this. Neglecting obliquity of the arms, determine the
   i) Spring stiffness
   ii) Initial compression
   iii) Equilibrium speed corresponding to radius of rotation of 95 mm. **8**

   b) Define the following terms related to cam
   i) Base circle ii) Pitch point
   iii) Pitch curve iv) Prime circle
   v) Pressure angle vi) Lift. **6**

Set Q

SLR-EP – 60

Seat No.	

Set **R**

S.E. (Mechanical Engineering) Part – II (CGPA) Examination, 2016
THEORY OF MACHINES – I

Day and Date : Tuesday, 22-11-2016 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.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answers : **(14×1=14)**

1) The driving and driven shaft connected by a Hooke's joint will have equal speeds if

a) $\cos\theta = \sin\alpha$ b) $\sin\theta = \pm\sqrt{\tan\alpha}$

c) $\tan\theta = \pm\sqrt{\cos\alpha}$ d) $\cot\theta = \cot\alpha$

where, θ = angle turned by driving shaft, α = angle between driving and driven shaft

2) A Hart mechanism consist of

a) 4 links b) 6 links

c) 8 links d) 10 links

3) Crank effort is the net force applied at the crankpin to the crank which gives the required turning moment on the crankshaft

a) Parallel b) Perpendicular

c) At 45° d) At 135°

4) The reference point on the follower to lay the cam profile is known as the

a) Cam centre b) Pitch point

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P.T.O.

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   a) Flat pivot bearing
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   where ω = angular velocity of link AB.

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   b) At the center of curvature
   c) At the center of circle
   d) At infinity

_____

SLR-EP – 60

Seat No.	

S.E. (Mechanical Engineering) Part – II (CGPA) Examination, 2016
THEORY OF MACHINES – I

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) *Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of calculator is* ***allowed****.*
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SECTION – I

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b) The crank and connecting rod of a reciprocating engine are 150 mm and 600 mm respectively. The crank makes an angle of 50° with the inner dead center and revolves at a uniform speed of 300 r.p.m. Find, by Klein's construction, 1. Velocity and acceleration of the piston, 2. Velocity and acceleration of the mid-point D of the connecting rod. **8**

3. a) In the toggle mechanism shown in Fig. III (a), the slider D is constrained to move on a horizontal path. The crank OA is rotating in the counter-clockwise direction at a speed of 180 r.p.m. increasing at the rate of 50 rad/s^2. The dimensions of the various links are as follows :

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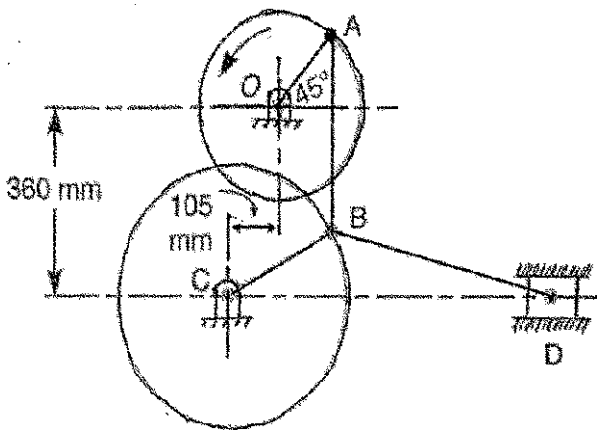

Fig. III (a)

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b) A single cylinder vertical engine has a bore of 30 cm and a stroke of 40 cm. The connecting rod is 100 cm long. The mass of the reciprocating parts is 140 kg. On the expansion stroke with the crank at 30° from top dead center the gas pressure is 0.7 MPa. If the engine runs at 250 r.p.m., determine :
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Set R

SECTION – II

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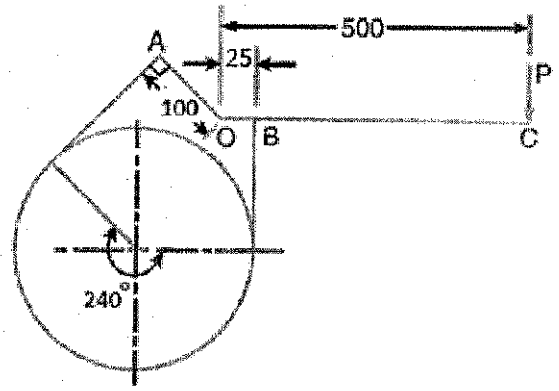

All dimensions in mm.

Fig.VI (a)

   b) A single plate clutch is required to transmit 8 KW at 1000 r.p.m. The axial pressure is limited to 70 KPa. The mean radius of the plate is 4.5 times the radial width of the friction surface. If both the sides of the plate are effective and the coefficient of friction is 0.25, find the
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7. a) In a spring loaded Hartnell governor, the lengths of the horizontal and vertical arms of the bell crank lever are 40 mm and 80 mm respectively. The mass of each ball is 1.2 kg. The extreme radii of rotations of the balls are 70 mm and 105 mm. The distance of fulcrum of each bell crank lever is 75 mm from the governor axis. The minimum equilibrium speed is 420 rpm and the maximum equilibrium speed is 4% higher than this. Neglecting obliquity of the arms, determine the
   i) Spring stiffness
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   b) Define the following terms related to cam
   i) Base circle ii) Pitch point
   iii) Pitch curve iv) Prime circle
   v) Pressure angle vi) Lift. **6**

Set R

SLR-EP – 60

Seat No.	

Set **S**

S.E. (Mechanical Engineering) Part – II (CGPA) Examination, 2016
THEORY OF MACHINES – I

Day and Date : Tuesday, 22-11-2016 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.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answers : **(14×1=14)**

1) The maximum efficiency of a screw jack is given by

a) $\eta = \dfrac{1+\sin\phi}{1-\sin\phi}$ b) $\eta = \dfrac{1-\sin\phi}{1+\sin\phi}$

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2) The frictional torque transmitted by a cone clutch is same as that of
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3) In a self-locking brake, the force required to apply the brake is
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P.T.O.

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———————

SLR-EP – 60

Seat No.	

S.E. (Mechanical Engineering) Part – II (CGPA) Examination, 2016
THEORY OF MACHINES – I

Day and Date : Tuesday, 22-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) *Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of calculator is* ***allowed****.*
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SECTION – I

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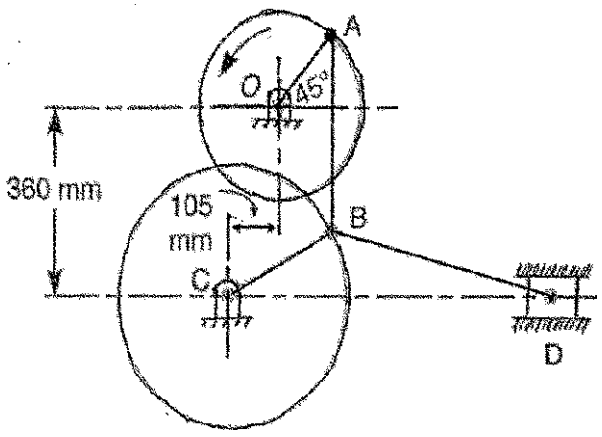

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iii) Thrust on the cylinder walls. **8**

Set S

SECTION – II

5. a) Draw the profile of the cam when the roller follower moves with cycloidal motion as given below :
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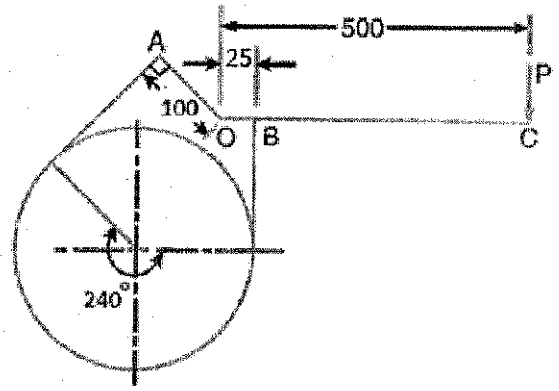

All dimensions in mm.

Fig.VI (a)

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   i) Spring stiffness
   ii) Initial compression
   iii) Equilibrium speed corresponding to radius of rotation of 95 mm. **8**

   b) Define the following terms related to cam
   i) Base circle ii) Pitch point
   iii) Pitch curve iv) Prime circle
   v) Pressure angle vi) Lift. **6**

Set S

SLR-EP – 61

Seat No.	

Set P

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2016
MANUFACTURING PROCESSES

Day and Date : Wednesday, 23-11-2016 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**.*
*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. A) Choose the correct answer (**1** mark **each**) : **(1×8=8)**

1) Sand which forms the surface of mould is
   a) Backing sand b) Facing sand
   c) Green sand d) All of the above

2) Feeder (riser) should solidify
   a) After solidification of casting
   b) Along with casting
   c) Before casting
   d) Any time during solidification of casting

3) The choke area is generally provided at
   a) Gate b) Pouring cup
   c) Feeder d) Sprue base

4) Plastic chair is manufactured by
   a) Blow moulding b) Injection moulding
   c) Compression moulding d) Extrusion moulding

5) Spanner is manufactured by
   a) Rolling b) Open die forging
   c) Direct extrusion d) Closed die forging

P.T.O.

6) Which of the following joining process is used in case of Plumbing joint ?
   a) Arc welding b) Soldering
   c) Gas welding d) TIG welding

7) Which of the following is cold extrusion process ?
   a) Direct b) Impact
   c) Indirect d) None of the above

8) Which of the welding process involves fusion of electrode ?
   a) Resistance welding b) GMAW
   c) TIG d) None of the above

B) Choose the correct answer (**2** marks **each**) : **(2×3=6)**

1) Directional solidification can be achieved by
   a) Using additional risers b) Use of core print
   c) Using chaplet d) Use of exothermic compound

2) Following joining processes does not involve fusion of base metal
   a) Resistance welding b) Brazing
   c) Soldering d) TIG welding

3) i) Skeleton pattern is used in centrifugal casting.
   ii) True centrifugal casting does not use core
   a) Statement (i) is correct, (ii) is incorrect
   b) Statement (ii) is correct, (i) is incorrect
   c) Both statements (i) and (ii) are correct
   d) Both statements (i) and (ii) are incorrect

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SLR-EP – 61

Seat No.	

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2016
MANUFACTURING PROCESSES

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) ***Neat*** *sketches must be drawn* ***wherever*** *necessary.*
3) Assume additional suitable data ***wherever*** *necessary and mention it* ***clearly****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) Enlist various types of patterns and explain application of match plated cope and drag pattern. **5**
   b) Explain steps in casting process with flow chart. **4**
   c) Explain oil sand process of core making. What are its advantages and limitations ? **5**

3. a) Explain the advantages of green sand molding process and draw neat sketch of section of green sand mold ready for pouring. **6**
   b) Explain the advantages and limitations of centrifugal casting process. **4**
   c) Explain the process of cold chamber pressure die casting with neat sketch. **4**

4. a) Explain the process of compression molding of plastics with neat sketch. What are its advantages ? **6**
   b) Enlist the charge materials added to cupolas. What is flux ? **4**
   c) Explain the areas of application of computers in foundry. **4**

SECTION – II

5. a) Enlist any four components/products produced by rolling and forging respectively. **4**

   b) Explain the process of cold rolling of sheet with flow chart. **5**

   c) Explain basic hand forging operations and their applications. **5**

6. a) Explain the process of impact extrusion with its advantages, limitations and applications. **5**

   b) Explain the process of multi pass wire drawing with neat sketch. **5**

   c) Compare between tube extrusion and tube drawing. **4**

7. a) Explain the process of MMAW welding pointing out its advantages, limitations and applications. **5**

   b) Explain the process of resistance welding. What are its types ? Explain its application. **5**

   c) Compare between gas welding and arc welding. **4**

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SLR-EP – 61

Seat No.	

Set Q

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2016
MANUFACTURING PROCESSES

Day and Date : Wednesday, 23-11-2016 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**.*
*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. A) Choose the correct answer (**2** marks **each**) : **(2×3=6)**

1) Directional solidification can be achieved by
a) Using additional risers b) Use of core print
c) Using chaplet d) Use of exothermic compound

2) Following joining processes does not involve fusion of base metal
a) Resistance welding b) Brazing
c) Soldering d) TIG welding

3) i) Skeleton pattern is used in centrifugal casting.
ii) True centrifugal casting does not use core
a) Statement (i) is correct, (ii) is incorrect
b) Statement (ii) is correct, (i) is incorrect
c) Both statements (i) and (ii) are correct
d) Both statements (i) and (ii) are incorrect

B) Choose the correct answer (**1** mark **each**) : **(1×8=8)**

1) Which of the welding process involves fusion of electrode ?
a) Resistance welding b) GMAW
c) TIG d) None of the above

P.T.O.

2) Which of the following is cold extrusion process ?
   a) Direct b) Impact
   c) Indirect d) None of the above

3) Which of the following joining process is used in case of Plumbing joint ?
   a) Arc welding b) Soldering
   c) Gas welding d) TIG welding

4) Spanner is manufactured by
   a) Rolling b) Open die forging
   c) Direct extrusion d) Closed die forging

5) Plastic chair is manufactured by
   a) Blow moulding b) Injection moulding
   c) Compression moulding d) Extrusion moulding

6) The choke area is generally provided at
   a) Gate b) Pouring cup
   c) Feeder d) Sprue base

7) Feeder (riser) should solidify
   a) After solidification of casting
   b) Along with casting
   c) Before casting
   d) Any time during solidification of casting

8) Sand which forms the surface of mould is
   a) Backing sand b) Facing sand
   c) Green sand d) All of the above

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SLR-EP – 61

Seat No.	

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2016
MANUFACTURING PROCESSES

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) **Neat** sketches must be drawn **wherever** necessary.*
*3) Assume additional suitable data **wherever** necessary and mention it **clearly**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Enlist various types of patterns and explain application of match plated cope and drag pattern. **5**
   b) Explain steps in casting process with flow chart. **4**
   c) Explain oil sand process of core making. What are its advantages and limitations ? **5**

3. a) Explain the advantages of green sand molding process and draw neat sketch of section of green sand mold ready for pouring. **6**
   b) Explain the advantages and limitations of centrifugal casting process. **4**
   c) Explain the process of cold chamber pressure die casting with neat sketch. **4**

4. a) Explain the process of compression molding of plastics with neat sketch. What are its advantages ? **6**
   b) Enlist the charge materials added to cupolas. What is flux ? **4**
   c) Explain the areas of application of computers in foundry. **4**

SECTION – II

5. a) Enlist any four components/products produced by rolling and forging respectively. **4**

   b) Explain the process of cold rolling of sheet with flow chart. **5**

   c) Explain basic hand forging operations and their applications. **5**

6. a) Explain the process of impact extrusion with its advantages, limitations and applications. **5**

   b) Explain the process of multi pass wire drawing with neat sketch. **5**

   c) Compare between tube extrusion and tube drawing. **4**

7. a) Explain the process of MMAW welding pointing out its advantages, limitations and applications. **5**

   b) Explain the process of resistance welding. What are its types ? Explain its application. **5**

   c) Compare between gas welding and arc welding. **4**

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SLR-EP – 61

Seat No.	

Set R

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2016
MANUFACTURING PROCESSES

Day and Date : Wednesday, 23-11-2016 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**.*
*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. A) Choose the correct answer (**1** mark **each**) : **(1×8=8)**

1) Plastic chair is manufactured by
a) Blow moulding b) Injection moulding
c) Compression moulding d) Extrusion moulding

2) The choke area is generally provided at
a) Gate b) Pouring cup
c) Feeder d) Sprue base

3) Feeder (riser) should solidify
a) After solidification of casting
b) Along with casting
c) Before casting
d) Any time during solidification of casting

4) Sand which forms the surface of mould is
a) Backing sand b) Facing sand
c) Green sand d) All of the above

5) Which of the welding process involves fusion of electrode ?
a) Resistance welding b) GMAW
c) TIG d) None of the above

6) Which of the following is cold extrusion process ?
   a) Direct b) Impact
   c) Indirect d) None of the above

7) Which of the following joining process is used in case of Plumbing joint ?
   a) Arc welding b) Soldering
   c) Gas welding d) TIG welding

8) Spanner is manufactured by
   a) Rolling b) Open die forging
   c) Direct extrusion d) Closed die forging

B) Choose the correct answer (**2** marks **each**) : **(2×3=6)**

1) i) Skeleton pattern is used in centrifugal casting.
   ii) True centrifugal casting does not use core
   a) Statement (i) is correct, (ii) is incorrect
   b) Statement (ii) is correct, (i) is incorrect
   c) Both statements (i) and (ii) are correct
   d) Both statements (i) and (ii) are incorrect

2) Following joining processes does not involve fusion of base metal
   a) Resistance welding b) Brazing
   c) Soldering d) TIG welding

3) Directional solidification can be achieved by
   a) Using additional risers b) Use of core print
   c) Using chaplet d) Use of exothermic compound

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SLR-EP – 61

Seat No.	

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2016
MANUFACTURING PROCESSES

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) **Neat** sketches must be drawn **wherever** necessary.*
*3) Assume additional suitable data **wherever** necessary and mention it **clearly**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Enlist various types of patterns and explain application of match plated cope and drag pattern. **5**
   b) Explain steps in casting process with flow chart. **4**
   c) Explain oil sand process of core making. What are its advantages and limitations ? **5**

3. a) Explain the advantages of green sand molding process and draw neat sketch of section of green sand mold ready for pouring. **6**
   b) Explain the advantages and limitations of centrifugal casting process. **4**
   c) Explain the process of cold chamber pressure die casting with neat sketch. **4**

4. a) Explain the process of compression molding of plastics with neat sketch. What are its advantages ? **6**
   b) Enlist the charge materials added to cupolas. What is flux ? **4**
   c) Explain the areas of application of computers in foundry. **4**

SECTION – II

5. a) Enlist any four components/products produced by rolling and forging respectively. **4**

   b) Explain the process of cold rolling of sheet with flow chart. **5**

   c) Explain basic hand forging operations and their applications. **5**

6. a) Explain the process of impact extrusion with its advantages, limitations and applications. **5**

   b) Explain the process of multi pass wire drawing with neat sketch. **5**

   c) Compare between tube extrusion and tube drawing. **4**

7. a) Explain the process of MMAW welding pointing out its advantages, limitations and applications. **5**

   b) Explain the process of resistance welding. What are its types ? Explain its application. **5**

   c) Compare between gas welding and arc welding. **4**

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Seat No.	

Set S

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2016
MANUFACTURING PROCESSES

Day and Date : Wednesday, 23-11-2016 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**.*
*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. A) Choose the correct answer (**2** marks **each**) : **(2×3=6)**

1) i) Skeleton pattern is used in centrifugal casting.
ii) True centrifugal casting does not use core
a) Statement (i) is correct, (ii) is incorrect
b) Statement (ii) is correct, (i) is incorrect
c) Both statements (i) and (ii) are correct
d) Both statements (i) and (ii) are incorrect

2) Following joining processes does not involve fusion of base metal
a) Resistance welding b) Brazing
c) Soldering d) TIG welding

3) Directional solidification can be achieved by
a) Using additional risers b) Use of core print
c) Using chaplet d) Use of exothermic compound

B) Choose the correct answer (**1** mark **each**) : **(1×8=8)**

1) The choke area is generally provided at
a) Gate b) Pouring cup
c) Feeder d) Sprue base

P.T.O.

2) Feeder (riser) should solidify
   a) After solidification of casting
   b) Along with casting
   c) Before casting
   d) Any time during solidification of casting

3) Sand which forms the surface of mould is
   a) Backing sand b) Facing sand
   c) Green sand d) All of the above

4) Which of the welding process involves fusion of electrode ?
   a) Resistance welding b) GMAW
   c) TIG d) None of the above

5) Which of the following is cold extrusion process ?
   a) Direct b) Impact
   c) Indirect d) None of the above

6) Which of the following joining process is used in case of Plumbing joint ?
   a) Arc welding b) Soldering
   c) Gas welding d) TIG welding

7) Spanner is manufactured by
   a) Rolling b) Open die forging
   c) Direct extrusion d) Closed die forging

8) Plastic chair is manufactured by
   a) Blow moulding b) Injection moulding
   c) Compression moulding d) Extrusion moulding

SLR-EP – 61

Seat No.	

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2016
MANUFACTURING PROCESSES

Day and Date : Wednesday, 23-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) **Neat** sketches must be drawn **wherever** necessary.*
*3) Assume additional suitable data **wherever** necessary and mention it **clearly**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Enlist various types of patterns and explain application of match plated cope and drag pattern. **5**
   b) Explain steps in casting process with flow chart. **4**
   c) Explain oil sand process of core making. What are its advantages and limitations ? **5**

3. a) Explain the advantages of green sand molding process and draw neat sketch of section of green sand mold ready for pouring. **6**
   b) Explain the advantages and limitations of centrifugal casting process. **4**
   c) Explain the process of cold chamber pressure die casting with neat sketch. **4**

4. a) Explain the process of compression molding of plastics with neat sketch. What are its advantages ? **6**
   b) Enlist the charge materials added to cupolas. What is flux ? **4**
   c) Explain the areas of application of computers in foundry. **4**

SECTION – II

5. a) Enlist any four components/products produced by rolling and forging respectively. **4**

   b) Explain the process of cold rolling of sheet with flow chart. **5**

   c) Explain basic hand forging operations and their applications. **5**

6. a) Explain the process of impact extrusion with its advantages, limitations and applications. **5**

   b) Explain the process of multi pass wire drawing with neat sketch. **5**

   c) Compare between tube extrusion and tube drawing. **4**

7. a) Explain the process of MMAW welding pointing out its advantages, limitations and applications. **5**

   b) Explain the process of resistance welding. What are its types ? Explain its application. **5**

   c) Compare between gas welding and arc welding. **4**

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Seat No.	

Set P

S.E. (Mechanical) (Part – II) Examination, 2016
NUMERICAL METHODS (CGPA)

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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****.*
3) *Figures to the* ***right*** *indicate* ***full*** *marks.*
4) ***Use*** *of calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) Using Bisection method a second approximation to the root of equation $x^3 - 4x - 9 = 0$ between 2 and 3 is
a) 2.25 b) 2.5 c) 2.75 d) 2.625

2) The order of convergence of Newton's Raphson method for finding root of algebraic and Transcendental equation f(x) = 0 is
a) 0.5 b) 1.5 c) 2 d) 2.5

3) In solving simultaneous linear system AX = B by Gauss-Jordan method, the coefficient matrix A reduces to
a) Upper triangular matrix b) Lower triangular matrix
c) Diagonal matrix d) Singular matrix

4) The value of coefficient of correlation r lies between
a) –2 and 1 b) – 1 and 1 c) 1 and 2 d) 2 and 3

5) If $f(x) = x^3$, whose arguments are –2 and 3, then the value of first divided difference between the argument is
a) 5 b) 1 c) –5 d) 7

6) Which of the following method is used to determine numerically largest eigen value and corresponding eigen vector of given matrix ?
a) Gauss-Seidal method b) Lagrange's method
c) Power method d) Euler's method

7) To fit the straight line y = ax + b to N observations, the normal equations are
a) $\sum y = N\sum x + b$ and $\sum xy = a\sum x^2 + b\sum x$
b) $\sum y = a\sum x + bN$ and $\sum xy = a\sum x^2 + b\sum x$
c) $\sum y = a\sum x^2 + b\sum x$ and $\sum xy = a\sum x^2 + bN$
d) none of these

P.T.O.

8) f(x) is given by

x	:	0	0.5	1
f(x)	:	1	0.8	0.5

Then using Trapezoidal rule, the value of $\int_0^1 f(x)\,dx$ is

a) 0.775 b) 0.7766 c) 0.7066 d) 0.7703

9) When f(x) is an even function, by Gauss 2-point quadrature formula value of integration $I = \int_{-1}^{1} f(x)\,dx$ is

a) $2f\left(\frac{1}{\sqrt{3}}\right)$ b) $f\left(-\frac{1}{\sqrt{3}}\right)+f\left(\frac{1}{\sqrt{3}}\right)$

c) $2\,f\left(-\frac{1}{\sqrt{3}}\right)$ d) All a, b and c are correct

10) The finite difference approximation to the second order derivative y'' at $x = x_i$ is

a) $\frac{1}{2h}(y_{i+1}-y_{i-1})$ b) $\frac{1}{2h}(y_{i+1}+y_{i-1})$ c) $\frac{1}{h^2}(y_{i+1}-2y_i+y_{i-1})$ d) $\frac{1}{h^2}(y_{i+1}-y_{i-1})$

11) In solving a set of simultaneous ordinary differential equations $\frac{dy}{dx}=f(x,y,z)$ and $\frac{dz}{dx}=\phi(x,y,z)$ by Picard's method, the n^{th} approximations for y and z is

a) $y_n = y_0 + \int f(x, y_{n-1}, z_{n-1})\,dx,\ z_n = z_0 + \int \phi(x, y_{n-1}, z_{n-1})dx$

b) $y_n = y_0 + \int f(x, y_{n-1})\,dx,\ z_n = z_0 + \int \phi(x, y_{n-1})dx$

c) $y_n = y_{n-1} + \int f(x, y_{n-1})\,dx,\ z_n = z_{n-1} + \int \phi(x, y_{n-1})dx$

d) None of these

12) In solving Laplace equation $U_{xx} + U_{yy} = 0$ the formula used $U_{ij} = \frac{1}{4}[U_{i-1\,j+1} + U_{i+1\,j-1} + U_{i+1\,j+1} + U_{i-1\,j-1}]$ is called

a) Standard five point formula b) Diagonal five point formula
c) Crank-Nicholson formula d) Bendre-Schmidt's formula

13) For the partial differential equation $AU_{xx} + BU_{xy} + CU_{yy} + DU_x + EU_y + FU = G$, where A, B, C, D, E, F and G are any functions of x and y or constant, then the partial differential equation is elliptic if

a) $B^2 - 4AC > 0$ b) $B^2 - 4AC = 0$ c) $B^2 - 4AC < 0$ d) None of these

14) Following is/are elliptic equation

a) Laplace equation b) Poisson's equation
c) Both a) and b) d) None of these

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Seat No.	

S.E. (Mechanical) (Part – II) Examination, 2016
NUMERICAL METHODS (CGPA)

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

N.B. : *1) Attempt **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of calculator is **allowed**.*

SECTION – I

2. Attempt the following.

a) Find by Newton's Raphson method a positive real root of the equation $2x^3 - 3x - 6 = 0$ correct to five places of decimals. **3**

b) Find a positive real root of the equation $xe^x - 3 = 0$ by False position method correct to three places of decimals. **3**

c) Perform two iterations of Newton's Raphson method to solve system of non-linear equations of $x^2 + y - 11 = 0$ and $x + y^2 - 7 = 0$ with initial approximation $x_0 = 3.5$, $y_0 = -1.5$. **4**

3. a) Find the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ using Power method. Take $[1 \quad 0 \quad 0]^T$ as initial eigen vector. (Perform six iterations) **5**

b) Solve **any one** from the following : **4**

i) Solve the system of equations $x + 2y + z = 3$, $2x + 3y + 3z = 10$, $3x - y + 2z = 13$ by Gauss Elimination method.

ii) Solve the system of equations $27x + 6y - z = 85$, $x + y + 54z = 110$, $6x + 15y + 2z = 72$ correct to three decimal places by Gauss Seidal method. (Take four iterations)

4. Solve the following :

a) Find the cubical function f(x) from the following data by Newton's Divided difference formula. **3**

x	:	–1	0	2	4	5
f(x)	:	0	1	9	65	126

b) Find the coefficient of correlation for the following data. **3**

x	:	10	14	18	22	26	30
y	:	18	12	24	6	30	36

c) Use Lagrange's interpolation formula to find y(2) from the data. **3**

x	:	0	1	3	4
y	:	–12	0	6	12

5. Attempt the following.

a) Fit a second degree parabola $y = ax^2 + bx + c$ for the following data : **5**

x	:	0	1	2	3	4
y	:	1	5	10	22	38

b) Derive Newton's Raphson iterative formula to find $\sqrt{N}$ where 'N' is positive number.
Hence use it to find value of $\sqrt{12}$ correct to four decimal places. **4**

SECTION – II

6. Attempt **any three** from the following. **(3×3=9)**

a) A curve is drawn to pass through the points given by the following table :

x	:	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	:	2.0	2.4	2.7	2.8	3.0	2.6	2.1

Using Weddle's rule, estimate the area bounded by the curve, the x-axis and the lines x = 1 and x = 4.

b) Using Simpson's rule, evaluate

$\int_0^1 \int_0^1 \frac{dx\,dy}{1+x+y}$ taking h = k = 0.5.

c) Evaluate the integral $\int_0^1 e^{-x^2} \cos dx$ by using three point Gaussian quadrature formula.

d) Evaluate $\int_0^4 e^x\,dx$ by trapezoidal rule given that e = 2.72, e^2 = 7.39, e^3 = 20.09, e^4 = 54.6 and compare it with the actual value.

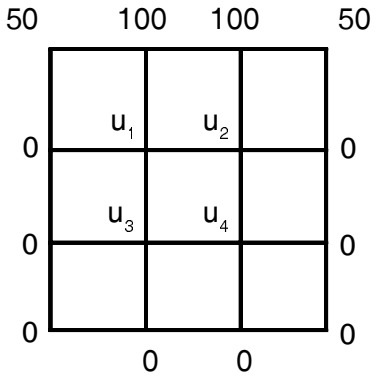
7. a) Using the finite difference method solve the equation $y'' = x + y$ with the boundary conditions $y(0) = y(1) = 0$. **5**

   b) If $\frac{dx}{dt} = x + y + t, \frac{dy}{dt} = xt - \frac{t^2}{2}$, at t = 0, x = 0, y = 1, then find the values of x and y at t = 0.2 by using Runge-Kutta method [Take h = 0.2]. **4**

8. a) Using Schmidt's method find the values of u(x, t) satisfying the equation $u_{xx} = u_t$ and boundary conditions u(0, t) = 0 = u(5, t) and $u(x, 0) = x^2(25 - x^2)$ taking h = 1 upto 3 seconds. **4**

   b) Solve by Crank-Nicholson method the equation $u_{xx} = u_t$ subject to u(x, 0) = 0, u(0, t) = 0 and u(1, t) = t for two time steps [Take h = 0.5]. **5**

9. a) Solve the equation $u_{xx} + u_{yy} = 0$ for the square mesh with the boundary values given below. **6**



   b) Apply Romberg's method to evaluate $\int_4^{5.2} \log dx$, given that

x	:	4	4.2	4.4	4.6	4.8	5.0	5.2
logx	:	1.3863	1.4351	1.4816	1.526	1.5686	1.6094	1.6486

   (Taking h = 0.4 and 0.2) **4**

Set P

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Seat No.	

Set Q

S.E. (Mechanical) (Part – II) Examination, 2016
NUMERICAL METHODS (CGPA)

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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****.*
3) *Figures to the* ***right*** *indicate* ***full*** *marks.*
4) ***Use*** *of calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) f(x) is given by

x	:	0	0.5	1
f(x)	:	1	0.8	0.5

Then using Trapezoidal rule, the value of $\int_0^1 f(x)\,dx$ is

a) 0.775 b) 0.7766 c) 0.7066 d) 0.7703

2) When f(x) is an even function, by Gauss 2-point quadrature formula value of integration $I = \int_{-1}^{1} f(x)\,dx$ is

a) $2\,f\left(\frac{1}{\sqrt{3}}\right)$ b) $f\left(-\frac{1}{\sqrt{3}}\right)+f\left(\frac{1}{\sqrt{3}}\right)$

c) $2\,f\left(-\frac{1}{\sqrt{3}}\right)$ d) All a, b and c are correct

3) The finite difference approximation to the second order derivative y'' at $x = x_i$ is

a) $\frac{1}{2h}(y_{i+1}-y_{i-1})$ b) $\frac{1}{2h}(y_{i+1}+y_{i-1})$

c) $\frac{1}{h^2}(y_{i+1}-2y_i+y_{i-1})$ d) $\frac{1}{h^2}(y_{i+1}-y_{i-1})$

P.T.O.

4) In solving a set of simultaneous ordinary differential equations $\frac{dy}{dx} = f(x, y, z)$ and $\frac{dz}{dx} = \phi(x, y, z)$ by Picard's method, the n^{th} approximations for y and z is

a) $y_n = y_0 + \int f(x, y_{n-1}, z_{n-1})\, dx,\ z_n = z_0 + \int \phi(x, y_{n-1}, z_{n-1})dx$

b) $y_n = y_0 + \int f(x, y_{n-1})\, dx,\ z_n = z_0 + \int \phi(x, y_{n-1})dx$

c) $y_n = y_{n-1} + \int f(x, y_{n-1})\, dx,\ z_n = z_{n-1} + \int \phi(x, y_{n-1})dx$

d) None of these

5) In solving Laplace equation $U_{xx} + U_{yy} = 0$ the formula used $U_{ij} = \frac{1}{4}[U_{i-1\,j+1} + U_{i+1\,j-1} + U_{i+1\,j+1} + U_{i-1\,j-1}]$ is called

a) Standard five point formula
b) Diagonal five point formula
c) Crank-Nicholson formula
d) Bendre-Schmidt's formula

6) For the partial differential equation $AU_{xx} + BU_{xy} + CU_{yy} + DU_x + EU_y + FU = G$, where A, B, C, D, E, F and G are any functions of x and y or constant, then the partial differential equation is elliptic if

a) $B^2 - 4AC > 0$ b) $B^2 - 4AC = 0$ c) $B^2 - 4AC < 0$ d) None of these

7) Following is/are elliptic equation

a) Laplace equation
b) Poisson's equation
c) Both a) and b)
d) None of these

8) Using Bisection method a second approximation to the root of equation $x^3 - 4x - 9 = 0$ between 2 and 3 is

a) 2.25 b) 2.5 c) 2.75 d) 2.625

9) The order of convergence of Newton's Raphson method for finding root of algebraic and Transcendental equation f(x) = 0 is

a) 0.5 b) 1.5 c) 2 d) 2.5

10) In solving simultaneous linear system AX = B by Gauss-Jordan method, the coefficient matrix A reduces to

a) Upper triangular matrix
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11) The value of coefficient of correlation r lies between

a) –2 and 1 b) – 1 and 1 c) 1 and 2 d) 2 and 3

12) If $f(x) = x^3$, whose arguments are –2 and 3, then the value of first divided difference between the argument is

a) 5 b) 1 c) –5 d) 7

13) Which of the following method is used to determine numerically largest eigen value and corresponding eigen vector of given matrix ?

a) Gauss-Seidal method
b) Lagrange's method
c) Power method
d) Euler's method

14) To fit the straight line y = ax + b to N observations, the normal equations are

a) $\sum y = N\sum x + b$ and $\sum xy = a\sum x^2 + b\sum x$

b) $\sum y = a\sum x + bN$ and $\sum xy = a\sum x^2 + b\sum x$

c) $\sum y = a\sum x^2 + b\sum x$ and $\sum xy = a\sum x^2 + bN$

d) none of these

Set Q

SLR-EP – 62

Seat No.	

S.E. (Mechanical) (Part – II) Examination, 2016
NUMERICAL METHODS (CGPA)

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

N.B. : *1) Attempt **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of calculator is **allowed**.*

SECTION – I

2. Attempt the following.

a) Find by Newton's Raphson method a positive real root of the equation $2x^3 - 3x - 6 = 0$ correct to five places of decimals. **3**

b) Find a positive real root of the equation $xe^x - 3 = 0$ by False position method correct to three places of decimals. **3**

c) Perform two iterations of Newton's Raphson method to solve system of non-linear equations of $x^2 + y - 11 = 0$ and $x + y^2 - 7 = 0$ with initial approximation $x_0 = 3.5$, $y_0 = -1.5$. **4**

3. a) Find the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ using Power method. Take $[1 \quad 0 \quad 0]^T$ as initial eigen vector. (Perform six iterations) **5**

b) Solve **any one** from the following : **4**

i) Solve the system of equations $x + 2y + z = 3$, $2x + 3y + 3z = 10$, $3x - y + 2z = 13$ by Gauss Elimination method.

ii) Solve the system of equations $27x + 6y - z = 85$, $x + y + 54z = 110$, $6x + 15y + 2z = 72$ correct to three decimal places by Gauss Seidal method. (Take four iterations)

4. Solve the following :

a) Find the cubical function f(x) from the following data by Newton's Divided difference formula. **3**

x	:	–1	0	2	4	5
f(x)	:	0	1	9	65	126

b) Find the coefficient of correlation for the following data. **3**

x	:	10	14	18	22	26	30
y	:	18	12	24	6	30	36

c) Use Lagrange's interpolation formula to find y(2) from the data. **3**

x	:	0	1	3	4
y	:	–12	0	6	12

5. Attempt the following.

a) Fit a second degree parabola $y = ax^2 + bx + c$ for the following data : **5**

x	:	0	1	2	3	4
y	:	1	5	10	22	38

b) Derive Newton's Raphson iterative formula to find $\sqrt{N}$ where 'N' is positive number.
Hence use it to find value of $\sqrt{12}$ correct to four decimal places. **4**

SECTION – II

6. Attempt **any three** from the following. **(3×3=9)**

a) A curve is drawn to pass through the points given by the following table :

x	:	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	:	2.0	2.4	2.7	2.8	3.0	2.6	2.1

Using Weddle's rule, estimate the area bounded by the curve, the x-axis and the lines x = 1 and x = 4.

b) Using Simpson's rule, evaluate

$\int_0^1 \int_0^1 \frac{dx\,dy}{1+x+y}$ taking h = k = 0.5.

c) Evaluate the integral $\int_0^1 e^{-x^2} \cos dx$ by using three point Gaussian quadrature formula.

d) Evaluate $\int_0^4 e^x\,dx$ by trapezoidal rule given that e = 2.72, e^2 = 7.39, e^3 = 20.09, e^4 = 54.6 and compare it with the actual value.

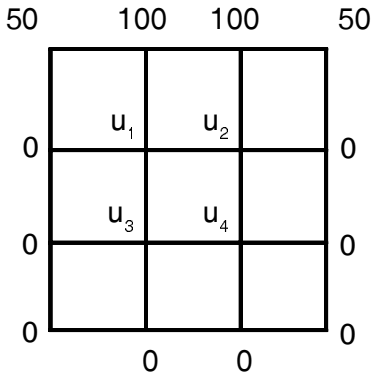
7. a) Using the finite difference method solve the equation $y'' = x + y$ with the boundary conditions $y(0) = y(1) = 0$. **5**

   b) If $\frac{dx}{dt} = x + y + t, \frac{dy}{dt} = xt - \frac{t^2}{2}$, at t = 0, x = 0, y = 1, then find the values of x and y at t = 0.2 by using Runge-Kutta method [Take h = 0.2]. **4**

8. a) Using Schmidt's method find the values of u(x, t) satisfying the equation $u_{xx} = u_t$ and boundary conditions u(0, t) = 0 = u(5, t) and $u(x, 0) = x^2(25 - x^2)$ taking h = 1 upto 3 seconds. **4**

   b) Solve by Crank-Nicholson method the equation $u_{xx} = u_t$ subject to u(x, 0) = 0, u(0, t) = 0 and u(1, t) = t for two time steps [Take h = 0.5]. **5**

9. a) Solve the equation $u_{xx} + u_{yy} = 0$ for the square mesh with the boundary values given below. **6**



   b) Apply Romberg's method to evaluate $\int_4^{5.2} \log dx$, given that

x	:	4	4.2	4.4	4.6	4.8	5.0	5.2
logx	:	1.3863	1.4351	1.4816	1.526	1.5686	1.6094	1.6486

   (Taking h = 0.4 and 0.2) **4**

Set Q

SLR-EP – 62

Seat No.	

Set R

S.E. (Mechanical) (Part – II) Examination, 2016
NUMERICAL METHODS (CGPA)

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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**.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Use** of calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) If $f(x) = x^3$, whose arguments are -2 and 3, then the value of first divided difference between the argument is
   a) 5 b) 1 c) -5 d) 7

2) Which of the following method is used to determine numerically largest eigen value and corresponding eigen vector of given matrix ?
   a) Gauss-Seidal method b) Lagrange's method
   c) Power method d) Euler's method

3) To fit the straight line y = ax + b to N observations, the normal equations are
   a) $\sum y = N\sum x + b$ and $\sum xy = a\sum x^2 + b\sum x$
   b) $\sum y = a\sum x + bN$ and $\sum xy = a\sum x^2 + b\sum x$
   c) $\sum y = a\sum x^2 + b\sum x$ and $\sum xy = a\sum x^2 + bN$
   d) none of these

4) f(x) is given by

x	:	0	0.5	1
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Then using Trapezoidal rule, the value of $\int_0^1 f(x)\,dx$ is
   a) 0.775 b) 0.7766
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P.T.O.

5) When f(x) is an even function, by Gauss 2-point quadrature formula value of integration $I = \int_{-1}^{1} f(x)\,dx$ is

a) $2\,f\left(\frac{1}{\sqrt{3}}\right)$ b) $f\left(-\frac{1}{\sqrt{3}}\right)+f\left(\frac{1}{\sqrt{3}}\right)$

c) $2\,f\left(-\frac{1}{\sqrt{3}}\right)$ d) All a, b and c are correct

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a) $\frac{1}{2h}(y_{i+1} - y_{i-1})$ b) $\frac{1}{2h}(y_{i+1} + y_{i-1})$ c) $\frac{1}{h^2}(y_{i+1} - 2y_i + y_{i-1})$ d) $\frac{1}{h^2}(y_{i+1} - y_{i-1})$

7) In solving a set of simultaneous ordinary differential equations $\frac{dy}{dx} = f(x, y, z)$ and $\frac{dz}{dx} = \phi(x, y, z)$ by Picard's method, the n^{th} approximations for y and z is

a) $y_n = y_0 + \int f(x, y_{n-1}, z_{n-1})\,dx,\ z_n = z_0 + \int \phi(x, y_{n-1}, z_{n-1})dx$

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13) In solving simultaneous linear system AX = B by Gauss-Jordan method, the coefficient matrix A reduces to

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14) The value of coefficient of correlation r lies between

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Set R

SLR-EP – 62

Seat No.	

S.E. (Mechanical) (Part – II) Examination, 2016
NUMERICAL METHODS (CGPA)

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

N.B. : *1) Attempt **any three** questions from **each** Section.*
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SECTION – I

2. Attempt the following.

a) Find by Newton's Raphson method a positive real root of the equation $2x^3 - 3x - 6 = 0$ correct to five places of decimals. **3**

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3. a) Find the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ using Power method. Take $[1 \quad 0 \quad 0]^T$ as initial eigen vector. (Perform six iterations) **5**

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Hence use it to find value of $\sqrt{12}$ correct to four decimal places. **4**

SECTION – II

6. Attempt **any three** from the following. **(3×3=9)**

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$\int_0^1 \int_0^1 \frac{dx\,dy}{1+x+y}$ taking h = k = 0.5.

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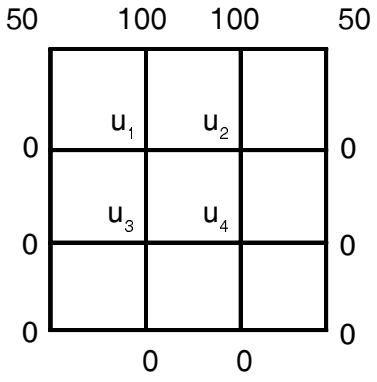

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Set R

SLR-EP – 62

Seat No.	

Set S

S.E. (Mechanical) (Part – II) Examination, 2016
NUMERICAL METHODS (CGPA)

Day and Date : Thursday, 24-11-2016 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) The finite difference approximation to the second order derivative y'' at $x = x_i$ is

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P.T.O.

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   c) $\sum y = a\sum x^2 + b\sum x$ and $\sum xy = a\sum x^2 + bN$
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   b) $f\left(-\frac{1}{\sqrt{3}}\right) + f\left(\frac{1}{\sqrt{3}}\right)$
   c) $2\,f\left(-\frac{1}{\sqrt{3}}\right)$
   d) All a, b and c are correct

SLR-EP – 62

Seat No.	

S.E. (Mechanical) (Part – II) Examination, 2016
NUMERICAL METHODS (CGPA)

Day and Date : Thursday, 24-11-2016 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

N.B. : *1) Attempt **any three** questions from **each** Section.*
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SECTION – I

2. Attempt the following.

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ii) Solve the system of equations $27x + 6y - z = 85$, $x + y + 54z = 110$, $6x + 15y + 2z = 72$ correct to three decimal places by Gauss Seidal method. (Take four iterations)

4. Solve the following :

a) Find the cubical function f(x) from the following data by Newton's Divided difference formula. **3**

x :	–1	0	2	4	5
f(x) :	0	1	9	65	126

b) Find the coefficient of correlation for the following data. **3**

x	:	10	14	18	22	26	30
y	:	18	12	24	6	30	36

c) Use Lagrange's interpolation formula to find y(2) from the data. **3**

x	:	0	1	3	4
y	:	–12	0	6	12

5. Attempt the following.

a) Fit a second degree parabola $y = ax^2 + bx + c$ for the following data : **5**

x	:	0	1	2	3	4
y	:	1	5	10	22	38

b) Derive Newton's Raphson iterative formula to find $\sqrt{N}$ where 'N' is positive number.

Hence use it to find value of $\sqrt{12}$ correct to four decimal places. **4**

SECTION – II

6. Attempt **any three** from the following. **(3×3=9)**

a) A curve is drawn to pass through the points given by the following table :

x	:	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	:	2.0	2.4	2.7	2.8	3.0	2.6	2.1

Using Weddle's rule, estimate the area bounded by the curve, the x-axis and the lines x = 1 and x = 4.

b) Using Simpson's rule, evaluate

$\int_0^1 \int_0^1 \frac{dx\,dy}{1+x+y}$ taking h = k = 0.5.

c) Evaluate the integral $\int_0^1 e^{-x^2} \cos dx$ by using three point Gaussian quadrature formula.

d) Evaluate $\int_0^4 e^x\,dx$ by trapezoidal rule given that e = 2.72, e^2 = 7.39, e^3 = 20.09, e^4 = 54.6 and compare it with the actual value.

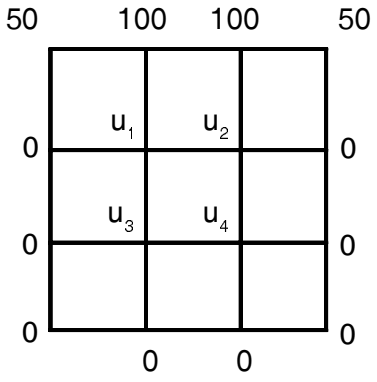
7. a) Using the finite difference method solve the equation $y'' = x + y$ with the boundary conditions $y(0) = y(1) = 0$. **5**

   b) If $\frac{dx}{dt} = x + y + t, \frac{dy}{dt} = xt - \frac{t^2}{2}$, at t = 0, x = 0, y = 1, then find the values of x and y at t = 0.2 by using Runge-Kutta method [Take h = 0.2]. **4**

8. a) Using Schmidt's method find the values of u(x, t) satisfying the equation $u_{xx} = u_t$ and boundary conditions u(0, t) = 0 = u(5, t) and $u(x, 0) = x^2(25 - x^2)$ taking h = 1 upto 3 seconds. **4**

   b) Solve by Crank-Nicholson method the equation $u_{xx} = u_t$ subject to u(x, 0) = 0, u(0, t) = 0 and u(1, t) = t for two time steps [Take h = 0.5]. **5**

9. a) Solve the equation $u_{xx} + u_{yy} = 0$ for the square mesh with the boundary values given below. **6**



   b) Apply Romberg's method to evaluate $\int_4^{5.2} \log dx$, given that

x	:	4	4.2	4.4	4.6	4.8	5.0	5.2
logx	:	1.3863	1.4351	1.4816	1.526	1.5686	1.6094	1.6486

   (Taking h = 0.4 and 0.2) **4**

Set S

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Seat No.	

Set P

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Friday, 25-11-2016 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) ***All*** *questions are* ***compulsory****.*
4) Draw ***neat*** *diagrams* ***whenever*** *necessary.*
5) Assume suitable data if ***necessary****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The Ta/Ia graph a d.c. series motor is a
   a) parabola from no-load to over load
   b) straight line throughout
   c) parabola throughout
   d) parabola up to full load and a straight line at overloads

2) The induced e.m.f. in the armature conductors of a d.c. motor is
   a) sinusoidal b) trapezoidal c) rectangular d) alternating

3) At start the slip of the induction motor
   a) zero b) 0.5 c) one d) infinite

4) A change of 4 % of supply voltage to an induction motor will produce a change of approximately
   a) 4 % in the rotor torque b) 8 % in the rotor torque
   c) 12 % in the rotor torque d) 16 % in the rotor torque

5) One of the characteristics of a single phase motor is that it
   a) is self-starting b) can rotate in one direction only
   c) is not self-starting d) requires only one winding

6) Each of the following statements regarding a shaded-pole motor is true EXCEPT
   a) its direction of rotation is from un-shaded portion of the poles
   b) it has very poor efficiency
   c) it has very poor p.f.
   d) it has high starting torque

P.T.O.

7) Which of the following methods of heating is NOT dependent on the frequency of supply ?
   a) Induction heating
   b) Dielectric heating
   c) Electric resistance heating
   d) All of the above

8) The electrode of a direct are furnace is made of
   a) tungsten
   b) graphite
   c) silver
   d) copper

9) Op-Amp uses
   a) Negative feedback
   b) Positive feedback
   c) No feedback
   d) None of the above

10) Percentage resolution of n bit DAC is given by
   a) $2^n - 1$
   b) $1/2^n - 1$
   c) $1/1 - 2^n$
   d) $1 - 2^n$

11) A universal register accept
   a) serial data
   b) parallel data
   c) gives serial and parallel output
   d) capable of all of above

12) Which of the following memory is non volatile and may be written only once ?
   a) RAM
   b) EEPROM
   c) EPROM
   d) PROM

13) The data bus is
   a) unidirectional
   b) bidirectional
   c) parallel
   d) serial

14) How much internal (On-Chip) RAM is available in 8051 ?
   a) 128 bytes
   b) 256 bytes
   c) 4 kb
   d) 8 kb

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S.E. (Mechanical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Friday, 25-11-2016 Marks : 56

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

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Draw ***neat*** *diagrams* ***whenever*** *necessary.*
3) Assume suitable data if ***necessary****.*
4) ***Separate*** *answerbooks for* ***each*** *Section.*

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**

a) Explain any one speed control method to control the speed of dc shunt motor.

b) Explain how the rotating magnetic field is generated in 3-phase induction motor.

c) Explain with neat diagram the working of any one induction furnace.

d) Compare individual and group drive.

e) Derive the torque equation of three phase induction motor under running condition.

f) Determine the energy required to melt 500 Kg of brass in 30 minutes. The thermal properties of brass are as follows : specific heat 0.095, latent heat of fusion to be 39 Kcals/Kg., melting point of brass = 920°C, furnace efficiency = 50 %, temperature of cold charge = 20°C.

3. Attempt **any two** of the following : **(2×6=12)**

a) Explain the necessary of starter in a dc motor and describe three point starter for d.c. shunt motor.

b) A 4 pole 3 phase, 50 Hz induction motor has a voltage between slip-rings on open circuit of 520 V. The star connected rotor has a standstill reactance and resistance of 2.0 and 0.4 per phase respectively. Determine :

i) the full load torque if full load speed is 1425 rpm

ii) the ratio of starting torque to full load torque

iii) the additional rotor resistance required to give maximum torque at standstill.

c) Explain the different types of the single phase induction motor.

SECTION – II

4. Attempt **any four** of the following : **(4×4=16)**

   a) Explain RS flip flop.

   b) What is ROM ? What are different types of ROM ? Explain their differences.

   c) Draw the equivalent circuit of practical inverting op-amp and derive the expression for output voltage gain.

   d) Explain architecture of 8085 microprocessor.

   e) Explain types of addressing modes of micro controller.

   f) Explain characteristics of an ideal op-amp.

5. Attempt **any two** of the following : **(2×6=12)**

   a) Draw and explain a 5 bit shift register using SR flip flop with wave form for serial input.

   b) Explain the working of op-amp as substractor and comparator with the help of neat diagram.

   c) Explain interrupt structure of micro controller 8051.

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Seat No.	

Set Q

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Friday, 25-11-2016 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) ***All*** *questions are* ***compulsory****.*
4) *Draw* ***neat*** *diagrams* ***whenever*** *necessary.*
5) *Assume suitable data if* ***necessary****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The electrode of a direct are furnace is made of
   a) tungsten b) graphite c) silver d) copper

2) Op-Amp uses
   a) Negative feedback b) Positive feedback
   c) No feedback d) None of the above

3) Percentage resolution of n bit DAC is given by
   a) $2^n - 1$ b) $1/2^n - 1$ c) $1/1 - 2^n$ d) $1 - 2^n$

4) A universal register accept
   a) serial data b) parallel data
   c) gives serial and parallel output d) capable of all of above

5) Which of the following memory is non volatile and may be written only once ?
   a) RAM b) EEPROM c) EPROM d) PROM

6) The data bus is
   a) unidirectional b) bidirectional c) parallel d) serial

7) How much internal (On-Chip) RAM is available in 8051 ?
   a) 128 bytes b) 256 bytes c) 4 kb d) 8 kb

P.T.O.

8) The Ta/Ia graph a d.c. series motor is a
   a) parabola from no-load to over load
   b) straight line throughout
   c) parabola throughout
   d) parabola up to full load and a straight line at overloads

9) The induced e.m.f. in the armature conductors of a d.c. motor is
   a) sinusoidal b) trapezoidal c) rectangular d) alternating

10) At start the slip of the induction motor
   a) zero b) 0.5 c) one d) infinite

11) A change of 4 % of supply voltage to an induction motor will produce a change of approximately
   a) 4 % in the rotor torque b) 8 % in the rotor torque
   c) 12 % in the rotor torque d) 16 % in the rotor torque

12) One of the characteristics of a single phase motor is that it
   a) is self-starting b) can rotate in one direction only
   c) is not self-starting d) requires only one winding

13) Each of the following statements regarding a shaded-pole motor is true EXCEPT
   a) its direction of rotation is from un-shaded portion of the poles
   b) it has very poor efficiency
   c) it has very poor p.f.
   d) it has high starting torque

14) Which of the following methods of heating is NOT dependent on the frequency of supply ?
   a) Induction heating b) Dielectric heating
   c) Electric resistance heating d) All of the above

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S.E. (Mechanical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Friday, 25-11-2016 Marks : 56

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

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Draw ***neat*** *diagrams* ***whenever*** *necessary.*
3) Assume suitable data if ***necessary****.*
4) ***Separate*** *answerbooks for* ***each*** *Section.*

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**

a) Explain any one speed control method to control the speed of dc shunt motor.

b) Explain how the rotating magnetic field is generated in 3-phase induction motor.

c) Explain with neat diagram the working of any one induction furnace.

d) Compare individual and group drive.

e) Derive the torque equation of three phase induction motor under running condition.

f) Determine the energy required to melt 500 Kg of brass in 30 minutes. The thermal properties of brass are as follows : specific heat 0.095, latent heat of fusion to be 39 Kcals/Kg., melting point of brass = 920°C, furnace efficiency = 50 %, temperature of cold charge = 20°C.

3. Attempt **any two** of the following : **(2×6=12)**

a) Explain the necessary of starter in a dc motor and describe three point starter for d.c. shunt motor.

b) A 4 pole 3 phase, 50 Hz induction motor has a voltage between slip-rings on open circuit of 520 V. The star connected rotor has a standstill reactance and resistance of 2.0 and 0.4 per phase respectively. Determine :

i) the full load torque if full load speed is 1425 rpm

ii) the ratio of starting torque to full load torque

iii) the additional rotor resistance required to give maximum torque at standstill.

c) Explain the different types of the single phase induction motor.

SECTION – II

4. Attempt **any four** of the following : **(4×4=16)**

   a) Explain RS flip flop.

   b) What is ROM ? What are different types of ROM ? Explain their differences.

   c) Draw the equivalent circuit of practical inverting op-amp and derive the expression for output voltage gain.

   d) Explain architecture of 8085 microprocessor.

   e) Explain types of addressing modes of micro controller.

   f) Explain characteristics of an ideal op-amp.

5. Attempt **any two** of the following : **(2×6=12)**

   a) Draw and explain a 5 bit shift register using SR flip flop with wave form for serial input.

   b) Explain the working of op-amp as substractor and comparator with the help of neat diagram.

   c) Explain interrupt structure of micro controller 8051.

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Seat No.	

Set R

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Friday, 25-11-2016 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) ***All*** *questions are* ***compulsory****.*
4) Draw ***neat*** *diagrams* ***whenever*** *necessary.*
5) Assume suitable data if ***necessary****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) One of the characteristics of a single phase motor is that it
   a) is self-starting b) can rotate in one direction only
   c) is not self-starting d) requires only one winding

2) Each of the following statements regarding a shaded-pole motor is true EXCEPT
   a) its direction of rotation is from un-shaded portion of the poles
   b) it has very poor efficiency
   c) it has very poor p.f.
   d) it has high starting torque

3) Which of the following methods of heating is NOT dependent on the frequency of supply ?
   a) Induction heating b) Dielectric heating
   c) Electric resistance heating d) All of the above

4) The electrode of a direct are furnace is made of
   a) tungsten b) graphite c) silver d) copper

5) Op-Amp uses
   a) Negative feedback b) Positive feedback
   c) No feedback d) None of the above

6) Percentage resolution of n bit DAC is given by
   a) $2^n - 1$ b) $1/2^n - 1$ c) $1/1 - 2^n$ d) $1 - 2^n$

P.T.O.

7) A universal register accept
   a) serial data
   b) parallel data
   c) gives serial and parallel output
   d) capable of all of above

8) Which of the following memory is non volatile and may be written only once ?
   a) RAM b) EEPROM c) EPROM d) PROM

9) The data bus is
   a) unidirectional b) bidirectional c) parallel d) serial

10) How much internal (On-Chip) RAM is available in 8051 ?
   a) 128 bytes b) 256 bytes c) 4 kb d) 8 kb

11) The Ta/Ia graph a d.c. series motor is a
   a) parabola from no-load to over load
   b) straight line throughout
   c) parabola throughout
   d) parabola up to full load and a straight line at overloads

12) The induced e.m.f. in the armature conductors of a d.c. motor is
   a) sinusoidal b) trapezoidal c) rectangular d) alternating

13) At start the slip of the induction motor
   a) zero b) 0.5 c) one d) infinite

14) A change of 4 % of supply voltage to an induction motor will produce a change of approximately
   a) 4 % in the rotor torque
   b) 8 % in the rotor torque
   c) 12 % in the rotor torque
   d) 16 % in the rotor torque

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Seat No.	

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Friday, 25-11-2016 Marks : 56

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

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Draw ***neat*** *diagrams* ***whenever*** *necessary.*
3) Assume suitable data if ***necessary****.*
4) ***Separate*** *answerbooks for* ***each*** *Section.*

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**

a) Explain any one speed control method to control the speed of dc shunt motor.

b) Explain how the rotating magnetic field is generated in 3-phase induction motor.

c) Explain with neat diagram the working of any one induction furnace.

d) Compare individual and group drive.

e) Derive the torque equation of three phase induction motor under running condition.

f) Determine the energy required to melt 500 Kg of brass in 30 minutes. The thermal properties of brass are as follows : specific heat 0.095, latent heat of fusion to be 39 Kcals/Kg., melting point of brass = 920°C, furnace efficiency = 50 %, temperature of cold charge = 20°C.

3. Attempt **any two** of the following : **(2×6=12)**

a) Explain the necessary of starter in a dc motor and describe three point starter for d.c. shunt motor.

b) A 4 pole 3 phase, 50 Hz induction motor has a voltage between slip-rings on open circuit of 520 V. The star connected rotor has a standstill reactance and resistance of 2.0 and 0.4 per phase respectively. Determine :

i) the full load torque if full load speed is 1425 rpm

ii) the ratio of starting torque to full load torque

iii) the additional rotor resistance required to give maximum torque at standstill.

c) Explain the different types of the single phase induction motor.

SECTION – II

4. Attempt **any four** of the following : **(4×4=16)**

   a) Explain RS flip flop.

   b) What is ROM ? What are different types of ROM ? Explain their differences.

   c) Draw the equivalent circuit of practical inverting op-amp and derive the expression for output voltage gain.

   d) Explain architecture of 8085 microprocessor.

   e) Explain types of addressing modes of micro controller.

   f) Explain characteristics of an ideal op-amp.

5. Attempt **any two** of the following : **(2×6=12)**

   a) Draw and explain a 5 bit shift register using SR flip flop with wave form for serial input.

   b) Explain the working of op-amp as substractor and comparator with the help of neat diagram.

   c) Explain interrupt structure of micro controller 8051.

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Seat No.	

Set S

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Friday, 25-11-2016 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) ***All*** *questions are* ***compulsory****.*
4) Draw ***neat*** *diagrams* ***whenever*** *necessary.*
5) Assume suitable data if ***necessary****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Percentage resolution of n bit DAC is given by
a) $2^n - 1$ b) $1/2^n - 1$ c) $1/1 - 2^n$ d) $1 - 2^n$

2) A universal register accept
a) serial data b) parallel data
c) gives serial and parallel output d) capable of all of above

3) Which of the following memory is non volatile and may be written only once ?
a) RAM b) EEPROM c) EPROM d) PROM

4) The data bus is
a) unidirectional b) bidirectional c) parallel d) serial

5) How much internal (On-Chip) RAM is available in 8051 ?
a) 128 bytes b) 256 bytes c) 4 kb d) 8 kb

6) The Ta/Ia graph a d.c. series motor is a
a) parabola from no-load to over load
b) straight line throughout
c) parabola throughout
d) parabola up to full load and a straight line at overloads

7) The induced e.m.f. in the armature conductors of a d.c. motor is
a) sinusoidal b) trapezoidal c) rectangular d) alternating

8) At start the slip of the induction motor
   a) zero b) 0.5 c) one d) infinite

9) A change of 4 % of supply voltage to an induction motor will produce a change of approximately
   a) 4 % in the rotor torque b) 8 % in the rotor torque
   c) 12 % in the rotor torque d) 16 % in the rotor torque

10) One of the characteristics of a single phase motor is that it
   a) is self-starting b) can rotate in one direction only
   c) is not self-starting d) requires only one winding

11) Each of the following statements regarding a shaded-pole motor is true EXCEPT
   a) its direction of rotation is from un-shaded portion of the poles
   b) it has very poor efficiency
   c) it has very poor p.f.
   d) it has high starting torque

12) Which of the following methods of heating is NOT dependent on the frequency of supply ?
   a) Induction heating b) Dielectric heating
   c) Electric resistance heating d) All of the above

13) The electrode of a direct are furnace is made of
   a) tungsten b) graphite c) silver d) copper

14) Op-Amp uses
   a) Negative feedback b) Positive feedback
   c) No feedback d) None of the above

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Seat No.	

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2016
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Friday, 25-11-2016 Marks : 56

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

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Draw ***neat*** *diagrams* ***whenever*** *necessary.*
3) Assume suitable data if ***necessary****.*
4) ***Separate*** *answerbooks for* ***each*** *Section.*

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**

a) Explain any one speed control method to control the speed of dc shunt motor.

b) Explain how the rotating magnetic field is generated in 3-phase induction motor.

c) Explain with neat diagram the working of any one induction furnace.

d) Compare individual and group drive.

e) Derive the torque equation of three phase induction motor under running condition.

f) Determine the energy required to melt 500 Kg of brass in 30 minutes. The thermal properties of brass are as follows : specific heat 0.095, latent heat of fusion to be 39 Kcals/Kg., melting point of brass = 920°C, furnace efficiency = 50 %, temperature of cold charge = 20°C.

3. Attempt **any two** of the following : **(2×6=12)**

a) Explain the necessary of starter in a dc motor and describe three point starter for d.c. shunt motor.

b) A 4 pole 3 phase, 50 Hz induction motor has a voltage between slip-rings on open circuit of 520 V. The star connected rotor has a standstill reactance and resistance of 2.0 and 0.4 per phase respectively. Determine :

i) the full load torque if full load speed is 1425 rpm

ii) the ratio of starting torque to full load torque

iii) the additional rotor resistance required to give maximum torque at standstill.

c) Explain the different types of the single phase induction motor.

SECTION – II

4. Attempt **any four** of the following : **(4×4=16)**

   a) Explain RS flip flop.

   b) What is ROM ? What are different types of ROM ? Explain their differences.

   c) Draw the equivalent circuit of practical inverting op-amp and derive the expression for output voltage gain.

   d) Explain architecture of 8085 microprocessor.

   e) Explain types of addressing modes of micro controller.

   f) Explain characteristics of an ideal op-amp.

5. Attempt **any two** of the following : **(2×6=12)**

   a) Draw and explain a 5 bit shift register using SR flip flop with wave form for serial input.

   b) Explain the working of op-amp as substractor and comparator with the help of neat diagram.

   c) Explain interrupt structure of micro controller 8051.

SLR-EP – 64

Seat No.	

Set P

T.E. (Mech.) (Part – I) Examination, 2016
THEORY OF MACHINE – II (New CGPA)

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. Choose the correct alternatives : **(14×1=14)**

1) The difference between tooth space and tooth thickness measured along pitch circle is called as
   a) Pitch circle b) Circular pitch
   c) Backlash d) Tooth thickness

2) Contact ratio is a ratio of
   a) Length of arc of contact to circular pitch
   b) Length of patch of contact to circular pitch
   c) Length of arc of contact to pitch circle
   d) Length of patch of contact to pitch circle

3) In an automobile if the vehicle makes a left turn the gyroscopic torque
   a) Decreases force on outer wheel b) Increases force on outer wheel
   c) Doesn't affect the forces d) None of these

4) Ratio of speed of driver to driven is called as
   a) Speed value b) Train value
   c) Train ratio d) Speed ratio

5) The size of gear is usually specified by
   a) Pressure angle b) Circular pitch
   c) Pitch circle diameter d) Diametral pitch

P.T.O.

6) When the ship is pitching upward, the effect of gyroscopic couple in rolling is
   a) Move towards starboard side
   b) No effect
   c) Move towards port side
   d) Stern will be lifted

7) Secondary forces in reciprocating mass of engine are
   a) Of same frequency as of primary force
   b) Twice the frequency as of primary force
   c) Four times frequency as of primary force
   d) None of the above

8) For dynamic balancing of shaft
   a) Net dynamic force acting is zero
   b) Net couple due to dynamic force is zero
   c) Both a) and b)
   d) None of the above

9) Natural frequency of shaft with both ends fixed and UDL is
   a) $f_n = 0.571/\sqrt{\delta s}$
   b) $f_n = 0.751/\sqrt{\delta s}$
   c) $f_n = 0.4985/\sqrt{\delta}$
   d) None of the above

10) Damping factor is
   a) Ratio of critical damping to coefficient of damping
   b) Ratio of coefficient of damping to critical damping
   c) Ratio of logarithmic decrement to critical damping
   d) Ratio of critical damping to logarithmic decrement

11) In torsional vibrations stresses induced are
   a) Compressive b) No stresses c) Bending d) Shear

12) A disturbing mass m_1 attached to a rotating shaft may be balanced by a single mass m_2 attached in the same plane of rotation as that of m1 such that
   a) $m_1.r_2 = m_2.r_1$
   b) $m_1.m_2 = r_1.r_2$
   c) $m_1.r_1 = m_2.r_2$
   d) $m_1.m_2 = 2\, r_1.r_2$

13) The factor which affects critical speed of shaft is
   a) Diameter of disc
   b) Span of shaft
   c) Eccentricity
   d) All of these

14) Coefficient of steadiness is
   a) Reciprocal of C_E
   b) Reciprocal of S_C
   c) Reciprocal of C_S
   d) Reciprocal of E_C

SLR-EP – 64

Seat No.	

T.E. (Mech.) (Part – I) Examination, 2016
THEORY OF MACHINE – II (New CGPA)

Day and Date : Monday, 28-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

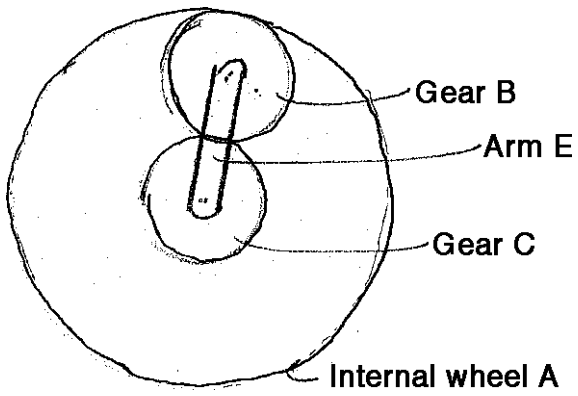
Instructions *: 1) Solve **any two** questions from **each** Section.*
*2) Use of calculator is **allowed**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume additional data if **necessary** and mention it **clearly**.*

SECTION – I

2. a) Derive an expression for centre distance between two spiral gears. **5**
   b) Draw only sketch of differential Gear Box. **3**
   c) Find angle of inclination with respect to the vertical of a two wheeler taking a turn. Given : combined mass of the vehicle with rider is 250 kg, moment of inertia of engine flywheel 0.30 kgm^2, M.I. of each road wheel 1 kgm^2, speed of engine flywheel 5 times that of road wheels and in same direction, height of C.G. is 0.60m, two wheeler speed 90 km/hr, wheel radius 0.30 m and radius of turn 50 m. **6**

3. a) Define coefficient of fluctuation of energy, coefficient of fluctuation of speed, Turning Moment Diagram. **3**
   b) Define angle of heel, pitching of ship, rolling of ship. **3**
   c) A pair of spiral gears is required to connect two shafts, the angle between the non-intersecting axes is 90°. The pitch circle diameters of the gears are equal and speed ratio is 3. If the approximate centre distance is 25 cm and if the normal pitch is 3π mm, estimate the helix angle of the gears and no. of teeth on each wheel. Take m = 3 mm. **8**

4. a) An epicyclic gear train consists of three wheels A, B, C as shown in Fig. (4 – a). Wheel A has 72 internal teeth, C has 32 external. The wheel B gears with both A and C and is carried on an arm which rotates about the centre of A at 18 rpm. If wheel A is fixed, determine speed of B and C. **8**



   b) A cross compound steam engine develops 298276 Watt at 90 rpm. The coefficient of fluctuation of energy, found from turning moment diagram is 0.1 and speed is to be kept within 0.5% of the mean speed. Find the weight of flywheel required if radius of gyration is 2 m. **6**

Set P

SECTION – II

5. A) Explain balancing of single mass with two masses when the plane of the disturbing mass lies in between the planes of the two balancing masses. **4**

   B) Four masses A, B, C and D are to be completely balanced. B has mass of 30 kg, C has mass of 50 Kg, D has mass of 40 Kg and radius of rotation of 240 mm, 120 mm, 150 mm. The planes containing masses B and C are 300 mm apart. The angle between planes containing B and C is 90°. B and C make angles of 210° and 120° respectively with D in the same sense. Find : 1) The magnitude and the angular position of mass A if its radius of rotation is 180 mm 2) The position of planes A and D. **10**

6. A) Derive the equivalent stiffness of springs when 1) Springs are in series and 2) Springs are in parallel. **6**

   B) Derive the differential equation of motion and calculate the natural frequency of system given in Fig. Q 6 B if a = 2 m, l = 7 m and m = 15 kg, k = 100 N/m. **8**

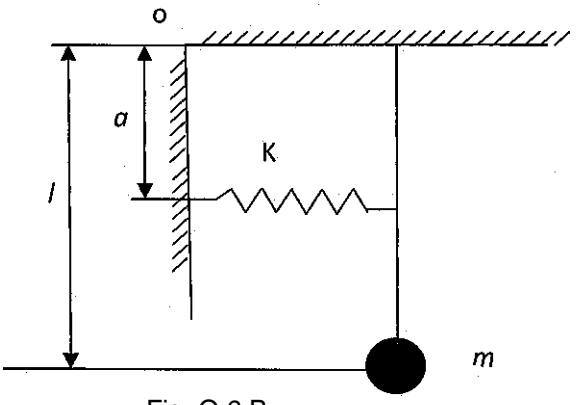


Fig. Q 6 B

7. A) Explain critical speed of shaft. **6**

   B) A shaft in Fig. Q 7 B carries two masses. The mass A is 380 kg with radius of gyration of 0.82 m and mass B is 850 kg with a radius of gyration of 0.91 m. Determine the frequency of torsional vibrations. The modulus of rigidity of shaft material is 80 GN/m^2. **8**

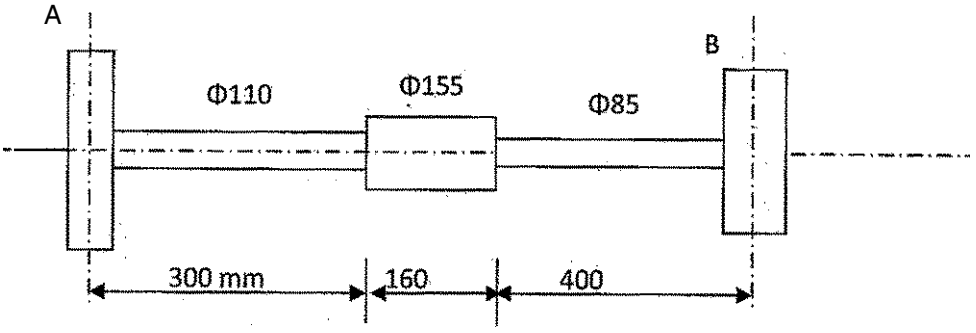


Fig. Q 7 B

SLR-EP – 64

Seat No.	

Set Q

T.E. (Mech.) (Part – I) Examination, 2016
THEORY OF MACHINE – II (New CGPA)

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. Choose the correct alternatives : **(14×1=14)**

1) For dynamic balancing of shaft
   a) Net dynamic force acting is zero
   b) Net couple due to dynamic force is zero
   c) Both a) and b)
   d) None of the above

2) Natural frequency of shaft with both ends fixed and UDL is
   a) $f_n = 0.571/\sqrt{\delta s}$ b) $f_n = 0.751/\sqrt{\delta s}$
   c) $f_n = 0.4985/\sqrt{\delta}$ d) None of the above

3) Damping factor is
   a) Ratio of critical damping to coefficient of damping
   b) Ratio of coefficient of damping to critical damping
   c) Ratio of logarithmic decrement to critical damping
   d) Ratio of critical damping to logarithmic decrement

4) In torsional vibrations stresses induced are
   a) Compressive b) No stresses c) Bending d) Shear

5) A disturbing mass m_1 attached to a rotating shaft may be balanced by a single mass m_2 attached in the same plane of rotation as that of m1 such that
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   c) $m_1.r_1 = m_2.r_2$ d) $m_1.m_2 = 2\, r_1.r_2$

P.T.O.

6) The factor which affects critical speed of shaft is
   a) Diameter of disc
   b) Span of shaft
   c) Eccentricity
   d) All of these

7) Coefficient of steadiness is
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   b) Reciprocal of S_C
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8) The difference between tooth space and tooth thickness measured along pitch circle is called as
   a) Pitch circle
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   c) Backlash
   d) Tooth thickness

9) Contact ratio is a ratio of
   a) Length of arc of contact to circular pitch
   b) Length of patch of contact to circular pitch
   c) Length of arc of contact to pitch circle
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10) In an automobile if the vehicle makes a left turn the gyroscopic torque
   a) Decreases force on outer wheel
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   c) Doesn't affect the forces
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11) Ratio of speed of driver to driven is called as
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SLR-EP – 64

Seat No.	

T.E. (Mech.) (Part – I) Examination, 2016
THEORY OF MACHINE – II (New CGPA)

Day and Date : Monday, 28-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
*2) Use of calculator is **allowed**.*
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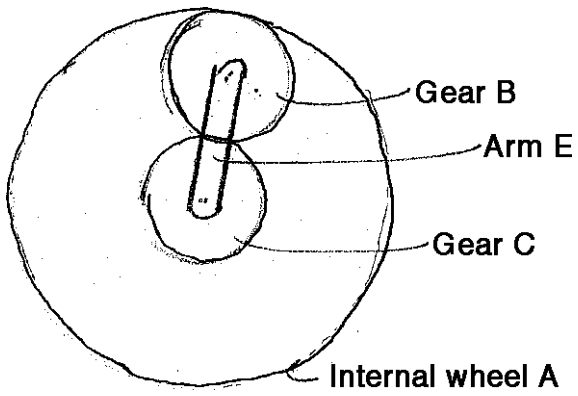
SECTION – I

2. a) Derive an expression for centre distance between two spiral gears. **5**
   b) Draw only sketch of differential Gear Box. **3**
   c) Find angle of inclination with respect to the vertical of a two wheeler taking a turn. Given : combined mass of the vehicle with rider is 250 kg, moment of inertia of engine flywheel 0.30 kgm^2, M.I. of each road wheel 1 kgm^2, speed of engine flywheel 5 times that of road wheels and in same direction, height of C.G. is 0.60m, two wheeler speed 90 km/hr, wheel radius 0.30 m and radius of turn 50 m. **6**

3. a) Define coefficient of fluctuation of energy, coefficient of fluctuation of speed, Turning Moment Diagram. **3**
   b) Define angle of heel, pitching of ship, rolling of ship. **3**
   c) A pair of spiral gears is required to connect two shafts, the angle between the non-intersecting axes is 90°. The pitch circle diameters of the gears are equal and speed ratio is 3. If the approximate centre distance is 25 cm and if the normal pitch is 3π mm, estimate the helix angle of the gears and no. of teeth on each wheel. Take m = 3 mm. **8**

4. a) An epicyclic gear train consists of three wheels A, B, C as shown in Fig. (4 – a). Wheel A has 72 internal teeth, C has 32 external. The wheel B gears with both A and C and is carried on an arm which rotates about the centre of A at 18 rpm. If wheel A is fixed, determine speed of B and C. **8**



   b) A cross compound steam engine develops 298276 Watt at 90 rpm. The coefficient of fluctuation of energy, found from turning moment diagram is 0.1 and speed is to be kept within 0.5% of the mean speed. Find the weight of flywheel required if radius of gyration is 2 m. **6**

Set Q

SECTION – II

5. A) Explain balancing of single mass with two masses when the plane of the disturbing mass lies in between the planes of the two balancing masses. **4**

   B) Four masses A, B, C and D are to be completely balanced. B has mass of 30 kg, C has mass of 50 Kg, D has mass of 40 Kg and radius of rotation of 240 mm, 120 mm, 150 mm. The planes containing masses B and C are 300 mm apart. The angle between planes containing B and C is 90°. B and C make angles of 210° and 120° respectively with D in the same sense. Find : 1) The magnitude and the angular position of mass A if its radius of rotation is 180 mm 2) The position of planes A and D. **10**

6. A) Derive the equivalent stiffness of springs when 1) Springs are in series and 2) Springs are in parallel. **6**

   B) Derive the differential equation of motion and calculate the natural frequency of system given in Fig. Q 6 B if a = 2 m, l = 7 m and m = 15 kg, k = 100 N/m. **8**

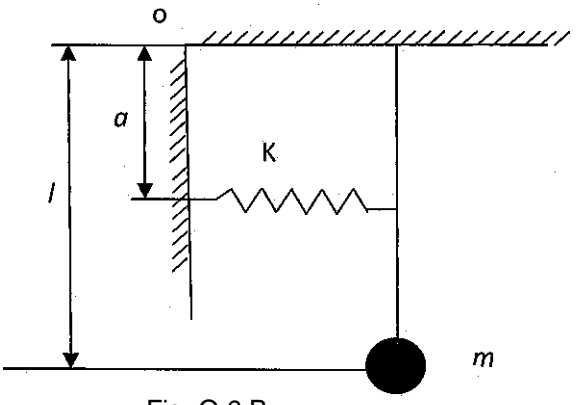


Fig. Q 6 B

7. A) Explain critical speed of shaft. **6**

   B) A shaft in Fig. Q 7 B carries two masses. The mass A is 380 kg with radius of gyration of 0.82 m and mass B is 850 kg with a radius of gyration of 0.91 m. Determine the frequency of torsional vibrations. The modulus of rigidity of shaft material is 80 GN/m^2. **8**

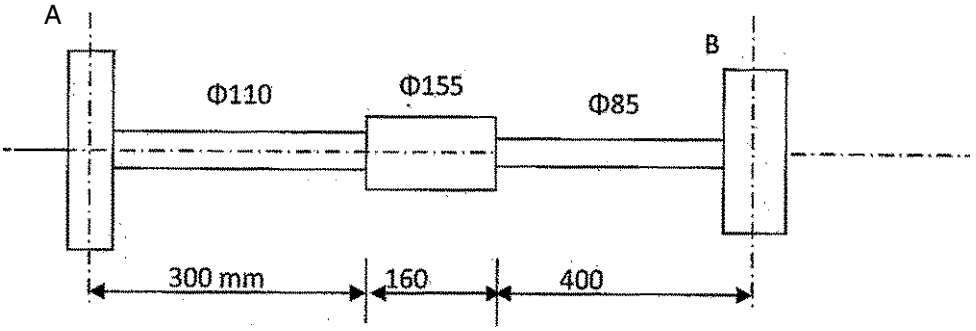


Fig. Q 7 B

SLR-EP – 64

Seat No.	

Set R

T.E. (Mech.) (Part – I) Examination, 2016
THEORY OF MACHINE – II (New CGPA)

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. Choose the correct alternatives : **(14×1=14)**

1) The size of gear is usually specified by
   a) Pressure angle b) Circular pitch
   c) Pitch circle diameter d) Diametral pitch

2) When the ship is pitching upward, the effect of gyroscopic couple in rolling is
   a) Move towards starboard side b) No effect
   c) Move towards port side d) Stern will be lifted

3) Secondary forces in reciprocating mass of engine are
   a) Of same frequency as of primary force
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   c) Four times frequency as of primary force
   d) None of the above

4) For dynamic balancing of shaft
   a) Net dynamic force acting is zero
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5) Natural frequency of shaft with both ends fixed and UDL is
   a) $f_n = 0.571/\sqrt{\delta s}$ b) $f_n = 0.751/\sqrt{\delta s}$
   c) $f_n = 0.4985/\sqrt{\delta}$ d) None of the above

P.T.O.

6) Damping factor is
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7) In torsional vibrations stresses induced are
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8) A disturbing mass m_1 attached to a rotating shaft may be balanced by a single mass m_2 attached in the same plane of rotation as that of m1 such that
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9) The factor which affects critical speed of shaft is
   a) Diameter of disc b) Span of shaft
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10) Coefficient of steadiness is
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13) In an automobile if the vehicle makes a left turn the gyroscopic torque
   a) Decreases force on outer wheel b) Increases force on outer wheel
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14) Ratio of speed of driver to driven is called as
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SLR-EP – 64

Seat No.	

T.E. (Mech.) (Part – I) Examination, 2016
THEORY OF MACHINE – II (New CGPA)

Day and Date : Monday, 28-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
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SECTION – I

2. a) Derive an expression for centre distance between two spiral gears. **5**
   b) Draw only sketch of differential Gear Box. **3**
   c) Find angle of inclination with respect to the vertical of a two wheeler taking a turn. Given : combined mass of the vehicle with rider is 250 kg, moment of inertia of engine flywheel 0.30 kgm^2, M.I. of each road wheel 1 kgm^2, speed of engine flywheel 5 times that of road wheels and in same direction, height of C.G. is 0.60m, two wheeler speed 90 km/hr, wheel radius 0.30 m and radius of turn 50 m. **6**

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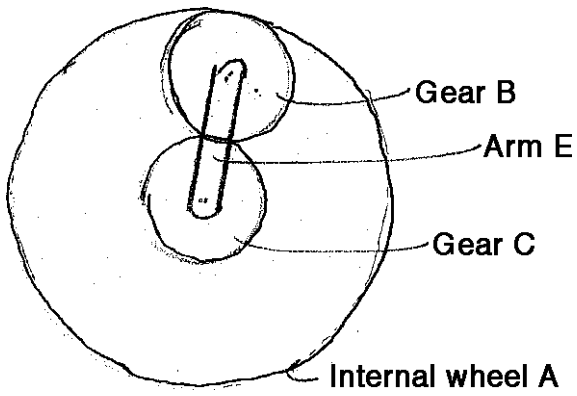

   b) A cross compound steam engine develops 298276 Watt at 90 rpm. The coefficient of fluctuation of energy, found from turning moment diagram is 0.1 and speed is to be kept within 0.5% of the mean speed. Find the weight of flywheel required if radius of gyration is 2 m. **6**

Set R

SECTION – II

5. A) Explain balancing of single mass with two masses when the plane of the disturbing mass lies in between the planes of the two balancing masses. **4**

   B) Four masses A, B, C and D are to be completely balanced. B has mass of 30 kg, C has mass of 50 Kg, D has mass of 40 Kg and radius of rotation of 240 mm, 120 mm, 150 mm. The planes containing masses B and C are 300 mm apart. The angle between planes containing B and C is 90°. B and C make angles of 210° and 120° respectively with D in the same sense. Find : 1) The magnitude and the angular position of mass A if its radius of rotation is 180 mm 2) The position of planes A and D. **10**

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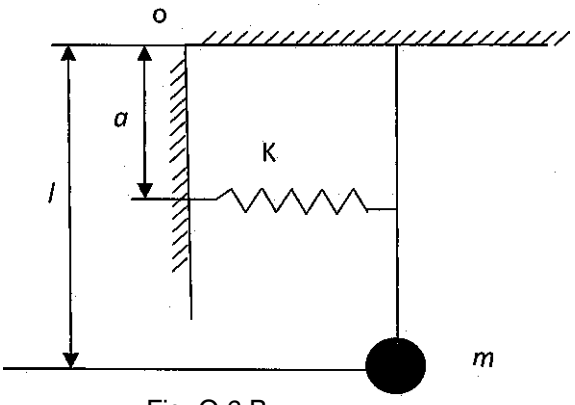

Fig. Q 6 B

7. A) Explain critical speed of shaft. **6**

   B) A shaft in Fig. Q 7 B carries two masses. The mass A is 380 kg with radius of gyration of 0.82 m and mass B is 850 kg with a radius of gyration of 0.91 m. Determine the frequency of torsional vibrations. The modulus of rigidity of shaft material is 80 GN/m^2. **8**

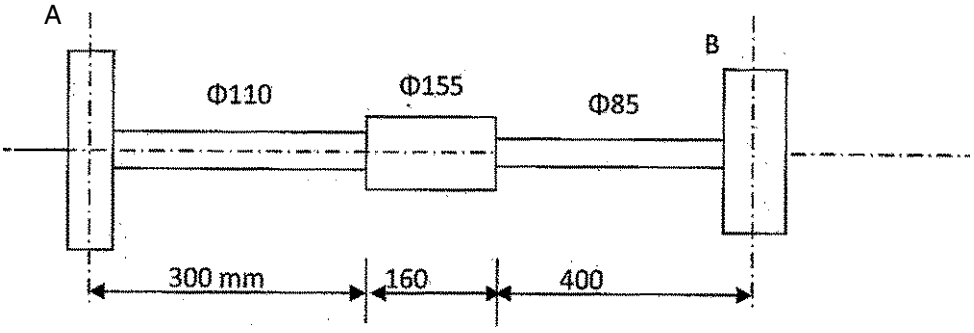

Fig. Q 7 B

SLR-EP – 64

Seat No.	

Set S

T.E. (Mech.) (Part – I) Examination, 2016
THEORY OF MACHINE – II (New CGPA)

Day and Date : Monday, 28-11-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternatives : **(14×1=14)**

1) Damping factor is
   a) Ratio of critical damping to coefficient of damping
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3) A disturbing mass m_1 attached to a rotating shaft may be balanced by a single mass m_2 attached in the same plane of rotation as that of m1 such that
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P.T.O.

6) The difference between tooth space and tooth thickness measured along pitch circle is called as
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SLR-EP – 64

Seat No.	

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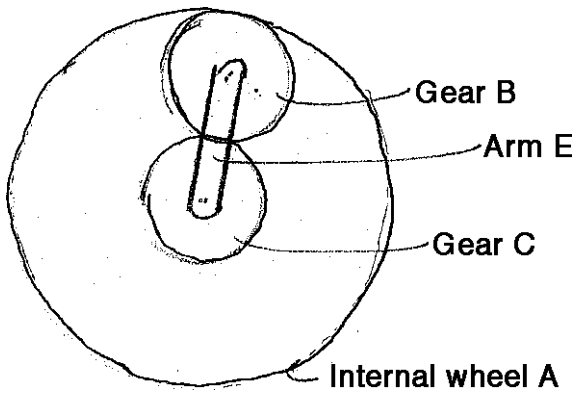
SECTION – I

2. a) Derive an expression for centre distance between two spiral gears. **5**
   b) Draw only sketch of differential Gear Box. **3**
   c) Find angle of inclination with respect to the vertical of a two wheeler taking a turn. Given : combined mass of the vehicle with rider is 250 kg, moment of inertia of engine flywheel 0.30 kgm^2, M.I. of each road wheel 1 kgm^2, speed of engine flywheel 5 times that of road wheels and in same direction, height of C.G. is 0.60m, two wheeler speed 90 km/hr, wheel radius 0.30 m and radius of turn 50 m. **6**

3. a) Define coefficient of fluctuation of energy, coefficient of fluctuation of speed, Turning Moment Diagram. **3**
   b) Define angle of heel, pitching of ship, rolling of ship. **3**
   c) A pair of spiral gears is required to connect two shafts, the angle between the non-intersecting axes is 90°. The pitch circle diameters of the gears are equal and speed ratio is 3. If the approximate centre distance is 25 cm and if the normal pitch is 3π mm, estimate the helix angle of the gears and no. of teeth on each wheel. Take m = 3 mm. **8**

4. a) An epicyclic gear train consists of three wheels A, B, C as shown in Fig. (4 – a). Wheel A has 72 internal teeth, C has 32 external. The wheel B gears with both A and C and is carried on an arm which rotates about the centre of A at 18 rpm. If wheel A is fixed, determine speed of B and C. **8**



   b) A cross compound steam engine develops 298276 Watt at 90 rpm. The coefficient of fluctuation of energy, found from turning moment diagram is 0.1 and speed is to be kept within 0.5% of the mean speed. Find the weight of flywheel required if radius of gyration is 2 m. **6**

Set S

SECTION – II

5. A) Explain balancing of single mass with two masses when the plane of the disturbing mass lies in between the planes of the two balancing masses. **4**

   B) Four masses A, B, C and D are to be completely balanced. B has mass of 30 kg, C has mass of 50 Kg, D has mass of 40 Kg and radius of rotation of 240 mm, 120 mm, 150 mm. The planes containing masses B and C are 300 mm apart. The angle between planes containing B and C is 90°. B and C make angles of 210° and 120° respectively with D in the same sense. Find : 1) The magnitude and the angular position of mass A if its radius of rotation is 180 mm 2) The position of planes A and D. **10**

6. A) Derive the equivalent stiffness of springs when 1) Springs are in series and 2) Springs are in parallel. **6**

   B) Derive the differential equation of motion and calculate the natural frequency of system given in Fig. Q 6 B if a = 2 m, l = 7 m and m = 15 kg, k = 100 N/m. **8**

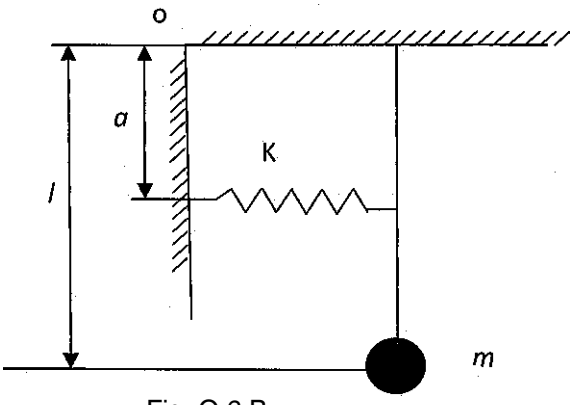


Fig. Q 6 B

7. A) Explain critical speed of shaft. **6**

   B) A shaft in Fig. Q 7 B carries two masses. The mass A is 380 kg with radius of gyration of 0.82 m and mass B is 850 kg with a radius of gyration of 0.91 m. Determine the frequency of torsional vibrations. The modulus of rigidity of shaft material is 80 GN/m^2. **8**

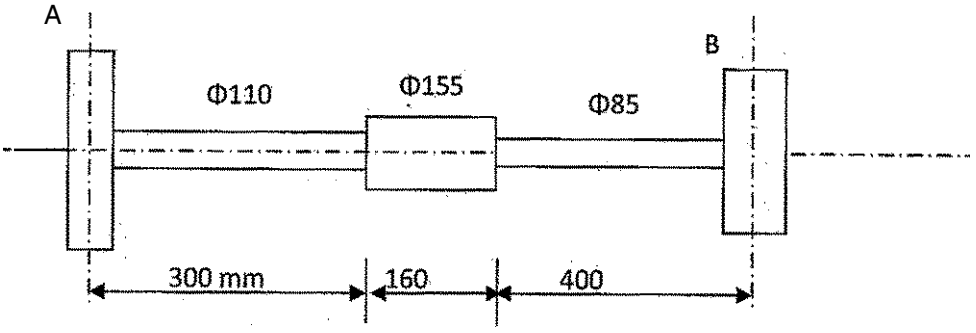


Fig. Q 7 B

SLR-EP – 65

Seat No.	

Set P

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
HEAT AND MASS TRANSFER

Day and Date : Wednesday, 30-11-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 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) *Assume suitable data* ***if*** *required.*
4) *Use of scientific calculator is* ***allowed****.*
5) *Figure to* ***right*** *side indicates* ***full*** *marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The steady state temperature distribution in a very large thin plate with uniform surface temperature will be
   a) Linear b) Hyperbolic c) Parabolic d) Logarithmic

2) Lumped parameter analysis for transient heat conduction is essentially for
   a) Bi < 0.1 b) 0.1 < Bi < 0.5
   c) 1 < Bi < 10 d) Bi number is infinity

3) The requirement of transfer of a large heat is usually met by
   a) increase the length of tube b) having multiple tube or shell passes
   c) decreasing diameter of tube d) increase number of tube

4) The normal automobile radiator is a heat exchanger of the type
   a) direct contact type b) parallel flow
   c) counter flow d) cross flow

5) The intensity of solar radiation on earth is
   a) 0.1 kW/m^2 b) 1 kW/m^2 c) 2 kW/m^2 d) 5 kW/m^2

6) Which of the following terms not associated with heat exchanger ?
   a) Mc Adoms correction factor b) NTU
   c) Fouling factor d) Heat carrying capacity

7) The thermal radiation occurs in the range of electromagnetic waves
   a) 0.1 to 100 microns b) 0.01 to 0.0001 microns
   c) 10 to 1000 microns d) 0.1 to 10 microns

P.T.O.

8) For a hemisphere, solid angle is measured in
   a) Radian and its maximum value of 2*pi
   b) Steradian and its maximum value of pi
   c) Steradian and its maximum value of 2*pi
   d) Radian and its maximum value of pi

9) The convective heat transfer co-efficient for boiling and condensation is usually lie in range of
   a) 50 – 500 W/m^2K
   b) 200 – 2500 W/m^2K
   c) 300 – 5000 W/m^2K
   d) 2500 – 10000 W/m^2K

10) Planks law is applicable to _____ radiations.
   a) Monochromatic b) Temperature c) Thermal d) None of these

11) Gases have poor
   a) Transmissivity b) Absorptivity c) Reflectivity d) All of the above

12) At thermal equilibrium absorptivity is _____ emissivity.
   a) Greater than
   b) Equal to
   c) Less than
   d) None of the above

13) In a heat exchanger, hot fluid enters at 180°C and leaves at 160°C. The cooling fluid enters at 30°C and leaves at 110°C. The capacity ratio of heat exchanger is
   a) 0.2 b) 0.33 c) 12.5 d) 0.25

14) For grey surface
   a) emissivity is constant
   b) absorptivity equal to reflectivity
   c) emissivity equal to transmissivity
   d) reflectivity equal emissivity

_____

SLR-EP – 65

Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
HEAT AND MASS TRANSFER

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Assume suitable data **if** required.*
*2) Use of scientific calculator is **allowed**.*
*3) Figure to **right** side indicates **full** marks.*

SECTION – I

2. Solve **any four** out of the following questions : **(4×4=16)**

A) A steel tube (k = 43 W/mK) of 5 cm inner diameter and 7.5 cm outer diameter is covered with 2.5 cm layer of asbestos magnesia (k = 0.2 W/mK). The hot gases are flowing in a tube at 300°C, while outer surface is to ambient at 30°C. Estimate heat loss from 3 m length of tube and temperature drop across the insulation.

B) Explain thermal resistance and electrical analogy for solving heat transfer problems.

C) Derive an expression for critical radius of insulation for cylinder.

D) Explain with neat sketch velocity boundary layer and thermal boundary layer.

E) Determine the rate of heat flow to a spherical boiler which is 2 m in diameter and 2 cm thick steel (k = 58 W/mK). The outside surface and that of fluid inside surface are 30°C and 300°C respectively. Take the inner film resistance as 0.0023 k/W.

F) Air at 1 atm and 20°C flows over a flat plate at 40 m/s. The plate is 80 cm long, 80 cm width and maintained at 80°C. Assuming unit depth in Z direction. Calculate heat transfer rate from plate.

Take k = 0.0273 W/mK, Cp = 1.007 kJ/kgK, Pr = 0.7, $\gamma = 1.906 \times 10^{-5}$ m^2/s

Use the relation $Nu = [0.036 (Re)^{0.8} – 871] (Pr)^{1/3}$

3. Solve **any two** out of the following questions : **(2×6=12)**

A) Derive the three dimensional equation for heat conduction in Cartesian co-ordinates for no heat generation.

B) The aluminium square fins (0.5 mm by 0.5 mm side) of 10 mm long are provided on a surface of semiconductor electronic device to carry 1 watt of energy generated by electronic device. The surface temperature of device should not exceed 80°C when surrounding temperature is 40°C. Find number of fins required to carry out above duty and neglect the heat loss from end. Take thermal conductivity of fin material is 200 W/mK and heat transfer coefficient of surrounding fluid 15 W/m^2K.

C) Using the dimensional analysis show that Nu = f (Gr, Pr) for natural convection.

SECTION – II

4. Solve **any four** out of the following questions : **(4×4=16)**

   A) Explain with neat sketch pool boiling curve.

   B) Explain the following :
      i) Kirchoff's law
      ii) Wein's law.

   C) Differentiate heat transfer and mass transfer.

   D) Write a short note on finite difference methods for solving conduction and convection problems.

   E) Explain the classifications of heat exchangers in detail.

   F) Find the percentage reduction in radiation heat transfer with a polished aluminium radiation shield with emissivity of 0.05 when placed between two very large parallel plates with emissivities of 0.5 and 0.3.

5. Solve **any two** out of the following questions : **(2×6=12)**

   A) The radiation shape factor for circular surface of thin hollow cylinder of 10 cm diameter and 10 cm long is 0.1716. What is the shape factor curved surface of the cylinder with respect to itself ?

   B) Derive an expression for LMTD of parallel flow heat exchanger.

   C) In a certain double pipe parallel flow heat exchanger hot water flows at a rate of 50000 kg/hr and gets cooled from 95°C to 65°C. At the same time 50000 kg/hr of cooling water at 30°C enters the heat exchanger. The flow conditions are such that overall heat transfer coefficient remains constant at 2270 W/m^2K. Determine the heat transfer area required and effectiveness. Assume for both the streams Cp = 4.2 kJ/kgK.

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SLR-EP – 65

Seat No.	

Set Q

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
HEAT AND MASS TRANSFER

Day and Date : Wednesday, 30-11-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 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) *Assume suitable data* ***if*** *required.*
4) *Use of scientific calculator is* ***allowed****.*
5) *Figure to* ***right*** *side indicates* ***full*** *marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) For a hemisphere, solid angle is measured in
   a) Radian and its maximum value of 2*pi
   b) Steradian and its maximum value of pi
   c) Steradian and its maximum value of 2*pi
   d) Radian and its maximum value of pi

2) The convective heat transfer co-efficient for boiling and condensation is usually lie in range of
   a) 50 – 500 W/m^2K
   b) 200 – 2500 W/m^2K
   c) 300 – 5000 W/m^2K
   d) 2500 – 10000 W/m^2K

3) Planks law is applicable to _____ radiations.
   a) Monochromatic b) Temperature c) Thermal d) None of these

4) Gases have poor
   a) Transmissivity b) Absorptivity c) Reflectivity d) All of the above

5) At thermal equilibrium absorptivity is _____ emissivity.
   a) Greater than
   b) Equal to
   c) Less than
   d) None of the above

6) In a heat exchanger, hot fluid enters at 180°C and leaves at 160°C. The cooling fluid enters at 30°C and leaves at 110°C. The capacity ratio of heat exchanger is
   a) 0.2 b) 0.33 c) 12.5 d) 0.25

P.T.O.

7) For grey surface
   a) emissivity is constant
   b) absorptivity equal to reflectivity
   c) emissivity equal to transmissivity
   d) reflectivity equal emissivity

8) The steady state temperature distribution in a very large thin plate with uniform surface temperature will be
   a) Linear b) Hyperbolic c) Parabolic d) Logarithmic

9) Lumped parameter analysis for transient heat conduction is essentially for
   a) $Bi < 0.1$
   b) $0.1 < Bi < 0.5$
   c) $1 < Bi < 10$
   d) Bi number is infinity

10) The requirement of transfer of a large heat is usually met by
   a) increase the length of tube
   b) having multiple tube or shell passes
   c) decreasing diameter of tube
   d) increase number of tube

11) The normal automobile radiator is a heat exchanger of the type
   a) direct contact type
   b) parallel flow
   c) counter flow
   d) cross flow

12) The intensity of solar radiation on earth is
   a) 0.1 kW/m^2 b) 1 kW/m^2 c) 2 kW/m^2 d) 5 kW/m^2

13) Which of the following terms not associated with heat exchanger ?
   a) Mc Adoms correction factor
   b) NTU
   c) Fouling factor
   d) Heat carrying capacity

14) The thermal radiation occurs in the range of electromagnetic waves
   a) 0.1 to 100 microns
   b) 0.01 to 0.0001 microns
   c) 10 to 1000 microns
   d) 0.1 to 10 microns

SLR-EP – 65

Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
HEAT AND MASS TRANSFER

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Assume suitable data **if** required.*
*2) Use of scientific calculator is **allowed**.*
*3) Figure to **right** side indicates **full** marks.*

SECTION – I

2. Solve **any four** out of the following questions : **(4×4=16)**

A) A steel tube (k = 43 W/mK) of 5 cm inner diameter and 7.5 cm outer diameter is covered with 2.5 cm layer of asbestos magnesia (k = 0.2 W/mK). The hot gases are flowing in a tube at 300°C, while outer surface is to ambient at 30°C. Estimate heat loss from 3 m length of tube and temperature drop across the insulation.

B) Explain thermal resistance and electrical analogy for solving heat transfer problems.

C) Derive an expression for critical radius of insulation for cylinder.

D) Explain with neat sketch velocity boundary layer and thermal boundary layer.

E) Determine the rate of heat flow to a spherical boiler which is 2 m in diameter and 2 cm thick steel (k = 58 W/mK). The outside surface and that of fluid inside surface are 30°C and 300°C respectively. Take the inner film resistance as 0.0023 k/W.

F) Air at 1 atm and 20°C flows over a flat plate at 40 m/s. The plate is 80 cm long, 80 cm width and maintained at 80°C. Assuming unit depth in Z direction. Calculate heat transfer rate from plate.

Take k = 0.0273 W/mK, Cp = 1.007 kJ/kgK, Pr = 0.7, $\gamma = 1.906 \times 10^{-5}$ m^2/s

Use the relation $Nu = [0.036 (Re)^{0.8} – 871] (Pr)^{1/3}$

3. Solve **any two** out of the following questions : **(2×6=12)**

A) Derive the three dimensional equation for heat conduction in Cartesian co-ordinates for no heat generation.

B) The aluminium square fins (0.5 mm by 0.5 mm side) of 10 mm long are provided on a surface of semiconductor electronic device to carry 1 watt of energy generated by electronic device. The surface temperature of device should not exceed 80°C when surrounding temperature is 40°C. Find number of fins required to carry out above duty and neglect the heat loss from end. Take thermal conductivity of fin material is 200 W/mK and heat transfer coefficient of surrounding fluid 15 W/m^2K.

C) Using the dimensional analysis show that Nu = f (Gr, Pr) for natural convection.

Set Q

SECTION – II

4. Solve **any four** out of the following questions : **(4×4=16)**

   A) Explain with neat sketch pool boiling curve.

   B) Explain the following :
      i) Kirchoff's law
      ii) Wein's law.

   C) Differentiate heat transfer and mass transfer.

   D) Write a short note on finite difference methods for solving conduction and convection problems.

   E) Explain the classifications of heat exchangers in detail.

   F) Find the percentage reduction in radiation heat transfer with a polished aluminium radiation shield with emissivity of 0.05 when placed between two very large parallel plates with emissivities of 0.5 and 0.3.

5. Solve **any two** out of the following questions : **(2×6=12)**

   A) The radiation shape factor for circular surface of thin hollow cylinder of 10 cm diameter and 10 cm long is 0.1716. What is the shape factor curved surface of the cylinder with respect to itself ?

   B) Derive an expression for LMTD of parallel flow heat exchanger.

   C) In a certain double pipe parallel flow heat exchanger hot water flows at a rate of 50000 kg/hr and gets cooled from 95°C to 65°C. At the same time 50000 kg/hr of cooling water at 30°C enters the heat exchanger. The flow conditions are such that overall heat transfer coefficient remains constant at 2270 W/m^2K. Determine the heat transfer area required and effectiveness. Assume for both the streams Cp = 4.2 kJ/kgK.

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SLR-EP – 65

Seat No.	

Set R

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
HEAT AND MASS TRANSFER

Day and Date : Wednesday, 30-11-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 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) *Assume suitable data* ***if*** *required.*
4) *Use of scientific calculator is* ***allowed****.*
5) *Figure to* ***right*** *side indicates* ***full*** *marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The intensity of solar radiation on earth is
   a) 0.1 kW/m^2 b) 1 kW/m^2 c) 2 kW/m^2 d) 5 kW/m^2

2) Which of the following terms not associated with heat exchanger ?
   a) Mc Adoms correction factor b) NTU
   c) Fouling factor d) Heat carrying capacity

3) The thermal radiation occurs in the range of electromagnetic waves
   a) 0.1 to 100 microns b) 0.01 to 0.0001 microns
   c) 10 to 1000 microns d) 0.1 to 10 microns

4) For a hemisphere, solid angle is measured in
   a) Radian and its maximum value of 2*pi
   b) Steradian and its maximum value of pi
   c) Steradian and its maximum value of 2*pi
   d) Radian and its maximum value of pi

5) The convective heat transfer co-efficient for boiling and condensation is usually lie in range of
   a) 50 – 500 W/m^2K b) 200 – 2500 W/m^2K
   c) 300 – 5000 W/m^2K d) 2500 – 10000 W/m^2K

6) Planks law is applicable to _____ radiations.
   a) Monochromatic b) Temperature c) Thermal d) None of these

P.T.O.

7) Gases have poor
   a) Transmissivity b) Absorptivity c) Reflectivity d) All of the above

8) At thermal equilibrium absorptivity is _____ emissivity.
   a) Greater than b) Equal to
   c) Less than d) None of the above

9) In a heat exchanger, hot fluid enters at 180°C and leaves at 160°C. The cooling fluid enters at 30°C and leaves at 110°C. The capacity ratio of heat exchanger is
   a) 0.2 b) 0.33 c) 12.5 d) 0.25

10) For grey surface
   a) emissivity is constant b) absorptivity equal to reflectivity
   c) emissivity equal to transmissivity d) reflectivity equal emissivity

11) The steady state temperature distribution in a very large thin plate with uniform surface temperature will be
   a) Linear b) Hyperbolic c) Parabolic d) Logarithmic

12) Lumped parameter analysis for transient heat conduction is essentially for
   a) Bi < 0.1 b) 0.1 < Bi < 0.5
   c) 1 < Bi < 10 d) Bi number is infinity

13) The requirement of transfer of a large heat is usually met by
   a) increase the length of tube b) having multiple tube or shell passes
   c) decreasing diameter of tube d) increase number of tube

14) The normal automobile radiator is a heat exchanger of the type
   a) direct contact type b) parallel flow
   c) counter flow d) cross flow

_____

SLR-EP – 65

Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
HEAT AND MASS TRANSFER

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Assume suitable data **if** required.*
*2) Use of scientific calculator is **allowed**.*
*3) Figure to **right** side indicates **full** marks.*

SECTION – I

2. Solve **any four** out of the following questions : **(4×4=16)**

A) A steel tube (k = 43 W/mK) of 5 cm inner diameter and 7.5 cm outer diameter is covered with 2.5 cm layer of asbestos magnesia (k = 0.2 W/mK). The hot gases are flowing in a tube at 300°C, while outer surface is to ambient at 30°C. Estimate heat loss from 3 m length of tube and temperature drop across the insulation.

B) Explain thermal resistance and electrical analogy for solving heat transfer problems.

C) Derive an expression for critical radius of insulation for cylinder.

D) Explain with neat sketch velocity boundary layer and thermal boundary layer.

E) Determine the rate of heat flow to a spherical boiler which is 2 m in diameter and 2 cm thick steel (k = 58 W/mK). The outside surface and that of fluid inside surface are 30°C and 300°C respectively. Take the inner film resistance as 0.0023 k/W.

F) Air at 1 atm and 20°C flows over a flat plate at 40 m/s. The plate is 80 cm long, 80 cm width and maintained at 80°C. Assuming unit depth in Z direction. Calculate heat transfer rate from plate.

Take k = 0.0273 W/mK, Cp = 1.007 kJ/kgK, Pr = 0.7, $\gamma = 1.906 \times 10^{-5}$ m^2/s

Use the relation $Nu = [0.036 (Re)^{0.8} - 871] (Pr)^{1/3}$

3. Solve **any two** out of the following questions : **(2×6=12)**

A) Derive the three dimensional equation for heat conduction in Cartesian co-ordinates for no heat generation.

B) The aluminium square fins (0.5 mm by 0.5 mm side) of 10 mm long are provided on a surface of semiconductor electronic device to carry 1 watt of energy generated by electronic device. The surface temperature of device should not exceed 80°C when surrounding temperature is 40°C. Find number of fins required to carry out above duty and neglect the heat loss from end. Take thermal conductivity of fin material is 200 W/mK and heat transfer coefficient of surrounding fluid 15 W/m^2K.

C) Using the dimensional analysis show that Nu = f (Gr, Pr) for natural convection.

SECTION – II

4. Solve **any four** out of the following questions : **(4×4=16)**

   A) Explain with neat sketch pool boiling curve.

   B) Explain the following :
      i) Kirchoff's law
      ii) Wein's law.

   C) Differentiate heat transfer and mass transfer.

   D) Write a short note on finite difference methods for solving conduction and convection problems.

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   B) Derive an expression for LMTD of parallel flow heat exchanger.

   C) In a certain double pipe parallel flow heat exchanger hot water flows at a rate of 50000 kg/hr and gets cooled from 95°C to 65°C. At the same time 50000 kg/hr of cooling water at 30°C enters the heat exchanger. The flow conditions are such that overall heat transfer coefficient remains constant at 2270 W/m^2K. Determine the heat transfer area required and effectiveness. Assume for both the streams Cp = 4.2 kJ/kgK.

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SLR-EP – 65

Seat No.	

Set S

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
HEAT AND MASS TRANSFER

Day and Date : Wednesday, 30-11-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 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.*
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5) *Figure to* ***right*** *side indicates* ***full*** *marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Planks law is applicable to _____ radiations.
a) Monochromatic b) Temperature c) Thermal d) None of these

2) Gases have poor
a) Transmissivity b) Absorptivity c) Reflectivity d) All of the above

3) At thermal equilibrium absorptivity is _____ emissivity.
a) Greater than b) Equal to
c) Less than d) None of the above

4) In a heat exchanger, hot fluid enters at 180°C and leaves at 160°C. The cooling fluid enters at 30°C and leaves at 110°C. The capacity ratio of heat exchanger is
a) 0.2 b) 0.33 c) 12.5 d) 0.25

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6) The steady state temperature distribution in a very large thin plate with uniform surface temperature will be
a) Linear b) Hyperbolic c) Parabolic d) Logarithmic

7) Lumped parameter analysis for transient heat conduction is essentially for
a) $Bi < 0.1$ b) $0.1 < Bi < 0.5$
c) $1 < Bi < 10$ d) Bi number is infinity

P.T.O.

8) The requirement of transfer of a large heat is usually met by
   a) increase the length of tube
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9) The normal automobile radiator is a heat exchanger of the type
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   d) cross flow

10) The intensity of solar radiation on earth is
   a) 0.1 kW/m^2 b) 1 kW/m^2 c) 2 kW/m^2 d) 5 kW/m^2

11) Which of the following terms not associated with heat exchanger ?
   a) Mc Adoms correction factor
   b) NTU
   c) Fouling factor
   d) Heat carrying capacity

12) The thermal radiation occurs in the range of electromagnetic waves
   a) 0.1 to 100 microns
   b) 0.01 to 0.0001 microns
   c) 10 to 1000 microns
   d) 0.1 to 10 microns

13) For a hemisphere, solid angle is measured in
   a) Radian and its maximum value of 2*pi
   b) Steradian and its maximum value of pi
   c) Steradian and its maximum value of 2*pi
   d) Radian and its maximum value of pi

14) The convective heat transfer co-efficient for boiling and condensation is usually lie in range of
   a) 50 – 500 W/m^2K
   b) 200 – 2500 W/m^2K
   c) 300 – 5000 W/m^2K
   d) 2500 – 10000 W/m^2K

SLR-EP – 65

Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
HEAT AND MASS TRANSFER

Day and Date : Wednesday, 30-11-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Assume suitable data **if** required.*
*2) Use of scientific calculator is **allowed**.*
*3) Figure to **right** side indicates **full** marks.*

SECTION – I

2. Solve **any four** out of the following questions : **(4×4=16)**

A) A steel tube (k = 43 W/mK) of 5 cm inner diameter and 7.5 cm outer diameter is covered with 2.5 cm layer of asbestos magnesia (k = 0.2 W/mK). The hot gases are flowing in a tube at 300°C, while outer surface is to ambient at 30°C. Estimate heat loss from 3 m length of tube and temperature drop across the insulation.

B) Explain thermal resistance and electrical analogy for solving heat transfer problems.

C) Derive an expression for critical radius of insulation for cylinder.

D) Explain with neat sketch velocity boundary layer and thermal boundary layer.

E) Determine the rate of heat flow to a spherical boiler which is 2 m in diameter and 2 cm thick steel (k = 58 W/mK). The outside surface and that of fluid inside surface are 30°C and 300°C respectively. Take the inner film resistance as 0.0023 k/W.

F) Air at 1 atm and 20°C flows over a flat plate at 40 m/s. The plate is 80 cm long, 80 cm width and maintained at 80°C. Assuming unit depth in Z direction. Calculate heat transfer rate from plate.

Take k = 0.0273 W/mK, Cp = 1.007 kJ/kgK, Pr = 0.7, $\gamma = 1.906 \times 10^{-5}$ m^2/s

Use the relation $Nu = [0.036 (Re)^{0.8} - 871] (Pr)^{1/3}$

3. Solve **any two** out of the following questions : **(2×6=12)**

A) Derive the three dimensional equation for heat conduction in Cartesian co-ordinates for no heat generation.

B) The aluminium square fins (0.5 mm by 0.5 mm side) of 10 mm long are provided on a surface of semiconductor electronic device to carry 1 watt of energy generated by electronic device. The surface temperature of device should not exceed 80°C when surrounding temperature is 40°C. Find number of fins required to carry out above duty and neglect the heat loss from end. Take thermal conductivity of fin material is 200 W/mK and heat transfer coefficient of surrounding fluid 15 W/m^2K.

C) Using the dimensional analysis show that Nu = f (Gr, Pr) for natural convection.

SECTION – II

4. Solve **any four** out of the following questions : **(4×4=16)**

   A) Explain with neat sketch pool boiling curve.

   B) Explain the following :
      i) Kirchoff's law
      ii) Wein's law.

   C) Differentiate heat transfer and mass transfer.

   D) Write a short note on finite difference methods for solving conduction and convection problems.

   E) Explain the classifications of heat exchangers in detail.

   F) Find the percentage reduction in radiation heat transfer with a polished aluminium radiation shield with emissivity of 0.05 when placed between two very large parallel plates with emissivities of 0.5 and 0.3.

5. Solve **any two** out of the following questions : **(2×6=12)**

   A) The radiation shape factor for circular surface of thin hollow cylinder of 10 cm diameter and 10 cm long is 0.1716. What is the shape factor curved surface of the cylinder with respect to itself ?

   B) Derive an expression for LMTD of parallel flow heat exchanger.

   C) In a certain double pipe parallel flow heat exchanger hot water flows at a rate of 50000 kg/hr and gets cooled from 95°C to 65°C. At the same time 50000 kg/hr of cooling water at 30°C enters the heat exchanger. The flow conditions are such that overall heat transfer coefficient remains constant at 2270 W/m^2K. Determine the heat transfer area required and effectiveness. Assume for both the streams Cp = 4.2 kJ/kgK.

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SLR-EP – 66

Seat No.	

Set P

T.E. (Mechanical Engineering) (Part – I) (New) (CGPA) Examination, 2016
METALLURGY

Day and Date : Friday, 2-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 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 no. 3 of answer sheet.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Choose the correct answer : **(1×6=6)**

1) Which of the following element causes grain coarsening in steels ?
a) Cobalt b) Molybdenum c) Niobium d) Chromium

2) Which of the following treatment is based on isothermal transformation of austenite ?
a) Annealing b) Normalizing c) Patenting d) Tempering

3) Which of the following treatments is carried out to restore ductility of cold worked parts ?
a) Homogenisation b) Spherodising
c) Recovery d) Recrystallisation annealing

4) Which hardness test is recommended to measure hardness of Razor blade ?
a) Rockwell b) Brinell
c) Shore's scleroscope d) Vicker's

5) Which of the following alloy is precipitation hardened ?
a) Brass b) Tin bronze c) Duralumin d) Aluminum bronze

6) To produce tungsten powder which of the following method is employed ?
a) Reduction method b) Carbonyl method
c) Electrodeposition d) Atomisation

P.T.O.

B) Choose the correct answer : **(2×4=8)**

1) Which of the following steels are oil hardened ?
   a) HCHC steels
   b) HSLA steel
   c) Hadfield 'Mn' steel
   d) HSS steel

2) Which of the following steels essentially contain 'Nickel' as an alloying element ?
   a) Ferritic stainless steels
   b) Austenitic stainless steels
   c) HCHC steels
   d) Marging steels

3) To determine cracks on surface and just below the surface of component which of the following NDT methods are commonly employed ?
   a) Radiography
   b) Ultrasonic test
   c) Dye penetrant test
   d) Magnetic Particle test

4) Which of the following products are manufactured by PM ?
   a) Tungsten filament in bulb
   b) Camshaft for automotive
   c) Cylinder block
   d) Electric contact material

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SLR-EP – 66

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (New) (CGPA) Examination, 2016
METALLURGY

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) ***Neat*** *sketches must be drawn* ***wherever*** *necessary.*
3) Assume additional suitable data wherever ***necessary*** *and mention it* ***clearly****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures correctly. **6**

   b) Explain the significance of A_1 and A_3 temperature. **2**

   c) Explain the eutectoid transformation and its significance. **3**

   d) Compare between Austenitic stainless steels and Ferritic stainless steels. **3**

3. a) Give typical composition, property and application of any 5 of the following : **10**

      i) HCHC steel

      ii) Free cutting steel

      iii) OHNS steel

      iv) Spring steel

      v) Muntz metal

      vi) Tinman's solder

      vii) Bell metal.

   b) Explain the steps in Precipitation hardening of Al-Cu system with neat sketch. **4**

4. Answer the following **(any four)** : **14**
   a) Explain the application of lever arm principle.
   b) Draw neat sketch of interstitial and substitutional solid solution.
   c) Compare between S.G. Iron and malleable iron.
   d) Explain why Copper is an essential constituent of babbits.
   e) What are composites ? What are their applications ?
   f) Explain the effect of Ni and Mn on properties of steel.

SECTION – II

5. a) Draw T-T-T diagram for eutectoid steel and label it correctly. **4**
   b) Explain characteristics of martensitic transformation. **3**
   c) Compare between Annealing and Normalising. **4**
   d) Explain the purposes of tempering. **3**

6. a) Enlist various methods of hardening. **3**
   b) Explain the advantages of induction hardening. **3**
   c) What are the advantages of Carbonitriding over gas carburising ? **3**
   d) Explain the set up for Charpy and Izod impact test and significance of impact test. **5**

7. a) Draw creep-curve and explain the creep phenomena. **4**
   b) Compare between X-ray radiography and γ-ray radiography. **3**
   c) Enlist various methods of powder manufacturing. **3**
   d) Explain flow chart for manufacturing of cemented carbide cutting tools. **4**

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SLR-EP – 66

Seat No.	

Set Q

T.E. (Mechanical Engineering) (Part – I) (New) (CGPA) Examination, 2016
METALLURGY

Day and Date : Friday, 2-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 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 no. 3 of answer sheet.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Choose the correct answer : **(1×6=6)**

1) Which of the following alloy is precipitation hardened ?
a) Brass b) Tin bronze c) Duralumin d) Aluminum bronze

2) Which hardness test is recommended to measure hardness of Razor blade ?
a) Rockwell b) Brinell
c) Shore's scleroscope d) Vicker's

3) Which of the following treatment is based on isothermal transformation of austenite ?
a) Annealing b) Normalizing c) Patenting d) Tempering

4) To produce tungsten powder which of the following method is employed ?
a) Reduction method b) Carbonyl method
c) Electrodeposition d) Atomisation

5) Which of the following element causes grain coarsening in steels ?
a) Cobalt b) Molybdenum c) Niobium d) Chromium

6) Which of the following treatments is carried out to restore ductility of cold worked parts ?
a) Homogenisation b) Spherodising
c) Recovery d) Recrystallisation annealing

P.T.O.

B) Choose the correct answer : **(2×4=8)**

1) Which of the following steels essentially contain 'Nickel' as an alloying element ?
   a) Ferritic stainless steels
   b) Austenitic stainless steels
   c) HCHC steels
   d) Marging steels

2) Which of the following products are manufactured by PM ?
   a) Tungsten filament in bulb
   b) Camshaft for automotive
   c) Cylinder block
   d) Electric contact material

3) Which of the following steels are oil hardened ?
   a) HCHC steels
   b) HSLA steel
   c) Hadfield 'Mn' steel
   d) HSS steel

4) To determine cracks on surface and just below the surface of component which of the following NDT methods are commonly employed ?
   a) Radiography
   b) Ultrasonic test
   c) Dye penetrant test
   d) Magnetic Particle test

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SLR-EP – 66

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (New) (CGPA) Examination, 2016
METALLURGY

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Attempt **any two** questions from **each** Section.*
*2) **Neat** sketches must be drawn **wherever** necessary.*
*3) Assume additional suitable data wherever **necessary** and mention it **clearly**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures correctly. **6**

   b) Explain the significance of A_1 and A_3 temperature. **2**

   c) Explain the eutectoid transformation and its significance. **3**

   d) Compare between Austenitic stainless steels and Ferritic stainless steels. **3**

3. a) Give typical composition, property and application of any 5 of the following : **10**

      i) HCHC steel

      ii) Free cutting steel

      iii) OHNS steel

      iv) Spring steel

      v) Muntz metal

      vi) Tinman's solder

      vii) Bell metal.

   b) Explain the steps in Precipitation hardening of Al-Cu system with neat sketch. **4**

4. Answer the following **(any four)** : **14**
   a) Explain the application of lever arm principle.
   b) Draw neat sketch of interstitial and substitutional solid solution.
   c) Compare between S.G. Iron and malleable iron.
   d) Explain why Copper is an essential constituent of babbits.
   e) What are composites ? What are their applications ?
   f) Explain the effect of Ni and Mn on properties of steel.

SECTION – II

5. a) Draw T-T-T diagram for eutectoid steel and label it correctly. **4**
   b) Explain characteristics of martensitic transformation. **3**
   c) Compare between Annealing and Normalising. **4**
   d) Explain the purposes of tempering. **3**

6. a) Enlist various methods of hardening. **3**
   b) Explain the advantages of induction hardening. **3**
   c) What are the advantages of Carbonitriding over gas carburising ? **3**
   d) Explain the set up for Charpy and Izod impact test and significance of impact test. **5**

7. a) Draw creep-curve and explain the creep phenomena. **4**
   b) Compare between X-ray radiography and γ-ray radiography. **3**
   c) Enlist various methods of powder manufacturing. **3**
   d) Explain flow chart for manufacturing of cemented carbide cutting tools. **4**

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SLR-EP – 66

Seat No.	

Set R

T.E. (Mechanical Engineering) (Part – I) (New) (CGPA) Examination, 2016
METALLURGY

Day and Date : Friday, 2-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 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 no. 3 of answer sheet.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Choose the correct answer : **(1×6=6)**

1) Which hardness test is recommended to measure hardness of Razor blade ?
   a) Rockwell b) Brinell
   c) Shore's scleroscope d) Vicker's

2) Which of the following element causes grain coarsening in steels ?
   a) Cobalt b) Molybdenum c) Niobium d) Chromium

3) Which of the following alloy is precipitation hardened ?
   a) Brass b) Tin bronze c) Duralumin d) Aluminum bronze

4) Which of the following treatments is carried out to restore ductility of cold worked parts ?
   a) Homogenisation b) Spherodising
   c) Recovery d) Recrystallisation annealing

5) To produce tungsten powder which of the following method is employed ?
   a) Reduction method b) Carbonyl method
   c) Electrodeposition d) Atomisation

6) Which of the following treatment is based on isothermal transformation of austenite ?
   a) Annealing b) Normalizing c) Patenting d) Tempering

B) Choose the correct answer : **(2×4=8)**

1) To determine cracks on surface and just below the surface of component which of the following NDT methods are commonly employed ?
   a) Radiography
   b) Ultrasonic test
   c) Dye penetrant test
   d) Magnetic Particle test

2) Which of the following steels are oil hardened ?
   a) HCHC steels
   b) HSLA steel
   c) Hadfield 'Mn' steel
   d) HSS steel

3) Which of the following products are manufactured by PM ?
   a) Tungsten filament in bulb
   b) Camshaft for automotive
   c) Cylinder block
   d) Electric contact material

4) Which of the following steels essentially contain 'Nickel' as an alloying element ?
   a) Ferritic stainless steels
   b) Austenitic stainless steels
   c) HCHC steels
   d) Marging steels

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SLR-EP – 66

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (New) (CGPA) Examination, 2016
METALLURGY

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) ***Neat*** *sketches must be drawn* ***wherever*** *necessary.*
3) Assume additional suitable data wherever ***necessary*** *and mention it* ***clearly****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures correctly. **6**

   b) Explain the significance of A_1 and A_3 temperature. **2**

   c) Explain the eutectoid transformation and its significance. **3**

   d) Compare between Austenitic stainless steels and Ferritic stainless steels. **3**

3. a) Give typical composition, property and application of any 5 of the following : **10**

      i) HCHC steel

      ii) Free cutting steel

      iii) OHNS steel

      iv) Spring steel

      v) Muntz metal

      vi) Tinman's solder

      vii) Bell metal.

   b) Explain the steps in Precipitation hardening of Al-Cu system with neat sketch. **4**

4. Answer the following **(any four)** : **14**
   a) Explain the application of lever arm principle.
   b) Draw neat sketch of interstitial and substitutional solid solution.
   c) Compare between S.G. Iron and malleable iron.
   d) Explain why Copper is an essential constituent of babbits.
   e) What are composites ? What are their applications ?
   f) Explain the effect of Ni and Mn on properties of steel.

SECTION – II

5. a) Draw T-T-T diagram for eutectoid steel and label it correctly. **4**
   b) Explain characteristics of martensitic transformation. **3**
   c) Compare between Annealing and Normalising. **4**
   d) Explain the purposes of tempering. **3**

6. a) Enlist various methods of hardening. **3**
   b) Explain the advantages of induction hardening. **3**
   c) What are the advantages of Carbonitriding over gas carburising ? **3**
   d) Explain the set up for Charpy and Izod impact test and significance of impact test. **5**

7. a) Draw creep-curve and explain the creep phenomena. **4**
   b) Compare between X-ray radiography and γ-ray radiography. **3**
   c) Enlist various methods of powder manufacturing. **3**
   d) Explain flow chart for manufacturing of cemented carbide cutting tools. **4**

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SLR-EP – 66

Seat No.	

Set S

T.E. (Mechanical Engineering) (Part – I) (New) (CGPA) Examination, 2016
METALLURGY

Day and Date : Friday, 2-12-2016 Total Marks : 70
Time : 10.00 a.m. to 1.00 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 no. 3 of answer sheet.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Choose the correct answer : **(1×6=6)**

1) To produce tungsten powder which of the following method is employed ?
   a) Reduction method b) Carbonyl method
   c) Electrodeposition d) Atomisation

2) Which of the following alloy is precipitation hardened ?
   a) Brass b) Tin bronze c) Duralumin d) Aluminum bronze

3) Which hardness test is recommended to measure hardness of Razor blade ?
   a) Rockwell b) Brinell
   c) Shore's scleroscope d) Vicker's

4) Which of the following treatment is based on isothermal transformation of austenite ?
   a) Annealing b) Normalizing c) Patenting d) Tempering

5) Which of the following treatments is carried out to restore ductility of cold worked parts ?
   a) Homogenisation b) Spherodising
   c) Recovery d) Recrystallisation annealing

6) Which of the following element causes grain coarsening in steels ?
   a) Cobalt b) Molybdenum c) Niobium d) Chromium

P.T.O.

B) Choose the correct answer : **(2×4=8)**

1) Which of the following products are manufactured by PM ?
   a) Tungsten filament in bulb
   b) Camshaft for automotive
   c) Cylinder block
   d) Electric contact material

2) To determine cracks on surface and just below the surface of component which of the following NDT methods are commonly employed ?
   a) Radiography
   b) Ultrasonic test
   c) Dye penetrant test
   d) Magnetic Particle test

3) Which of the following steels essentially contain 'Nickel' as an alloying element ?
   a) Ferritic stainless steels
   b) Austenitic stainless steels
   c) HCHC steels
   d) Marging steels

4) Which of the following steels are oil hardened ?
   a) HCHC steels
   b) HSLA steel
   c) Hadfield 'Mn' steel
   d) HSS steel

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SLR-EP – 66

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (New) (CGPA) Examination, 2016
METALLURGY

Day and Date : Friday, 2-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) ***Neat*** *sketches must be drawn* ***wherever*** *necessary.*
3) Assume additional suitable data wherever ***necessary*** *and mention it* ***clearly****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures correctly. **6**

   b) Explain the significance of A_1 and A_3 temperature. **2**

   c) Explain the eutectoid transformation and its significance. **3**

   d) Compare between Austenitic stainless steels and Ferritic stainless steels. **3**

3. a) Give typical composition, property and application of any 5 of the following : **10**

      i) HCHC steel

      ii) Free cutting steel

      iii) OHNS steel

      iv) Spring steel

      v) Muntz metal

      vi) Tinman's solder

      vii) Bell metal.

   b) Explain the steps in Precipitation hardening of Al-Cu system with neat sketch. **4**

4. Answer the following **(any four)** : **14**
   a) Explain the application of lever arm principle.
   b) Draw neat sketch of interstitial and substitutional solid solution.
   c) Compare between S.G. Iron and malleable iron.
   d) Explain why Copper is an essential constituent of babbits.
   e) What are composites ? What are their applications ?
   f) Explain the effect of Ni and Mn on properties of steel.

SECTION – II

5. a) Draw T-T-T diagram for eutectoid steel and label it correctly. **4**
   b) Explain characteristics of martensitic transformation. **3**
   c) Compare between Annealing and Normalising. **4**
   d) Explain the purposes of tempering. **3**

6. a) Enlist various methods of hardening. **3**
   b) Explain the advantages of induction hardening. **3**
   c) What are the advantages of Carbonitriding over gas carburising ? **3**
   d) Explain the set up for Charpy and Izod impact test and significance of impact test. **5**

7. a) Draw creep-curve and explain the creep phenomena. **4**
   b) Compare between X-ray radiography and γ-ray radiography. **3**
   c) Enlist various methods of powder manufacturing. **3**
   d) Explain flow chart for manufacturing of cemented carbide cutting tools. **4**

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SLR-EP – 67

Seat No.	

Set P

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
MACHINE DESIGN – I

Day and Date : Monday, 5-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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.***
*3) Solve **any two** questions from **each** Section **I** and **II**.*
*4) Make **necessary** assumptions, if required and mention it **clearly**.*
*5) Figures to the **right** indicate **full** marks.*
*6) **Use** of non-programmable calculator is **permitted**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Solve Multiple Correct Answers : **8**

(**Note : All** responses must be correct, that carries **2** marks otherwise **zero** marks).

i) Selection of factor of safety is based on
   a) Reliability of applied load
   b) Extent of localized stresses
   c) Extent of loss of life if failure occurs
   d) Extent of loss of property if failure occurs

ii) For completely reversed stresses/loading
   a) Mean stress is zero and amplitude stress is non zero
   b) Amplitude stress is zero and Mean stress is non zero
   c) Problems can be solved by S-N curve
   d) Problems can be solved by Modified Goodman diagram

iii) Spring deflection is proportional to
a) Load acting b) Number of turns
c) Modulus of rigidity d) None of a), b), c)

iv) In machining considerations for design
a) Avoid machining
b) Use stock dimensions
c) Maintain the parts under compression
d) Avoid concentration of the material at junction

B) Solve Multiple Choice Questions i. e. MCQ : **6**

(**Note :** One option is correct, that carries **1** mark).

i) Surgical instruments are prepared from
a) Cast iron b) Mild steel
c) Plastic d) Stainless steel

ii) Fatigue is dangerous due to occurrence of _____ failure.
a) Slow b) Sudden
c) Corrosive d) Erosive

iii) Most suitable material for lathe bed is _____ due to the property of _____
a) Grey cast iron-yield strength b) Grey cast iron-damping
c) Mild steel d) Stainless steel

iv) Spring used for wrist watch is
a) Spiral b) Helical spring S
c) Torsion spring d) Belleville spring

v) For a bushed pin type flexible coupling, pin failure is on the basis of
a) Shear-bending b) Shear-fatigue
c) Torsion d) Buckling

vi) As per ASME code for shaft design, maximum permissible value of shear stress is taken as
a) 0.3 Syt or 0.18 Syt, whichever is maximum
b) 0.3 Syt or 0.18 Syt, whichever is minimum
c) 0.18 Syt or 0.3 Syt, whichever is maximum
d) 0.18 Syt or 0.3 Syt, whichever is minimum

SLR-EP – 67

Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
MACHINE DESIGN – I

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section **I** and **II**.*
*2) Make **necessary** assumptions, if required and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Use** of non-programmable calculator is **permitted**.*

SECTION – I

2. a) Explain factors for selection of material. **3**

   b) Define factor of safety. Discuss the factors affecting selection of factor of safety. **4**

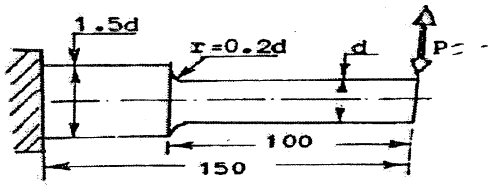
   c) It is required to select a flat belt drive to connect two transmission shafts rotating at 800 rpm and 400 rpm respectively. The centre to centre distance between the shafts is approximately 3 m and the belt drive is open-type. The power transmitted by the belt is 30 kW. The belt should operate at a velocity between 17.8 to 22.9 m/s. The power transmitting capacity of the belt per mm width per ply at 180° arc of contact and at a belt velocity of 5.08 m/s is 0.0147 kW. Select preferred pulley diameters and specify the belt. Take load correction factor Fa = 1.3. **7**

3. a) Write in brief about cyclic stresses. **3**

   b) Discuss modified Goodman diagram. **4**

   c) A cantilever beam made of cold drawn steel 40C8 (S_{ut} = 600 N/mm^2, S_{yt} = 380 N/mm^2) is subjected to fluctuating bending moment which varies from + 15000 N-mm to – 5000 N-mm. The expected reliability is 90% and factor of safety is 2. **7**

K_a = surface finish factor = 0.76
K_b = size factor = 0.85
K_c = reliability factor = 0.897
K_d = modifying factor = 0.735
Determine the diameter of shaft.



4. a) Write down the strength equations for various failure modes to be considered for design of cotter joint with necessary sketches. **7**

   b) A lever loaded safety valve is 70 mm in diameter. It is required to blow-off at a pressure of 1.5 N/mm^2. The length of the lever is 1000 mm. The distance between the fulcrum and toggle is 100 mm. Determine the amount of dead weight to be put at the end of the lever. Also, determine the size of the rectangular cross section of the lever and the size of pins at the fulcrum and the toggle. User following permissible stresses :

   Tensile stress = 60 MPa, Shear stress = 50 MPa and bearing pressure = 12 MPa. Assume length of pin = 1.5 × diameter of pin and b = 3t. **7**

SECTION – II

5. a) Discuss the design considerations for casting. **3**

   b) Discuss ASME code for shaft design. **4**

   c) Design a shaft to transmit power from an electric motor to a machine spindle through a pulley by means of a belt drive. The pulley weighs 300 N and is located at 250 mm from the centre of the bearing. The diameter of the pulley is 150 mm and the maximum power transmitted is 2.5 kW at 150 r.p.m. The angle of lap of the belt is 180° and coefficient of friction between the belt and the pulley is 0.3. The shock and fatigue factors as per ASME are 1.5 and 2.0 respectively. Assume a factor of safety of 4 and consider S_{yt} for the shaft material as 280 N/mm^2. **7**

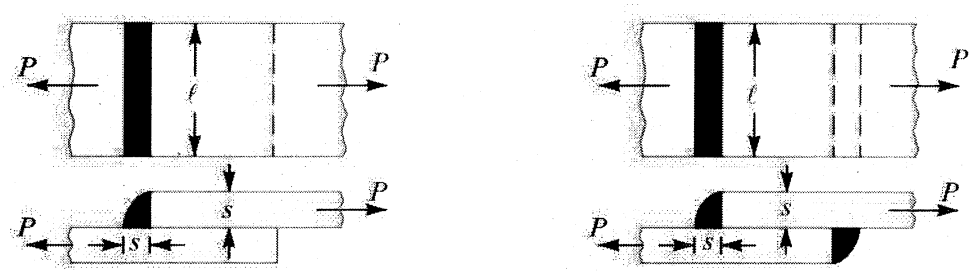
6. a) Discuss the design considerations for forging. **3**

   b) Discuss construction of leaf spring. **4**

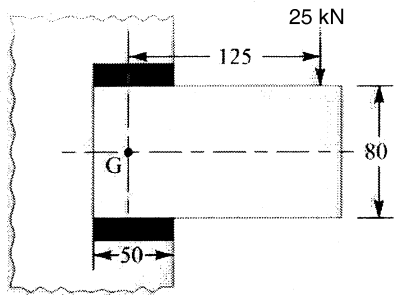
   c) Design a close coiled helical compression spring for a service load ranging from 3100 N to 3800 N. The axial deflection of the spring for the load range is 8 mm. Assume a spring index of 6. The permissible shear stress intensity is 400 N/mm^2 and modulus of rigidity, G = 84 kN/mm^2. Consider Wahl's factor and assume squared and ground ends for the spring. **7**

7. a) Discuss advantages and limitations of bolted and welded joints. **3**

   b) Design the single transverse and double transverse fillet weld (as shown in Fig. with usual notations). **4**



   c) A bracket carrying a load of 25 kN is to be welded as shown in Fig. Find the size of weld required. Take Syt = 300 N/mm^2 and a factor of safety as 2. **7**



Design data for Selection of Flat-Belt

Arc of Contact factor

α s	120	130	140	150	160	170	180	190	200
Fd	1.33	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard with of belts

3-Ply	25	40	50	63	76					
4-Ply	40	44	50	63	76	90	100	112	125	152
5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

Power Transmitting Capacities

HI-SPEED	0.0118 kW per mm width per ply
FORT	0.0147 kW per mm width per ply

Preferred Pulley Diameters

Pitch Diameter (mm)		125	132	140	150	160	170	180	190	200
212	224	236	250	265	280	300	315	355	375	
400	425	450	475	500	530	560	600	630	670	
710	750	800	900	1000						

SLR-EP – 67

Seat No.	

Set Q

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
MACHINE DESIGN – I

Day and Date : Monday, 5-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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.***
*3) Solve **any two** questions from **each** Section **I** and **II**.*
*4) Make **necessary** assumptions, if required and mention it **clearly**.*
*5) Figures to the **right** indicate **full** marks.*
*6) **Use** of non-programmable calculator is **permitted**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Solve Multiple Correct Answers : **8**

(**Note : All** responses must be correct, that carries **2** marks otherwise **zero** marks).

i) In machining considerations for design
   a) Avoid machining
   b) Use stock dimensions
   c) Maintain the parts under compression
   d) Avoid concentration of the material at junction

ii) Selection of factor of safety is based on
   a) Reliability of applied load
   b) Extent of localized stresses
   c) Extent of loss of life if failure occurs
   d) Extent of loss of property if failure occurs

iii) For completely reversed stresses/loading
a) Mean stress is zero and amplitude stress is non zero
b) Amplitude stress is zero and Mean stress is non zero
c) Problems can be solved by S-N curve
d) Problems can be solved by Modified Goodman diagram

iv) Spring deflection is proportional to
a) Load acting b) Number of turns
c) Modulus of rigidity d) None of a), b), c)

B) Solve Multiple Choice Questions i. e. MCQ : **6**

(**Note :** One option is correct, that carries **1** mark).

i) For a bushed pin type flexible coupling, pin failure is on the basis of
a) Shear-bending b) Shear-fatigue
c) Torsion d) Buckling

ii) As per ASME code for shaft design, maximum permissible value of shear stress is taken as
a) 0.3 Syt or 0.18 Syt, whichever is maximum
b) 0.3 Syt or 0.18 Syt, whichever is minimum
c) 0.18 Syt or 0.3 Syt, whichever is maximum
d) 0.18 Syt or 0.3 Syt, whichever is minimum

iii) Surgical instruments are prepared from
a) Cast iron b) Mild steel
c) Plastic d) Stainless steel

iv) Fatigue is dangerous due to occurrence of _____ failure.
a) Slow b) Sudden
c) Corrosive d) Erosive

v) Most suitable material for lathe bed is _____ due to the property of _____
a) Grey cast iron-yield strength b) Grey cast iron-damping
c) Mild steel d) Stainless steel

vi) Spring used for wrist watch is
a) Spiral b) Helical spring S
c) Torsion spring d) Belleville spring

_____

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Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
MACHINE DESIGN – I

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section **I** and **II**.*
*2) Make **necessary** assumptions, if required and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Use** of non-programmable calculator is **permitted**.*

SECTION – I

2. a) Explain factors for selection of material. **3**

   b) Define factor of safety. Discuss the factors affecting selection of factor of safety. **4**

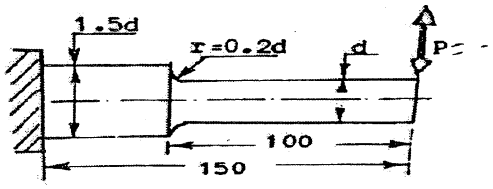
   c) It is required to select a flat belt drive to connect two transmission shafts rotating at 800 rpm and 400 rpm respectively. The centre to centre distance between the shafts is approximately 3 m and the belt drive is open-type. The power transmitted by the belt is 30 kW. The belt should operate at a velocity between 17.8 to 22.9 m/s. The power transmitting capacity of the belt per mm width per ply at 180° arc of contact and at a belt velocity of 5.08 m/s is 0.0147 kW. Select preferred pulley diameters and specify the belt. Take load correction factor Fa = 1.3. **7**

3. a) Write in brief about cyclic stresses. **3**

   b) Discuss modified Goodman diagram. **4**

   c) A cantilever beam made of cold drawn steel 40C8 (S_{ut} = 600 N/mm^2, S_{yt} = 380 N/mm^2) is subjected to fluctuating bending moment which varies from + 15000 N-mm to – 5000 N-mm. The expected reliability is 90% and factor of safety is 2. **7**

K_a = surface finish factor = 0.76
K_b = size factor = 0.85
K_c = reliability factor = 0.897
K_d = modifying factor = 0.735
Determine the diameter of shaft.



4. a) Write down the strength equations for various failure modes to be considered for design of cotter joint with necessary sketches. **7**

   b) A lever loaded safety valve is 70 mm in diameter. It is required to blow-off at a pressure of 1.5 N/mm^2. The length of the lever is 1000 mm. The distance between the fulcrum and toggle is 100 mm. Determine the amount of dead weight to be put at the end of the lever. Also, determine the size of the rectangular cross section of the lever and the size of pins at the fulcrum and the toggle. User following permissible stresses :

   Tensile stress = 60 MPa, Shear stress = 50 MPa and bearing pressure = 12 MPa. Assume length of pin = 1.5 × diameter of pin and b = 3t. **7**

SECTION – II

5. a) Discuss the design considerations for casting. **3**

   b) Discuss ASME code for shaft design. **4**

   c) Design a shaft to transmit power from an electric motor to a machine spindle through a pulley by means of a belt drive. The pulley weighs 300 N and is located at 250 mm from the centre of the bearing. The diameter of the pulley is 150 mm and the maximum power transmitted is 2.5 kW at 150 r.p.m. The angle of lap of the belt is 180° and coefficient of friction between the belt and the pulley is 0.3. The shock and fatigue factors as per ASME are 1.5 and 2.0 respectively. Assume a factor of safety of 4 and consider S_{yt} for the shaft material as 280 N/mm^2. **7**

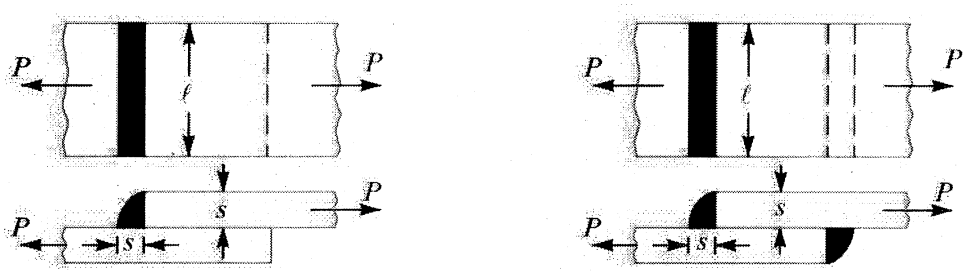
6. a) Discuss the design considerations for forging. **3**

   b) Discuss construction of leaf spring. **4**

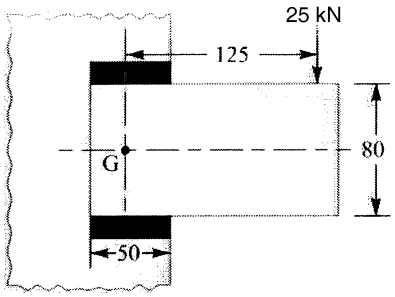
   c) Design a close coiled helical compression spring for a service load ranging from 3100 N to 3800 N. The axial deflection of the spring for the load range is 8 mm. Assume a spring index of 6. The permissible shear stress intensity is 400 N/mm^2 and modulus of rigidity, G = 84 kN/mm^2. Consider Wahl's factor and assume squared and ground ends for the spring. **7**

7. a) Discuss advantages and limitations of bolted and welded joints. **3**

   b) Design the single transverse and double transverse fillet weld (as shown in Fig. with usual notations). **4**



   c) A bracket carrying a load of 25 kN is to be welded as shown in Fig. Find the size of weld required. Take Syt = 300 N/mm^2 and a factor of safety as 2. **7**



Design data for Selection of Flat-Belt

Arc of Contact factor

α s	120	130	140	150	160	170	180	190	200
Fd	1.33	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard with of belts

3-Ply	25	40	50	63	76					
4-Ply	40	44	50	63	76	90	100	112	125	152
5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

Power Transmitting Capacities

HI-SPEED	0.0118 kW per mm width per ply
FORT	0.0147 kW per mm width per ply

Preferred Pulley Diameters

Pitch Diameter (mm)		125	132	140	150	160	170	180	190	200
212	224	236	250	265	280	300	315	355	375	
400	425	450	475	500	530	560	600	630	670	
710	750	800	900	1000						

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Seat No.	

Set R

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
MACHINE DESIGN – I

Day and Date : Monday, 5-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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.***
*3) Solve **any two** questions from **each** Section **I** and **II**.*
*4) Make **necessary** assumptions, if required and mention it **clearly**.*
*5) Figures to the **right** indicate **full** marks.*
*6) **Use** of non-programmable calculator is **permitted**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Solve Multiple Correct Answers : **8**

(**Note : All** responses must be correct, that carries **2** marks otherwise **zero** marks).

i) Spring deflection is proportional to
   a) Load acting
   b) Number of turns
   c) Modulus of rigidity
   d) None of a), b), c)

ii) In machining considerations for design
   a) Avoid machining
   b) Use stock dimensions
   c) Maintain the parts under compression
   d) Avoid concentration of the material at junction

iii) Selection of factor of safety is based on
   a) Reliability of applied load
   b) Extent of localized stresses
   c) Extent of loss of life if failure occurs
   d) Extent of loss of property if failure occurs

P.T.O.

iv) For completely reversed stresses/loading
   a) Mean stress is zero and amplitude stress is non zero
   b) Amplitude stress is zero and Mean stress is non zero
   c) Problems can be solved by S-N curve
   d) Problems can be solved by Modified Goodman diagram

B) Solve Multiple Choice Questions i. e. MCQ : **6**

(**Note :** One option is correct, that carries **1** mark).

i) Spring used for wrist watch is
   a) Spiral b) Helical spring S
   c) Torsion spring d) Belleville spring

ii) For a bushed pin type flexible coupling, pin failure is on the basis of
   a) Shear-bending b) Shear-fatigue
   c) Torsion d) Buckling

iii) As per ASME code for shaft design, maximum permissible value of shear stress is taken as
   a) 0.3 Syt or 0.18 Syt, whichever is maximum
   b) 0.3 Syt or 0.18 Syt, whichever is minimum
   c) 0.18 Syt or 0.3 Syt, whichever is maximum
   d) 0.18 Syt or 0.3 Syt, whichever is minimum

iv) Surgical instruments are prepared from
   a) Cast iron b) Mild steel
   c) Plastic d) Stainless steel

v) Fatigue is dangerous due to occurrence of _____ failure.
   a) Slow b) Sudden
   c) Corrosive d) Erosive

vi) Most suitable material for lathe bed is _____ due to the property of _____
   a) Grey cast iron-yield strength b) Grey cast iron-damping
   c) Mild steel d) Stainless steel

_____

SLR-EP – 67

Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
MACHINE DESIGN – I

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section **I** and **II**.*
*2) Make **necessary** assumptions, if required and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Use** of non-programmable calculator is **permitted**.*

SECTION – I

2. a) Explain factors for selection of material. **3**

   b) Define factor of safety. Discuss the factors affecting selection of factor of safety. **4**

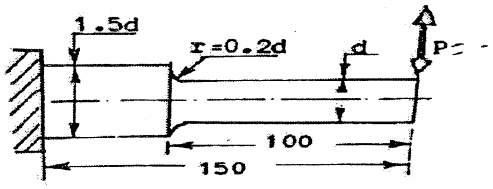
   c) It is required to select a flat belt drive to connect two transmission shafts rotating at 800 rpm and 400 rpm respectively. The centre to centre distance between the shafts is approximately 3 m and the belt drive is open-type. The power transmitted by the belt is 30 kW. The belt should operate at a velocity between 17.8 to 22.9 m/s. The power transmitting capacity of the belt per mm width per ply at 180° arc of contact and at a belt velocity of 5.08 m/s is 0.0147 kW. Select preferred pulley diameters and specify the belt. Take load correction factor Fa = 1.3. **7**

3. a) Write in brief about cyclic stresses. **3**

   b) Discuss modified Goodman diagram. **4**

   c) A cantilever beam made of cold drawn steel 40C8 (S_{ut} = 600 N/mm^2, S_{yt} = 380 N/mm^2) is subjected to fluctuating bending moment which varies from + 15000 N-mm to – 5000 N-mm. The expected reliability is 90% and factor of safety is 2. **7**

K_a = surface finish factor = 0.76
K_b = size factor = 0.85
K_c = reliability factor = 0.897
K_d = modifying factor = 0.735
Determine the diameter of shaft.



4. a) Write down the strength equations for various failure modes to be considered for design of cotter joint with necessary sketches. **7**

   b) A lever loaded safety valve is 70 mm in diameter. It is required to blow-off at a pressure of 1.5 N/mm^2. The length of the lever is 1000 mm. The distance between the fulcrum and toggle is 100 mm. Determine the amount of dead weight to be put at the end of the lever. Also, determine the size of the rectangular cross section of the lever and the size of pins at the fulcrum and the toggle. User following permissible stresses :

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SECTION – II

5. a) Discuss the design considerations for casting. **3**

   b) Discuss ASME code for shaft design. **4**

   c) Design a shaft to transmit power from an electric motor to a machine spindle through a pulley by means of a belt drive. The pulley weighs 300 N and is located at 250 mm from the centre of the bearing. The diameter of the pulley is 150 mm and the maximum power transmitted is 2.5 kW at 150 r.p.m. The angle of lap of the belt is 180° and coefficient of friction between the belt and the pulley is 0.3. The shock and fatigue factors as per ASME are 1.5 and 2.0 respectively. Assume a factor of safety of 4 and consider S_{yt} for the shaft material as 280 N/mm^2. **7**

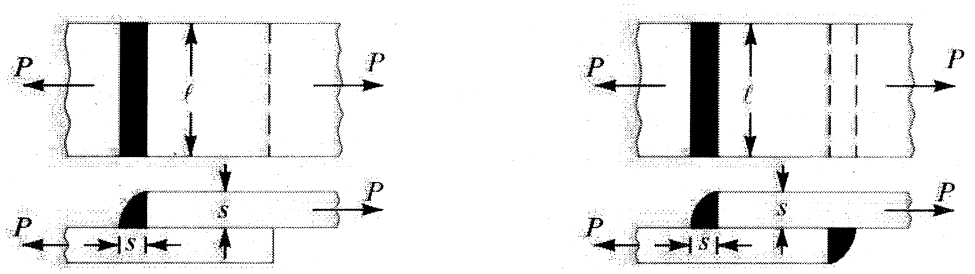
6. a) Discuss the design considerations for forging. **3**

   b) Discuss construction of leaf spring. **4**

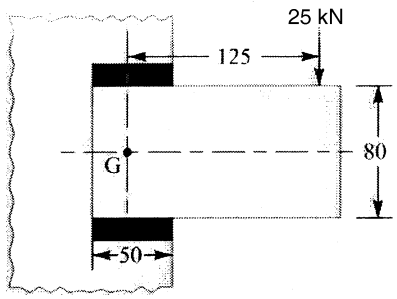
   c) Design a close coiled helical compression spring for a service load ranging from 3100 N to 3800 N. The axial deflection of the spring for the load range is 8 mm. Assume a spring index of 6. The permissible shear stress intensity is 400 N/mm^2 and modulus of rigidity, G = 84 kN/mm^2. Consider Wahl's factor and assume squared and ground ends for the spring. **7**

7. a) Discuss advantages and limitations of bolted and welded joints. **3**

   b) Design the single transverse and double transverse fillet weld (as shown in Fig. with usual notations). **4**



   c) A bracket carrying a load of 25 kN is to be welded as shown in Fig. Find the size of weld required. Take Syt = 300 N/mm^2 and a factor of safety as 2. **7**



Design data for Selection of Flat-Belt

Arc of Contact factor

α s	120	130	140	150	160	170	180	190	200
Fd	1.33	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard with of belts

3-Ply	25	40	50	63	76					
4-Ply	40	44	50	63	76	90	100	112	125	152
5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

Power Transmitting Capacities

HI-SPEED	0.0118 kW per mm width per ply
FORT	0.0147 kW per mm width per ply

Preferred Pulley Diameters

Pitch Diameter (mm)		125	132	140	150	160	170	180	190	200
212	224	236	250	265	280	300	315	355	375	
400	425	450	475	500	530	560	600	630	670	
710	750	800	900	1000						

SLR-EP – 67

Seat No.	

Set S

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
MACHINE DESIGN – I

Day and Date : Monday, 5-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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.***
*3) Solve **any two** questions from **each** Section **I** and **II**.*
*4) Make **necessary** assumptions, if required and mention it **clearly**.*
*5) Figures to the **right** indicate **full** marks.*
*6) **Use** of non-programmable calculator is **permitted**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Solve Multiple Correct Answers : **8**

(**Note : All** responses must be correct, that carries **2** marks otherwise **zero** marks).

i) For completely reversed stresses/loading
   a) Mean stress is zero and amplitude stress is non zero
   b) Amplitude stress is zero and Mean stress is non zero
   c) Problems can be solved by S-N curve
   d) Problems can be solved by Modified Goodman diagram

ii) Spring deflection is proportional to
   a) Load acting b) Number of turns
   c) Modulus of rigidity d) None of a), b), c)

iii) In machining considerations for design
   a) Avoid machining
   b) Use stock dimensions
   c) Maintain the parts under compression
   d) Avoid concentration of the material at junction

P.T.O.

iv) Selection of factor of safety is based on
   a) Reliability of applied load
   b) Extent of localized stresses
   c) Extent of loss of life if failure occurs
   d) Extent of loss of property if failure occurs

B) Solve Multiple Choice Questions i. e. MCQ : **6**

(**Note :** One option is correct, that carries **1** mark).

i) Most suitable material for lathe bed is _____ due to the property of _____
   a) Grey cast iron-yield strength
   b) Grey cast iron-damping
   c) Mild steel
   d) Stainless steel

ii) Spring used for wrist watch is
   a) Spiral
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   a) 0.3 Syt or 0.18 Syt, whichever is maximum
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v) Surgical instruments are prepared from
   a) Cast iron
   b) Mild steel
   c) Plastic
   d) Stainless steel

vi) Fatigue is dangerous due to occurrence of _____ failure.
   a) Slow
   b) Sudden
   c) Corrosive
   d) Erosive

_____

SLR-EP – 67

Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
MACHINE DESIGN – I

Day and Date : Monday, 5-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section **I** and **II**.*
*2) Make **necessary** assumptions, if required and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Use** of non-programmable calculator is **permitted**.*

SECTION – I

2. a) Explain factors for selection of material. **3**

   b) Define factor of safety. Discuss the factors affecting selection of factor of safety. **4**

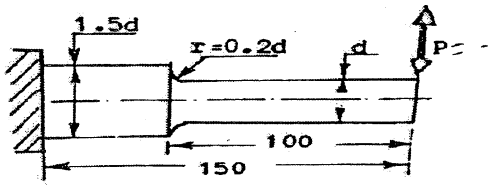
   c) It is required to select a flat belt drive to connect two transmission shafts rotating at 800 rpm and 400 rpm respectively. The centre to centre distance between the shafts is approximately 3 m and the belt drive is open-type. The power transmitted by the belt is 30 kW. The belt should operate at a velocity between 17.8 to 22.9 m/s. The power transmitting capacity of the belt per mm width per ply at 180° arc of contact and at a belt velocity of 5.08 m/s is 0.0147 kW. Select preferred pulley diameters and specify the belt. Take load correction factor Fa = 1.3. **7**

3. a) Write in brief about cyclic stresses. **3**

   b) Discuss modified Goodman diagram. **4**

   c) A cantilever beam made of cold drawn steel 40C8 (S_{ut} = 600 N/mm^2, S_{yt} = 380 N/mm^2) is subjected to fluctuating bending moment which varies from + 15000 N-mm to – 5000 N-mm. The expected reliability is 90% and factor of safety is 2. **7**

K_a = surface finish factor = 0.76
K_b = size factor = 0.85
K_c = reliability factor = 0.897
K_d = modifying factor = 0.735
Determine the diameter of shaft.



4. a) Write down the strength equations for various failure modes to be considered for design of cotter joint with necessary sketches. **7**

   b) A lever loaded safety valve is 70 mm in diameter. It is required to blow-off at a pressure of 1.5 N/mm^2. The length of the lever is 1000 mm. The distance between the fulcrum and toggle is 100 mm. Determine the amount of dead weight to be put at the end of the lever. Also, determine the size of the rectangular cross section of the lever and the size of pins at the fulcrum and the toggle. User following permissible stresses :

   Tensile stress = 60 MPa, Shear stress = 50 MPa and bearing pressure = 12 MPa. Assume length of pin = 1.5 × diameter of pin and b = 3t. **7**

SECTION – II

5. a) Discuss the design considerations for casting. **3**

   b) Discuss ASME code for shaft design. **4**

   c) Design a shaft to transmit power from an electric motor to a machine spindle through a pulley by means of a belt drive. The pulley weighs 300 N and is located at 250 mm from the centre of the bearing. The diameter of the pulley is 150 mm and the maximum power transmitted is 2.5 kW at 150 r.p.m. The angle of lap of the belt is 180° and coefficient of friction between the belt and the pulley is 0.3. The shock and fatigue factors as per ASME are 1.5 and 2.0 respectively. Assume a factor of safety of 4 and consider S_{yt} for the shaft material as 280 N/mm^2. **7**

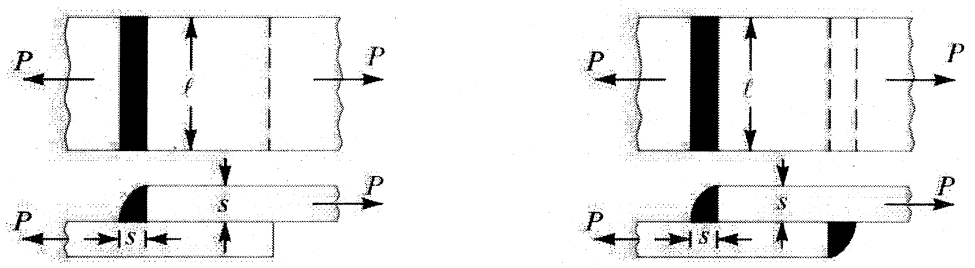
6. a) Discuss the design considerations for forging. **3**

   b) Discuss construction of leaf spring. **4**

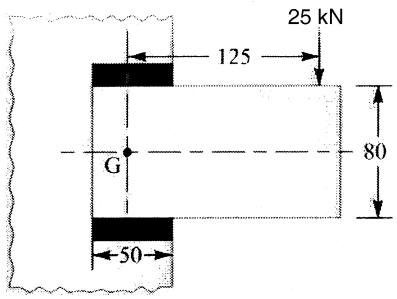
   c) Design a close coiled helical compression spring for a service load ranging from 3100 N to 3800 N. The axial deflection of the spring for the load range is 8 mm. Assume a spring index of 6. The permissible shear stress intensity is 400 N/mm^2 and modulus of rigidity, G = 84 kN/mm^2. Consider Wahl's factor and assume squared and ground ends for the spring. **7**

7. a) Discuss advantages and limitations of bolted and welded joints. **3**

   b) Design the single transverse and double transverse fillet weld (as shown in Fig. with usual notations). **4**



   c) A bracket carrying a load of 25 kN is to be welded as shown in Fig. Find the size of weld required. Take Syt = 300 N/mm^2 and a factor of safety as 2. **7**



Design data for Selection of Flat-Belt

Arc of Contact factor

α s	120	130	140	150	160	170	180	190	200
Fd	1.33	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard with of belts

3-Ply	25	40	50	63	76					
4-Ply	40	44	50	63	76	90	100	112	125	152
5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

Power Transmitting Capacities

HI-SPEED	0.0118 kW per mm width per ply
FORT	0.0147 kW per mm width per ply

Preferred Pulley Diameters

Pitch Diameter (mm)		125	132	140	150	160	170	180	190	200
212	224	236	250	265	280	300	315	355	375	
400	425	450	475	500	530	560	600	630	670	
710	750	800	900	1000						

SLR-EP – 68 (2)

Seat No.	

Set **P**

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
FLUID MACHINERY AND FLUID POWER
Professional Elective – I

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) Draw **neat** sketches **wherever** necessary.*
*3) **Use** of non-programmable calculators is **permitted**.*
*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=14)**

1) The major field(s) of application of gas turbine is (are)
   a) Aviation b) Oil and gas industry
   c) Marine propulsion d) All of the above

2) Multistage centrifugal pumps are used to
   a) Produce a high head b) Discharge large quantity of liquid
   c) Both a) and b) above d) None of these

3) The following is (are) the limitation(s) of gas turbines
   a) They are not self-starting b) Higher rotor speeds
   c) Low efficiencies at part loads d) All of the above

4) If at the inlet of a turbine, the energy available is only kinetic energy, the turbine is known as
   a) Impulse Turbine b) Reaction Turbine
   c) Centrifugal Pump d) None of these

5) Governing of a turbine is defined as the operation by which the speed of the turbine is kept _____ under all working conditions.
   a) Varying b) Constant
   c) Time dependent d) None of these

6) The vertical height of the centre-line of the centrifugal pump from the water surface in the pump is called as
   a) Manometric head b) Delivery head
   c) Suction head d) Vertical head

7) Characteristic curves are used for predicting _____ of a pump.
   a) Reliability and life span b) Behaviour and performance
   c) Quality and brand d) All of the above

8) Pressure reducing valves are normally _____ pressure control valves.
   a) Closed b) Open c) a) and b) d) None of above

9) In meter in circuit, heat generated due to throttling is fed to the
   a) Oil reservoir b) Actuator c) a) and b) d) a) or b)

10) Pressure rating for Brass piping is
   a) 250 bar b) 200 bar c) 2500 bar d) 125 bar

11) Air motor are
   a) Compressor
   b) Electric motor
   c) Are used to run fluid power system using pressurized air
   d) None of above

12) The principle on which intensifier work is _____ where 'P' indicate pressure and 'A' is cross sectional area of two sides.
   a) $\frac{P_1}{A_1} = \frac{P_2}{A_2}$ b) $P_1A_1 = P_2A_2$ c) $\frac{A_1}{P_1} = \frac{A_2}{P_2}$ d) $\frac{A_2}{A_1} = \frac{P_2}{P_1}$

13) A counter balance valve is used to maintain over _____ cylinder so that it will not fall freely because of gravity.
   a) Horizontal b) Vertical c) a) and b) d) None of above

14) _____ displacement pumps are used where pressure is primary consideration.
   a) Nonpositive b) Positive c) Both a) and b) d) None of above

_____

SLR-EP – 68 (2)

Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
FLUID MACHINERY AND FLUID POWER
Professional Elective – I

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) Draw ***neat*** *sketches* ***wherever*** *necessary.*
3) ***Use*** *of non-programmable calculators is* ***permitted****.*

SECTION – I

2. a) A Pelton wheel is having a mean bucket diameter of 0.8 meter and is running at 1000 rpm. The net head on the Pelton wheel is 400 meter. If the side clearance angle is 15° and discharge through nozzle is 150 litres/sec.

   Find : i) Power available at the nozzle and ii) Hydraulic efficiency of the turbine. **5**

   b) What are the various methods for improving the thermal efficiency of open cycle gas turbines ? Explain Re-heating method. **4**

   c) The following data is given for a Francis Turbine. Net head = 60 meters; Speed N = 700 rpm; Shaft power = 294.3 kW; η_o = 84%; η_h = 93%; flow ratio = 0.20; breadth ratio = 0.1; Outer diameter of the runner = 2 x inner diameter of runner. The thickness of vanes occupy 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine :
   i) Guide blade angle ii) Runner vane angle at inlet. **5**

3. a) In an air standard gas turbine plant, air at a temperature of 15° C and pressure of 1.01 bar enters the compressor, where it is compressed through a pressure ratio of 5. Air enters the turbine at a temperature of 815° C and expands to original pressure of 1.01 bar. Determine the ratio of turbine work to compressor work and the thermal efficiency when the plant operates on ideal Brayton cycle. Take γ = 1.4, C_p = 1.005 kJ/kgk. **5**

b) The diameter of an impeller of a centrifugal pump at inlet and outlet are 300 mm and 600 mm respectively. The velocity of flow at outlet is 2.5 m/s and vanes are set back at an angle of 45° at outlet. Determine the minimum starting speed of the pump if the manometric efficiency is 75%. **5**

c) Derive Euler's equation of work done for rotodynamic machines. **4**

4. a) A Kaplan turbine develops 9000 kW under a net head of 7.5 meters. Overall efficiency of the wheel is 86%. The speed ratio based on the outer diameter is 2.2 and the flow ratio is 0.66. Diameter of the boss is 0.35 times the external diameter of the wheel. Determine the diameter of the runner and the specific speed of the runner. **5**

b) Why multistaging of centrifugal pumps in required ? Explain pumps in series. **4**

c) Explain governing of Pelton Wheels. **5**

SECTION – II

5. a) Explain any one Rotary Hydraulic Actuator. **4**

b) Differentiate between Meter In and Meter Out. **5**

c) Draw and explain with neat sketch of Lubricator unit. **5**

6. a) Explain various Spool Actuating methods. **4**

b) Draw a neat sketch of Hydraulic and Pneumatic Clamping system. **5**

c) Explain with neat sketch of Twin Pressure Valve in Pneumatic. **5**

7. a) Explain construction and working of Pressure Compensated Flow Control Valve. **5**

b) What is intensifier and explain different types of intensifier. **4**

c) Explain Cushioning effect in Hydraulic system. **5**

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SLR-EP – 68 (2)

Seat No.	

Set Q

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
FLUID MACHINERY AND FLUID POWER
Professional Elective – I

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Pressure reducing valves are normally _____ pressure control valves.
a) Closed b) Open c) a) and b) d) None of above

2) In meter in circuit, heat generated due to throttling is fed to the
a) Oil reservoir b) Actuator c) a) and b) d) a) or b)

3) Pressure rating for Brass piping is
a) 250 bar b) 200 bar c) 2500 bar d) 125 bar

4) Air motor are
a) Compressor
b) Electric motor
c) Are used to run fluid power system using pressurized air
d) None of above

5) The principle on which intensifier work is _____ where 'P' indicate pressure and 'A' is cross sectional area of two sides.
a) $\frac{P_1}{A_1} = \frac{P_2}{A_2}$ b) $P_1A_1 = P_2A_2$ c) $\frac{A_1}{P_1} = \frac{A_2}{P_2}$ d) $\frac{A_2}{A_1} = \frac{P_2}{P_1}$

P.T.O.

6) A counter balance valve is used to maintain over _____ cylinder so that it will not fall freely because of gravity.
   a) Horizontal b) Vertical c) a) and b) d) None of above

7) _____ displacement pumps are used where pressure is primary consideration.
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8) The major field(s) of application of gas turbine is (are)
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9) Multistage centrifugal pumps are used to
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   a) They are not self-starting b) Higher rotor speeds
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12) Governing of a turbine is defined as the operation by which the speed of the turbine is kept _____ under all working conditions.
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   a) Reliability and life span b) Behaviour and performance
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_____

SLR-EP – 68 (2)

Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
FLUID MACHINERY AND FLUID POWER
Professional Elective – I

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
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SECTION – I

2. a) A Pelton wheel is having a mean bucket diameter of 0.8 meter and is running at 1000 rpm. The net head on the Pelton wheel is 400 meter. If the side clearance angle is 15° and discharge through nozzle is 150 litres/sec.

   Find : i) Power available at the nozzle and ii) Hydraulic efficiency of the turbine. **5**

   b) What are the various methods for improving the thermal efficiency of open cycle gas turbines ? Explain Re-heating method. **4**

   c) The following data is given for a Francis Turbine. Net head = 60 meters; Speed N = 700 rpm; Shaft power = 294.3 kW; η_o = 84%; η_h = 93%; flow ratio = 0.20; breadth ratio = 0.1; Outer diameter of the runner = 2 x inner diameter of runner. The thickness of vanes occupy 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine :
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b) The diameter of an impeller of a centrifugal pump at inlet and outlet are 300 mm and 600 mm respectively. The velocity of flow at outlet is 2.5 m/s and vanes are set back at an angle of 45° at outlet. Determine the minimum starting speed of the pump if the manometric efficiency is 75%. **5**

c) Derive Euler's equation of work done for rotodynamic machines. **4**

4. a) A Kaplan turbine develops 9000 kW under a net head of 7.5 meters. Overall efficiency of the wheel is 86%. The speed ratio based on the outer diameter is 2.2 and the flow ratio is 0.66. Diameter of the boss is 0.35 times the external diameter of the wheel. Determine the diameter of the runner and the specific speed of the runner. **5**

b) Why multistaging of centrifugal pumps in required ? Explain pumps in series. **4**

c) Explain governing of Pelton Wheels. **5**

SECTION – II

5. a) Explain any one Rotary Hydraulic Actuator. **4**

b) Differentiate between Meter In and Meter Out. **5**

c) Draw and explain with neat sketch of Lubricator unit. **5**

6. a) Explain various Spool Actuating methods. **4**

b) Draw a neat sketch of Hydraulic and Pneumatic Clamping system. **5**

c) Explain with neat sketch of Twin Pressure Valve in Pneumatic. **5**

7. a) Explain construction and working of Pressure Compensated Flow Control Valve. **5**

b) What is intensifier and explain different types of intensifier. **4**

c) Explain Cushioning effect in Hydraulic system. **5**

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SLR-EP – 68 (2)

Seat No.	

Set **R**

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
FLUID MACHINERY AND FLUID POWER
Professional Elective – I

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Governing of a turbine is defined as the operation by which the speed of the turbine is kept _____ under all working conditions.
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P.T.O.

5) In meter in circuit, heat generated due to throttling is fed to the
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_____

SLR-EP – 68 (2)

Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
FLUID MACHINERY AND FLUID POWER
Professional Elective – I

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
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SECTION – I

2. a) A Pelton wheel is having a mean bucket diameter of 0.8 meter and is running at 1000 rpm. The net head on the Pelton wheel is 400 meter. If the side clearance angle is 15° and discharge through nozzle is 150 litres/sec.

   Find : i) Power available at the nozzle and ii) Hydraulic efficiency of the turbine. **5**

   b) What are the various methods for improving the thermal efficiency of open cycle gas turbines ? Explain Re-heating method. **4**

   c) The following data is given for a Francis Turbine. Net head = 60 meters; Speed N = 700 rpm; Shaft power = 294.3 kW; η_o = 84%; η_h = 93%; flow ratio = 0.20; breadth ratio = 0.1; Outer diameter of the runner = 2 x inner diameter of runner. The thickness of vanes occupy 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine :
   i) Guide blade angle ii) Runner vane angle at inlet. **5**

3. a) In an air standard gas turbine plant, air at a temperature of 15° C and pressure of 1.01 bar enters the compressor, where it is compressed through a pressure ratio of 5. Air enters the turbine at a temperature of 815° C and expands to original pressure of 1.01 bar. Determine the ratio of turbine work to compressor work and the thermal efficiency when the plant operates on ideal Brayton cycle. Take γ = 1.4, C_p = 1.005 kJ/kgk. **5**

b) The diameter of an impeller of a centrifugal pump at inlet and outlet are 300 mm and 600 mm respectively. The velocity of flow at outlet is 2.5 m/s and vanes are set back at an angle of 45° at outlet. Determine the minimum starting speed of the pump if the manometric efficiency is 75%. **5**

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c) Explain governing of Pelton Wheels. **5**

SECTION – II

5. a) Explain any one Rotary Hydraulic Actuator. **4**

b) Differentiate between Meter In and Meter Out. **5**

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7. a) Explain construction and working of Pressure Compensated Flow Control Valve. **5**

b) What is intensifier and explain different types of intensifier. **4**

c) Explain Cushioning effect in Hydraulic system. **5**

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SLR-EP – 68 (2)

Seat No.	

Set S

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
FLUID MACHINERY AND FLUID POWER
Professional Elective – I

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) Draw ***neat*** *sketches* ***wherever*** *necessary.*
3) ***Use*** *of non-programmable calculators is* ***permitted****.*
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.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Pressure rating for Brass piping is
a) 250 bar b) 200 bar c) 2500 bar d) 125 bar

2) Air motor are
a) Compressor
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3) The principle on which intensifier work is _____ where 'P' indicate pressure and 'A' is cross sectional area of two sides.
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P.T.O.

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   a) Aviation b) Oil and gas industry
   c) Marine propulsion d) All of the above

7) Multistage centrifugal pumps are used to
   a) Produce a high head b) Discharge large quantity of liquid
   c) Both a) and b) above d) None of these

8) The following is (are) the limitation(s) of gas turbines
   a) They are not self-starting b) Higher rotor speeds
   c) Low efficiencies at part loads d) All of the above

9) If at the inlet of a turbine, the energy available is only kinetic energy, the turbine is known as
   a) Impulse Turbine b) Reaction Turbine
   c) Centrifugal Pump d) None of these

10) Governing of a turbine is defined as the operation by which the speed of the turbine is kept _____ under all working conditions.
   a) Varying b) Constant
   c) Time dependent d) None of these

11) The vertical height of the centre-line of the centrifugal pump from the water surface in the pump is called as
   a) Manometric head b) Delivery head
   c) Suction head d) Vertical head

12) Characteristic curves are used for predicting _____ of a pump.
   a) Reliability and life span b) Behaviour and performance
   c) Quality and brand d) All of the above

13) Pressure reducing valves are normally _____ pressure control valves.
   a) Closed b) Open c) a) and b) d) None of above

14) In meter in circuit, heat generated due to throttling is fed to the
   a) Oil reservoir b) Actuator c) a) and b) d) a) or b)

_____

SLR-EP – 68 (2)

Seat No.	

T.E. (Mechanical) (Part – I) (New – CGPA) Examination, 2016
FLUID MACHINERY AND FLUID POWER
Professional Elective – I

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) Draw ***neat*** *sketches* ***wherever*** *necessary.*
3) ***Use*** *of non-programmable calculators is* ***permitted****.*

SECTION – I

2. a) A Pelton wheel is having a mean bucket diameter of 0.8 meter and is running at 1000 rpm. The net head on the Pelton wheel is 400 meter. If the side clearance angle is 15° and discharge through nozzle is 150 litres/sec.

   Find : i) Power available at the nozzle and ii) Hydraulic efficiency of the turbine. **5**

   b) What are the various methods for improving the thermal efficiency of open cycle gas turbines ? Explain Re-heating method. **4**

   c) The following data is given for a Francis Turbine. Net head = 60 meters; Speed N = 700 rpm; Shaft power = 294.3 kW; η_o = 84%; η_h = 93%; flow ratio = 0.20; breadth ratio = 0.1; Outer diameter of the runner = 2 x inner diameter of runner. The thickness of vanes occupy 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine :
   i) Guide blade angle ii) Runner vane angle at inlet. **5**

3. a) In an air standard gas turbine plant, air at a temperature of 15° C and pressure of 1.01 bar enters the compressor, where it is compressed through a pressure ratio of 5. Air enters the turbine at a temperature of 815° C and expands to original pressure of 1.01 bar. Determine the ratio of turbine work to compressor work and the thermal efficiency when the plant operates on ideal Brayton cycle. Take γ = 1.4, C_p = 1.005 kJ/kgk. **5**

b) The diameter of an impeller of a centrifugal pump at inlet and outlet are 300 mm and 600 mm respectively. The velocity of flow at outlet is 2.5 m/s and vanes are set back at an angle of 45° at outlet. Determine the minimum starting speed of the pump if the manometric efficiency is 75%. **5**

c) Derive Euler's equation of work done for rotodynamic machines. **4**

4. a) A Kaplan turbine develops 9000 kW under a net head of 7.5 meters. Overall efficiency of the wheel is 86%. The speed ratio based on the outer diameter is 2.2 and the flow ratio is 0.66. Diameter of the boss is 0.35 times the external diameter of the wheel. Determine the diameter of the runner and the specific speed of the runner. **5**

b) Why multistaging of centrifugal pumps in required ? Explain pumps in series. **4**

c) Explain governing of Pelton Wheels. **5**

SECTION – II

5. a) Explain any one Rotary Hydraulic Actuator. **4**

b) Differentiate between Meter In and Meter Out. **5**

c) Draw and explain with neat sketch of Lubricator unit. **5**

6. a) Explain various Spool Actuating methods. **4**

b) Draw a neat sketch of Hydraulic and Pneumatic Clamping system. **5**

c) Explain with neat sketch of Twin Pressure Valve in Pneumatic. **5**

7. a) Explain construction and working of Pressure Compensated Flow Control Valve. **5**

b) What is intensifier and explain different types of intensifier. **4**

c) Explain Cushioning effect in Hydraulic system. **5**

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SLR-EP – 68(1)

Seat No.	

Set P

T.E. (Mechanical Engineering) (Part – I) (New CGPA) Examination, 2016
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. A) Match the pairs : **4**

Machine tools	Tool movement
a) Lathe machine	p) Rotary motion
b) Milling machine	q) Reciprocating motion
c) Drilling machine	r) Rotary and translatory motion
d) Shaping machine	s) Translatory motion

B) Choose the correct answers : **(1×10=10)**

1) What is the function of cone pulley drive in lathe machines ?
   a) Drive the lead screw b) Change the spindle speed
   c) Drive the tail-stock d) All of the above

2) Which of the following is a mechanism for mechanized movements of the carriage along longitudinal axis ?
   a) Cross-slide b) Compound rest
   c) Apron d) Saddle

3) Which of the following is positive drive ?
   a) V belt drive b) Cross flat belt drive
   c) Rope drive d) Chain drive

P.T.O.

4) O Symbol indicates in control panel
   a) On b) Off
   c) On-off d) None of the above
5) The efficiency of ball screw is
   a) 90% b) 95%
   c) 80% d) 85%
6) The limiting value of transmission intervals for 1.06 $\varnothing$ = 1.06 in speed reduction is
   a) 4 b) 6
   c) 12 d) 24
7) For planning machine the type of slide way profile is
   a) Open V + Open V b) Closed V + Closed V
   c) Open flat + Open V d) Closed flat + Closed V
8) In hydrodynamic journal bearing, the recommended L/D ratio is
   a) > 1 b) < 1
   c) 1 d) 0.121
9) The limiting value of transmission intervals for 1.06 $\varnothing$ = 1.06 in speed increment is
   a) 2 b) 6
   c) 3 d) 12
10) ! symbol indicates in control panel
   a) On b) Off
   c) On-off d) Attention

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SLR-EP – 68(1)

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (New CGPA)
Examination, 2016
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) **Use** of calculator is **allowed**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume additional suitable data, if necessary and mention it **clearly**.*

SECTION – I

2. a) Explain in detail general requirements of machine tool design. **7**

   b) What are the functional requirements of machine tool structures ? Explain in brief. **7**

3. a) What are functions of guideways ? Explain types of guideways with example. **7**

   b) Explain classification of speed and feed boxes. **7**

4. Write short note on the following (**any three**) : **14**
   i) Layout of machine tools
   ii) Design of feed box
   iii) Overall compliance of machine tool
   iv) Design of Aerostatic slideways.

SECTION – II

5. a) What are the functions of spindle unit and its requirements in brief. **7**

   b) What is the significance of stability analysis ? **7**

Set P

6. a) Discuss the control systems for speeds and feeds. **7**

   b) Explain the trends and developments in machine tool design. **7**

7. Write short note on the following **(any three)** : **14**

   i) Bearings for spindles.

   ii) Forced vibrations of machine tools.

   iii) Spindle unit and requirements.

   iv) Design of antifriction slideways.

SLR-EP – 68(1)

Seat No.	

Set Q

T.E. (Mechanical Engineering) (Part – I) (New CGPA) Examination, 2016
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. A) Choose the correct answers : **(1×10=10)**

1) The limiting value of transmission intervals for 1.06 $\varnothing$ = 1.06 in speed reduction is

a) 4 b) 6

c) 12 d) 24

2) For planning machine the type of slide way profile is

a) Open V + Open V b) Closed V + Closed V

c) Open flat + Open V d) Closed flat + Closed V

3) In hydrodynamic journal bearing, the recommended L/D ratio is

a) > 1 b) < 1

c) 1 d) 0.121

4) The limiting value of transmission intervals for 1.06 $\varnothing$ = 1.06 in speed increment is

a) 2 b) 6

c) 3 d) 12

5) ! symbol indicates in control panel
   a) On b) Off
   c) On-off d) Attention
6) What is the function of cone pulley drive in lathe machines ?
   a) Drive the lead screw b) Change the spindle speed
   c) Drive the tail-stock d) All of the above
7) Which of the following is a mechanism for mechanized movements of the carriage along longitudinal axis ?
   a) Cross-slide b) Compound rest
   c) Apron d) Saddle
8) Which of the following is positive drive ?
   a) V belt drive b) Cross flat belt drive
   c) Rope drive d) Chain drive
9) O Symbol indicates in control panel
   a) On b) Off
   c) On-off d) None of the above
10) The efficiency of ball screw is
   a) 90% b) 95%
   c) 80% d) 85%

B) Match the pairs : **4**

Machine tools	**Tool movement**
a) Lathe machine	p) Rotary motion
b) Milling machine	q) Reciprocating motion
c) Drilling machine	r) Rotary and translatory motion
d) Shaping machine	s) Translatory motion

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SLR-EP – 68(1)

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (New CGPA)
Examination, 2016
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) **Use** of calculator is **allowed**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume additional suitable data, if necessary and mention it **clearly**.*

SECTION – I

2. a) Explain in detail general requirements of machine tool design. **7**

   b) What are the functional requirements of machine tool structures ? Explain in brief. **7**

3. a) What are functions of guideways ? Explain types of guideways with example. **7**

   b) Explain classification of speed and feed boxes. **7**

4. Write short note on the following (**any three**) : **14**
   i) Layout of machine tools
   ii) Design of feed box
   iii) Overall compliance of machine tool
   iv) Design of Aerostatic slideways.

SECTION – II

5. a) What are the functions of spindle unit and its requirements in brief. **7**

   b) What is the significance of stability analysis ? **7**

Set Q

6. a) Discuss the control systems for speeds and feeds. **7**

   b) Explain the trends and developments in machine tool design. **7**

7. Write short note on the following **(any three)** : **14**

   i) Bearings for spindles.

   ii) Forced vibrations of machine tools.

   iii) Spindle unit and requirements.

   iv) Design of antifriction slideways.

SLR-EP – 68(1)

Seat No.	

Set R

T.E. (Mechanical Engineering) (Part – I) (New CGPA) Examination, 2016
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. A) Match the pairs : **4**

Machine tools	Tool movement
a) Lathe machine	p) Rotary motion
b) Milling machine	q) Reciprocating motion
c) Drilling machine	r) Rotary and translatory motion
d) Shaping machine	s) Translatory motion

B) Choose the correct answers : **(1×10=10)**

1) Which of the following is positive drive ?

a) V belt drive b) Cross flat belt drive

c) Rope drive d) Chain drive

2) O Symbol indicates in control panel

a) On b) Off

c) On-off d) None of the above

3) The efficiency of ball screw is

a) 90% b) 95%

c) 80% d) 85%

4) The limiting value of transmission intervals for 1.06 $\varnothing$ = 1.06 in speed reduction is

a) 4 b) 6

c) 12 d) 24

5) For planning machine the type of slide way profile is

a) Open V + Open V b) Closed V + Closed V

c) Open flat + Open V d) Closed flat + Closed V

6) In hydrodynamic journal bearing, the recommended L/D ratio is

a) > 1 b) < 1

c) 1 d) 0.121

7) The limiting value of transmission intervals for 1.06 $\varnothing$ = 1.06 in speed increment is

a) 2 b) 6

c) 3 d) 12

8) ! symbol indicates in control panel

a) On b) Off

c) On-off d) Attention

9) What is the function of cone pulley drive in lathe machines ?

a) Drive the lead screw b) Change the spindle speed

c) Drive the tail-stock d) All of the above

10) Which of the following is a mechanism for mechanized movements of the carriage along longitudinal axis ?

a) Cross-slide b) Compound rest

c) Apron d) Saddle

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SLR-EP – 68(1)

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (New CGPA)
Examination, 2016
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
*2) **Use** of calculator is **allowed**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume additional suitable data, if necessary and mention it **clearly**.*

SECTION – I

2. a) Explain in detail general requirements of machine tool design. **7**

   b) What are the functional requirements of machine tool structures ? Explain in brief. **7**

3. a) What are functions of guideways ? Explain types of guideways with example. **7**

   b) Explain classification of speed and feed boxes. **7**

4. Write short note on the following (**any three**) : **14**
   i) Layout of machine tools
   ii) Design of feed box
   iii) Overall compliance of machine tool
   iv) Design of Aerostatic slideways.

SECTION – II

5. a) What are the functions of spindle unit and its requirements in brief. **7**

   b) What is the significance of stability analysis ? **7**

Set R

6. a) Discuss the control systems for speeds and feeds. **7**

   b) Explain the trends and developments in machine tool design. **7**

7. Write short note on the following **(any three)** : **14**

   i) Bearings for spindles.

   ii) Forced vibrations of machine tools.

   iii) Spindle unit and requirements.

   iv) Design of antifriction slideways.

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SLR-EP – 68(1)

Seat No.	

Set S

T.E. (Mechanical Engineering) (Part – I) (New CGPA) Examination, 2016
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. A) Choose the correct answers : **(1×10=10)**

1) What is the function of cone pulley drive in lathe machines ?
   a) Drive the lead screw b) Change the spindle speed
   c) Drive the tail-stock d) All of the above

2) Which of the following is a mechanism for mechanized movements of the carriage along longitudinal axis ?
   a) Cross-slide b) Compound rest
   c) Apron d) Saddle

3) Which of the following is positive drive ?
   a) V belt drive b) Cross flat belt drive
   c) Rope drive d) Chain drive

4) O Symbol indicates in control panel
   a) On b) Off
   c) On-off d) None of the above

5) The efficiency of ball screw is
   a) 90% b) 95%
   c) 80% d) 85%

P.T.O.

6) The limiting value of transmission intervals for 1.06 $\varnothing$ = 1.06 in speed reduction is
   a) 4 b) 6
   c) 12 d) 24

7) For planning machine the type of slide way profile is
   a) Open V + Open V b) Closed V + Closed V
   c) Open flat + Open V d) Closed flat + Closed V

8) In hydrodynamic journal bearing, the recommended L/D ratio is
   a) > 1 b) < 1
   c) 1 d) 0.121

9) The limiting value of transmission intervals for 1.06 $\varnothing$ = 1.06 in speed increment is
   a) 2 b) 6
   c) 3 d) 12

10) ! symbol indicates in control panel
   a) On b) Off
   c) On-off d) Attention

B) Match the pairs : **4**

Machine tools	**Tool movement**
a) Lathe machine	p) Rotary motion
b) Milling machine	q) Reciprocating motion
c) Drilling machine	r) Rotary and translatory motion
d) Shaping machine	s) Translatory motion

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SLR-EP – 68(1)

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (New CGPA)
Examination, 2016
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of calculator is* ***allowed****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Assume additional suitable data, if necessary and mention it ***clearly****.*

SECTION – I

2. a) Explain in detail general requirements of machine tool design. **7**

   b) What are the functional requirements of machine tool structures ? Explain in brief. **7**

3. a) What are functions of guideways ? Explain types of guideways with example. **7**

   b) Explain classification of speed and feed boxes. **7**

4. Write short note on the following (**any three**) : **14**
   i) Layout of machine tools
   ii) Design of feed box
   iii) Overall compliance of machine tool
   iv) Design of Aerostatic slideways.

SECTION – II

5. a) What are the functions of spindle unit and its requirements in brief. **7**

   b) What is the significance of stability analysis ? **7**

Set S

6. a) Discuss the control systems for speeds and feeds. **7**

   b) Explain the trends and developments in machine tool design. **7**

7. Write short note on the following **(any three)** : **14**

   i) Bearings for spindles.

   ii) Forced vibrations of machine tools.

   iii) Spindle unit and requirements.

   iv) Design of antifriction slideways.

SLR-EP – 68(3)

Seat No.	

Set P

T.E. (Mech.) (Part – I) Examination, 2016
MATERIAL HANDLING SYSTEM (New) (CGPA)
(Professional Elective – I)

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. Choose the correct answer : **(14×1=14)**

1) Hand truck are characterized by
   a) Pallet + Walk + No stack + Powered
   b) Pallet + Walk + No stack + Manual
   c) Non-Pallet + Walk + Stack + Powered
   d) Non-Pallet + Walk + No Stack + Manual

2) Flow diagram is used to study
   a) Bottleneck b) Sequence of operations
   c) M/c maintenance d) Operator skill

3) To transport ferrous material vertically, _____ conveyor is used.
   a) Wheel conveyors b) Chain conveyors
   c) Chute conveyors d) Magnetic conveyors

4) Flow process chart gives
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

5) The main objective of the material handling system is to _____ material movement.
   a) Reduce b) Maximum c) Medium d) Light movement

6) The equipment used to handle material at a single location so that, it is in the correct position for machining
   a) Transport equipment b) Storage equipment
   c) Positioning equipment d) None of these

7) Cranes are used to move material over _____ paths.
   a) Fixed b) Diverted c) Variable d) None of these

8) Hoisting equipments works in conjection with _____ and workstation cranes.
   a) Roller b) Industrial trucks
   c) Elevator d) Overhead crane

9) For _____ type material flow having less difficulty in returning empty containers.
   a) Straight line b) Inverted c) L shaped d) U shaped

10) The material handling equation consists of the material characteristics, the move requirement and
   a) The method capabilities b) Human capacity
   c) Load d) Gravity

11) Storage equipments are used for _____ material over a period of time.
   a) Catching b) Holding
   c) Hanging d) None of these

12) The handling of a quantity designed to be treated as a single mass
   a) Unit load b) Unit mass
   c) Unit wt. d) None of these

13) For automated material handling system _____ materials are required.
   a) Low volume b) Medium volume
   c) High volume d) None of these

14) In power equipment automatic correction according to
   a) Gravity b) Manual
   c) Signal d) Equipment

_____

SLR-EP – 68(3)

Seat No.	

T.E. (Mech.) (Part – I) Examination, 2016
MATERIAL HANDLING SYSTEM (New) (CGPA)
(Professional Elective – I)

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Draw ***neat*** *diagram* ***where*** *necessary.*
3) Solve ***any two*** *questions in* ***each*** *Section.*

SECTION – I

2. a) Explain objective and significance of material handling system in industry. **5**
   b) Explain any two types of fork lift trucks. **5**
   c) Explain any three types of conveyors. **4**

3. a) What is meant by material handling system ? Explain its principles. **5**
   b) Explain CIMS in material handling and give its benefits. **5**
   c) "Material handling does not add value to a product it usually adds significant element of cost". Justify the statement. **4**

4. Write a short notes (**any three**) : **14**
   a) Role of computer in CIMS. **5**
   b) Storing equipment. **5**
   c) Objectives of material handling. **5**
   d) Automatic guided vehicles. **4**

SECTION – II

5. a) Explain with figure equipment evaluation sheet. **5**
   b) Explain the factors for selection of material handling equipments. **5**
   c) Explain with fig. assembly chart. **4**
6. a) Describe with figure material handling equation. **5**
   b) Material handling selection in sugar industry. **5**
   c) Discuss the importance of material handling safety. **4**
7. Write a short notes (**any three**) : **14**
   a) Choice of material handling equipments. **5**
   b) Flow process chart. **5**
   c) Degree of mechanization. **5**
   d) Equipment evaluation sheet. **4**

SLR-EP – 68(3)

Seat No.	

Set Q

T.E. (Mech.) (Part – I) Examination, 2016
MATERIAL HANDLING SYSTEM (New) (CGPA)
(Professional Elective – I)

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. Choose the correct answer : **(14×1=14)**

1) Hoisting equipments works in conjection with _____ and workstation cranes.
   a) Roller b) Industrial trucks
   c) Elevator d) Overhead crane

2) For _____ type material flow having less difficulty in returning empty containers.
   a) Straight line b) Inverted
   c) L shaped d) U shaped

3) The material handling equation consists of the material characteristics, the move requirement and
   a) The method capabilities b) Human capacity
   c) Load d) Gravity

4) Storage equipments are used for _____ material over a period of time.
   a) Catching b) Holding
   c) Hanging d) None of these

5) The handling of a quantity designed to be treated as a single mass
   a) Unit load b) Unit mass
   c) Unit wt. d) None of these

6) For automated material handling system _____ materials are required.
   a) Low volume b) Medium volume
   c) High volume d) None of these

7) In power equipment automatic correction according to
   a) Gravity b) Manual
   c) Signal d) Equipment

8) Hand truck are characterized by
   a) Pallet + Walk + No stack + Powered
   b) Pallet + Walk + No stack + Manual
   c) Non-Pallet + Walk + Stack + Powered
   d) Non-Pallet + Walk + No Stack + Manual

9) Flow diagram is used to study
   a) Bottleneck b) Sequence of operations
   c) M/c maintenance d) Operator skill

10) To transport ferrous material vertically, _____ conveyor is used.
   a) Wheel conveyors b) Chain conveyors
   c) Chute conveyors d) Magnetic conveyors

11) Flow process chart gives
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

12) The main objective of the material handling system is to _____ material movement.
   a) Reduce b) Maximum c) Medium d) Light movement

13) The equipment used to handle material at a single location so that, it is in the correct position for machining
   a) Transport equipment b) Storage equipment
   c) Positioning equipment d) None of these

14) Cranes are used to move material over _____ paths.
   a) Fixed b) Diverted c) Variable d) None of these

_____

SLR-EP – 68(3)

Seat No.	

T.E. (Mech.) (Part – I) Examination, 2016
MATERIAL HANDLING SYSTEM (New) (CGPA)
(Professional Elective – I)

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Draw ***neat*** *diagram* ***where*** *necessary.*
3) Solve ***any two*** *questions in* ***each*** *Section.*

SECTION – I

2. a) Explain objective and significance of material handling system in industry. **5**
   b) Explain any two types of fork lift trucks. **5**
   c) Explain any three types of conveyors. **4**

3. a) What is meant by material handling system ? Explain its principles. **5**
   b) Explain CIMS in material handling and give its benefits. **5**
   c) "Material handling does not add value to a product it usually adds significant element of cost". Justify the statement. **4**

4. Write a short notes (**any three**) : **14**
   a) Role of computer in CIMS. **5**
   b) Storing equipment. **5**
   c) Objectives of material handling. **5**
   d) Automatic guided vehicles. **4**

SECTION – II

5. a) Explain with figure equipment evaluation sheet. **5**
   b) Explain the factors for selection of material handling equipments. **5**
   c) Explain with fig. assembly chart. **4**
6. a) Describe with figure material handling equation. **5**
   b) Material handling selection in sugar industry. **5**
   c) Discuss the importance of material handling safety. **4**
7. Write a short notes (**any three**) : **14**
   a) Choice of material handling equipments. **5**
   b) Flow process chart. **5**
   c) Degree of mechanization. **5**
   d) Equipment evaluation sheet. **4**

SLR-EP – 68(3)

Seat No.	

Set R

T.E. (Mech.) (Part – I) Examination, 2016
MATERIAL HANDLING SYSTEM (New) (CGPA)
(Professional Elective – I)

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. Choose the correct answer : **(14×1=14)**

1) The main objective of the material handling system is to _____ material movement.
a) Reduce b) Maximum c) Medium d) Light movement

2) The equipment used to handle material at a single location so that, it is in the correct position for machining
a) Transport equipment b) Storage equipment
c) Positioning equipment d) None of these

3) Cranes are used to move material over _____ paths.
a) Fixed b) Diverted
c) Variable d) None of these

4) Hoisting equipments works in conjection with _____ and workstation cranes.
a) Roller b) Industrial trucks
c) Elevator d) Overhead crane

5) For _____ type material flow having less difficulty in returning empty containers.
a) Straight line b) Inverted
c) L shaped d) U shaped

6) The material handling equation consists of the material characteristics, the move requirement and
   a) The method capabilities
   b) Human capacity
   c) Load
   d) Gravity

7) Storage equipments are used for _____ material over a period of time.
   a) Catching
   b) Holding
   c) Hanging
   d) None of these

8) The handling of a quantity designed to be treated as a single mass
   a) Unit load
   b) Unit mass
   c) Unit wt.
   d) None of these

9) For automated material handling system _____ materials are required.
   a) Low volume
   b) Medium volume
   c) High volume
   d) None of these

10) In power equipment automatic correction according to
   a) Gravity
   b) Manual
   c) Signal
   d) Equipment

11) Hand truck are characterized by
   a) Pallet + Walk + No stack + Powered
   b) Pallet + Walk + No stack + Manual
   c) Non-Pallet + Walk + Stack + Powered
   d) Non-Pallet + Walk + No Stack + Manual

12) Flow diagram is used to study
   a) Bottleneck
   b) Sequence of operations
   c) M/c maintenance
   d) Operator skill

13) To transport ferrous material vertically, _____ conveyor is used.
   a) Wheel conveyors
   b) Chain conveyors
   c) Chute conveyors
   d) Magnetic conveyors

14) Flow process chart gives
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

_____

SLR-EP – 68(3)

Seat No.	

T.E. (Mech.) (Part – I) Examination, 2016
MATERIAL HANDLING SYSTEM (New) (CGPA)
(Professional Elective – I)

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Draw ***neat*** *diagram* ***where*** *necessary.*
3) Solve ***any two*** *questions in* ***each*** *Section.*

SECTION – I

2. a) Explain objective and significance of material handling system in industry. **5**
   b) Explain any two types of fork lift trucks. **5**
   c) Explain any three types of conveyors. **4**

3. a) What is meant by material handling system ? Explain its principles. **5**
   b) Explain CIMS in material handling and give its benefits. **5**
   c) "Material handling does not add value to a product it usually adds significant element of cost". Justify the statement. **4**

4. Write a short notes (**any three**) : **14**
   a) Role of computer in CIMS. **5**
   b) Storing equipment. **5**
   c) Objectives of material handling. **5**
   d) Automatic guided vehicles. **4**

SECTION – II

5. a) Explain with figure equipment evaluation sheet. **5**
   b) Explain the factors for selection of material handling equipments. **5**
   c) Explain with fig. assembly chart. **4**
6. a) Describe with figure material handling equation. **5**
   b) Material handling selection in sugar industry. **5**
   c) Discuss the importance of material handling safety. **4**
7. Write a short notes (**any three**) : **14**
   a) Choice of material handling equipments. **5**
   b) Flow process chart. **5**
   c) Degree of mechanization. **5**
   d) Equipment evaluation sheet. **4**

SLR-EP – 68(3)

Seat No.	

Set **S**

T.E. (Mech.) (Part – I) Examination, 2016
MATERIAL HANDLING SYSTEM (New) (CGPA)
(Professional Elective – I)

Day and Date : Wednesday, 7-12-2016 Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. Choose the correct answer : **(14×1=14)**

1) The material handling equation consists of the material characteristics, the move requirement and
   a) The method capabilities b) Human capacity
   c) Load d) Gravity
2) Storage equipments are used for _____ material over a period of time.
   a) Catching b) Holding
   c) Hanging d) None of these
3) The handling of a quantity designed to be treated as a single mass
   a) Unit load b) Unit mass
   c) Unit wt. d) None of these
4) For automated material handling system _____ materials are required.
   a) Low volume b) Medium volume
   c) High volume d) None of these
5) In power equipment automatic correction according to
   a) Gravity b) Manual
   c) Signal d) Equipment

P.T.O.

6) Hand truck are characterized by
   a) Pallet + Walk + No stack + Powered
   b) Pallet + Walk + No stack + Manual
   c) Non-Pallet + Walk + Stack + Powered
   d) Non-Pallet + Walk + No Stack + Manual

7) Flow diagram is used to study
   a) Bottleneck
   b) Sequence of operations
   c) M/c maintenance
   d) Operator skill

8) To transport ferrous material vertically, _____ conveyor is used.
   a) Wheel conveyors
   b) Chain conveyors
   c) Chute conveyors
   d) Magnetic conveyors

9) Flow process chart gives
   a) To reduce the distance travelled by men and material
   b) Assembly line
   c) Relationship between product
   d) None of these

10) The main objective of the material handling system is to _____ material movement.
   a) Reduce b) Maximum c) Medium d) Light movement

11) The equipment used to handle material at a single location so that, it is in the correct position for machining
   a) Transport equipment
   b) Storage equipment
   c) Positioning equipment
   d) None of these

12) Cranes are used to move material over _____ paths.
   a) Fixed b) Diverted c) Variable d) None of these

13) Hoisting equipments works in conjection with _____ and workstation cranes.
   a) Roller
   b) Industrial trucks
   c) Elevator
   d) Overhead crane

14) For _____ type material flow having less difficulty in returning empty containers.
   a) Straight line b) Inverted c) L shaped d) U shaped

_____

SLR-EP – 68(3)

Seat No.	

T.E. (Mech.) (Part – I) Examination, 2016
MATERIAL HANDLING SYSTEM (New) (CGPA)
(Professional Elective – I)

Day and Date : Wednesday, 7-12-2016 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Draw ***neat*** *diagram* ***where*** *necessary.*
3) Solve ***any two*** *questions in* ***each*** *Section.*

SECTION – I

2. a) Explain objective and significance of material handling system in industry. **5**
   b) Explain any two types of fork lift trucks. **5**
   c) Explain any three types of conveyors. **4**

3. a) What is meant by material handling system ? Explain its principles. **5**
   b) Explain CIMS in material handling and give its benefits. **5**
   c) "Material handling does not add value to a product it usually adds significant element of cost". Justify the statement. **4**

4. Write a short notes (**any three**) : **14**
   a) Role of computer in CIMS. **5**
   b) Storing equipment. **5**
   c) Objectives of material handling. **5**
   d) Automatic guided vehicles. **4**

SECTION – II

5. a) Explain with figure equipment evaluation sheet. **5**
   b) Explain the factors for selection of material handling equipments. **5**
   c) Explain with fig. assembly chart. **4**
6. a) Describe with figure material handling equation. **5**
   b) Material handling selection in sugar industry. **5**
   c) Discuss the importance of material handling safety. **4**
7. Write a short notes (**any three**) : **14**
   a) Choice of material handling equipments. **5**
   b) Flow process chart. **5**
   c) Degree of mechanization. **5**
   d) Equipment evaluation sheet. **4**

SLR-EP – 70

Seat No.	

Set P

T.E. (Mechanical) (Part – II) Examination, 2016
METROLOGY AND MECHANICAL MEASUREMENTS

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 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. **Type I** : Match the pair (**One** mark **each**) :

i)

Column I	**Column II**
A) Measurement of Angle	p) Solex Pneumatic gauge
B) Screw Thread Measurement	q) Sine Instruments
C) Comparators	r) Floating carriage micrometer
	s) Michelsons Interferometer

ii)

Column I	**Column II**
A) Accelerometer	p) Light intensity to resistance change
B) Hot wire anemometer	q) To measure the dampers
C) Photo conductive cell	r) To measure gas velocities
	s) To measure the vibration

Type II : Straight objective type (**One** mark **each**) :

iii) In measurements system, which of the following static characteristics are desirable ?
A) Accuracy B) Sensitivity
C) Reproducibility D) All of the above

iv) A dead weight tester is used for
A) Producing high pressure
B) Accurate measurements of load
C) Testing the magnitude of given wt.
D) Calibrating pressure measuring instruments

v) Mark the odd one.

A) Orifice plate B) Hot wire anemometer

C) Electromagnetic flow meter D) Nutating disk flow meter

vi) Which metal/non-metal has the highest temperature range ?

A) Semi-conductors B) Nickel

C) Copper D) Platinum

Type III : Multiple answer type (**Two** marks **each**) :

vii) In measurement systems which of the following static characteristics are undesirable ?

A) Sensitivity B) Reproductivity

C) Non-linearity D) Drift

viii) In a rotameter the flow is inferred from

A) Force balance on float B) Direction of flow

C) Position of float D) Colour change

ix) As per the Taylor's principle of gauging

A) Go – gauge should be full form gauge

B) Go – gauge should check all the related dimensions simultaneously

C) No – Go gauge should the full form

D) No – Go gauge should check only one dimension at a time

x) A bore of ∅ 14.67 mm in a work piece can be measured by

A) Steel rule B) Micrometer

C) Vernier Caliper D) Pneumatic Gauge

xi) Comparator consists of

A) Sensing device B) Line standard

C) End standard D) Display unit

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SLR-EP – 70

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
METROLOGY AND MECHANICAL MEASUREMENTS

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Question No.* ***2*** *and* ***7*** *are* ***compulsory****.*
2) Answer ***any two*** *questions from the remaining in* ***each*** *Section.*
3) ***Use*** *of non-programmable calculator is* ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) Explain the principle of Vernier. In a Bevel Protractor, 12 divisions of vernier scale are matching with 11 divisions of the main angular scale having one degree division. Find the least count. **5**

   b) For each of the following cases find minimum and maximum clearance/interference and identify the type of fit.

      i) Hole 50 H, tolerance 0.05 mm, shaft sizes 50 mm + 0.005, + 0.07 mm

      ii) Shaft 60 h, tolerance 120 microns hole sizes 60.010 and 60.030. **10**

   c) Explain the principle of Autocollimator with a sketch. **5**

3. a) Explain the concept of measurement and distinguish between precision and accuracy. **5**

   b) Compare hole basis and shaft basis systems. **5**

4. A 200 mm sine bar is to be set to measure an angle of 32 degree. Find the suitable combination of minimum no. of slip gauges to form the necessary height. Which of the two sets M-45 or M-87 would you prefer ? Why ? Sketch the setup. **10**

5. Explain the base tangent method used for gear tooth thickness measurement with neat sketch. Write the expression for the measurement. Compare it to measurement with constant chord method. **10**

6. Write short notes on (**any two**) : **10**

   a) Accumulation of tolerances

   b) Co-ordinate measuring machine

   c) Laser measurement.

SECTION – II

7. A) Explain drift, dead zone and constancy. **5**

   B) Explain calibration of Thermocouple. **5**

   C) Explain working of Rotameter and explain the equation for the flow rate. **5**

   D) Explain the working of Wheatstone's bridge network using electric strain gauges. **5**

8. Identify and explain various basic functional elements in Bourdon tube pressure gauge in the form of different stages of the generalised measurements system. **10**

9. A) Define the following term : **5**
   i) Pressure
   ii) Atmospheric pressure
   iii) Gauge pressure
   iv) Absolute pressure
   v) Static pressure.

   B) Describe briefly the Gas flow meter. **5**

10. A) How are tachometers classified ? **5**

    B) Explain briefly the Hydraulic load cell. **5**

SLR-EP – 70

Seat No.	

Set **Q**

T.E. (Mechanical) (Part – II) Examination, 2016
METROLOGY AND MECHANICAL MEASUREMENTS

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 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. **Type I** : Straight objective type (**One** mark **each**) :

i) In measurements system, which of the following static characteristics are desirable ?
A) Accuracy B) Sensitivity
C) Reproducibility D) All of the above

ii) A dead weight tester is used for
A) Producing high pressure
B) Accurate measurements of load
C) Testing the magnitude of given wt.
D) Calibrating pressure measuring instruments

iii) Mark the odd one.
A) Orifice plate B) Hot wire anemometer
C) Electromagnetic flow meter D) Nutating disk flow meter

iv) Which metal/non-metal has the highest temperature range ?
A) Semi-conductors B) Nickel
C) Copper D) Platinum

Type II : Match the pair (**One** mark **each**) :

v)

Column I	**Column II**
A) Measurement of Angle	p) Solex Pneumatic gauge
B) Screw Thread Measurement	q) Sine Instruments
C) Comparators	r) Floating carriage micrometer
	s) Michelsons Interferometer

vi)

Column I	Column II
A) Accelerometer	p) Light intensity to resistance change
B) Hot wire anemometer	q) To measure the dampers
C) Photo conductive cell	r) To measure gas velocities
	s) To measure the vibration

Type III : Multiple answer type (**Two** marks **each**) :

vii) As per the Taylor's principle of gauging
- A) Go – gauge should be full form gauge
- B) Go – gauge should check all the related dimensions simultaneously
- C) No – Go gauge should the full form
- D) No – Go gauge should check only one dimension at a time

viii) A bore of ∅ 14.67 mm in a work piece can be measured by
- A) Steel rule
- B) Micrometer
- C) Vernier Caliper
- D) Pneumatic Gauge

ix) Comparator consists of
- A) Sensing device
- B) Line standard
- C) End standard
- D) Display unit

x) In measurement systems which of the following static characteristics are undesirable ?
- A) Sensitivity
- B) Reproductivity
- C) Non-linearity
- D) Drift

xi) In a rotameter the flow is inferred from
- A) Force balance on float
- B) Direction of flow
- C) Position of float
- D) Colour change

———————

SLR-EP – 70

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
METROLOGY AND MECHANICAL MEASUREMENTS

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Question No. **2** and **7** are **compulsory**.*
*2) Answer **any two** questions from the remaining in **each** Section.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Explain the principle of Vernier. In a Bevel Protractor, 12 divisions of vernier scale are matching with 11 divisions of the main angular scale having one degree division. Find the least count. **5**

   b) For each of the following cases find minimum and maximum clearance/interference and identify the type of fit.

      i) Hole 50 H, tolerance 0.05 mm, shaft sizes 50 mm + 0.005, + 0.07 mm

      ii) Shaft 60 h, tolerance 120 microns hole sizes 60.010 and 60.030. **10**

   c) Explain the principle of Autocollimator with a sketch. **5**

3. a) Explain the concept of measurement and distinguish between precision and accuracy. **5**

   b) Compare hole basis and shaft basis systems. **5**

4. A 200 mm sine bar is to be set to measure an angle of 32 degree. Find the suitable combination of minimum no. of slip gauges to form the necessary height. Which of the two sets M-45 or M-87 would you prefer ? Why ? Sketch the setup. **10**

5. Explain the base tangent method used for gear tooth thickness measurement with neat sketch. Write the expression for the measurement. Compare it to measurement with constant chord method. **10**

6. Write short notes on (**any two**) : **10**

   a) Accumulation of tolerances

   b) Co-ordinate measuring machine

   c) Laser measurement.

SECTION – II

7. A) Explain drift, dead zone and constancy. **5**

   B) Explain calibration of Thermocouple. **5**

   C) Explain working of Rotameter and explain the equation for the flow rate. **5**

   D) Explain the working of Wheatstone's bridge network using electric strain gauges. **5**

8. Identify and explain various basic functional elements in Bourdon tube pressure gauge in the form of different stages of the generalised measurements system. **10**

9. A) Define the following term : **5**

      i) Pressure

      ii) Atmospheric pressure

      iii) Gauge pressure

      iv) Absolute pressure

      v) Static pressure.

   B) Describe briefly the Gas flow meter. **5**

10. A) How are tachometers classified ? **5**

    B) Explain briefly the Hydraulic load cell. **5**

SLR-EP – 70

Seat No.	

Set **R**

T.E. (Mechanical) (Part – II) Examination, 2016
METROLOGY AND MECHANICAL MEASUREMENTS

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 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. **Type I** : Multiple answer type (**Two** marks **each**) :

i) A bore of ∅ 14.67 mm in a work piece can be measured by

A) Steel rule B) Micrometer

C) Vernier Caliper D) Pneumatic Gauge

ii) Comparator consists of

A) Sensing device B) Line standard

C) End standard D) Display unit

iii) In measurement systems which of the following static characteristics are undesirable ?

A) Sensitivity B) Reproductivity

C) Non-linearity D) Drift

iv) In a rotameter the flow is inferred from

A) Force balance on float B) Direction of flow

C) Position of float D) Colour change

v) As per the Taylor's principle of gauging

A) Go – gauge should be full form gauge

B) Go – gauge should check all the related dimensions simultaneously

C) No – Go gauge should the full form

D) No – Go gauge should check only one dimension at a time

Type II : Straight objective type (**One** mark **each**) :

vi) Mark the odd one.

A) Orifice plate B) Hot wire anemometer

C) Electromagnetic flow meter D) Nutating disk flow meter

vii) Which metal/non-metal has the highest temperature range ?

A) Semi-conductors B) Nickel

C) Copper D) Platinum

viii) In measurements system, which of the following static characteristics are desirable ?

A) Accuracy B) Sensitivity

C) Reproducibility D) All of the above

ix) A dead weight tester is used for

A) Producing high pressure

B) Accurate measurements of load

C) Testing the magnitude of given wt.

D) Calibrating pressure measuring instruments

Type III : Match the pair (**One** mark **each**) :

x)

Column I	**Column II**
A) Measurement of Angle	p) Solex Pneumatic gauge
B) Screw Thread Measurement	q) Sine Instruments
C) Comparators	r) Floating carriage micrometer
	s) Michelsons Interferometer

xi)

Column I	**Column II**
A) Accelerometer	p) Light intensity to resistance change
B) Hot wire anemometer	q) To measure the dampers
C) Photo conductive cell	r) To measure gas velocities
	s) To measure the vibration

SLR-EP – 70

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
METROLOGY AND MECHANICAL MEASUREMENTS

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Question No. **2** and **7** are **compulsory**.*
*2) Answer **any two** questions from the remaining in **each** Section.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Explain the principle of Vernier. In a Bevel Protractor, 12 divisions of vernier scale are matching with 11 divisions of the main angular scale having one degree division. Find the least count. **5**

   b) For each of the following cases find minimum and maximum clearance/interference and identify the type of fit.

      i) Hole 50 H, tolerance 0.05 mm, shaft sizes 50 mm + 0.005, + 0.07 mm

      ii) Shaft 60 h, tolerance 120 microns hole sizes 60.010 and 60.030. **10**

   c) Explain the principle of Autocollimator with a sketch. **5**

3. a) Explain the concept of measurement and distinguish between precision and accuracy. **5**

   b) Compare hole basis and shaft basis systems. **5**

4. A 200 mm sine bar is to be set to measure an angle of 32 degree. Find the suitable combination of minimum no. of slip gauges to form the necessary height. Which of the two sets M-45 or M-87 would you prefer ? Why ? Sketch the setup. **10**

5. Explain the base tangent method used for gear tooth thickness measurement with neat sketch. Write the expression for the measurement. Compare it to measurement with constant chord method. **10**

6. Write short notes on (**any two**) : **10**

   a) Accumulation of tolerances

   b) Co-ordinate measuring machine

   c) Laser measurement.

SECTION – II

7. A) Explain drift, dead zone and constancy. **5**

   B) Explain calibration of Thermocouple. **5**

   C) Explain working of Rotameter and explain the equation for the flow rate. **5**

   D) Explain the working of Wheatstone's bridge network using electric strain gauges. **5**

8. Identify and explain various basic functional elements in Bourdon tube pressure gauge in the form of different stages of the generalised measurements system. **10**

9. A) Define the following term : **5**
      i) Pressure
      ii) Atmospheric pressure
      iii) Gauge pressure
      iv) Absolute pressure
      v) Static pressure.

   B) Describe briefly the Gas flow meter. **5**

10. A) How are tachometers classified ? **5**

    B) Explain briefly the Hydraulic load cell. **5**

SLR-EP – 70

Seat No.	

Set **S**

T.E. (Mechanical) (Part – II) Examination, 2016
METROLOGY AND MECHANICAL MEASUREMENTS

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 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. **Type I** : Multiple answer type (**Two** marks **each**) :

i) In a rotameter the flow is inferred from

A) Force balance on float B) Direction of flow

C) Position of float D) Colour change

ii) As per the Taylor's principle of gauging

A) Go – gauge should be full form gauge

B) Go – gauge should check all the related dimensions simultaneously

C) No – Go gauge should the full form

D) No – Go gauge should check only one dimension at a time

iii) A bore of ∅ 14.67 mm in a work piece can be measured by

A) Steel rule B) Micrometer

C) Vernier Caliper D) Pneumatic Gauge

iv) Comparator consists of

A) Sensing device B) Line standard

C) End standard D) Display unit

v) In measurement systems which of the following static characteristics are undesirable ?

A) Sensitivity B) Reproductivity

C) Non-linearity D) Drift

P.T.O.

Type II : Match the pair (**One** mark **each**) :

vi)

Column I	**Column II**
A) Measurement of Angle	p) Solex Pneumatic gauge
B) Screw Thread Measurement	q) Sine Instruments
C) Comparators	r) Floating carriage micrometer
	s) Michelsons Interferometer

vii)

Column I	**Column II**
A) Accelerometer	p) Light intensity to resistance change
B) Hot wire anemometer	q) To measure the dampers
C) Photo conductive cell	r) To measure gas velocities
	s) To measure the vibration

Type III : Straight objective type (**One** mark **each**) :

viii) A dead weight tester is used for
- A) Producing high pressure
- B) Accurate measurements of load
- C) Testing the magnitude of given wt.
- D) Calibrating pressure measuring instruments

ix) Mark the odd one.
- A) Orifice plate
- B) Hot wire anemometer
- C) Electromagnetic flow meter
- D) Nutating disk flow meter

x) Which metal/non-metal has the highest temperature range ?
- A) Semi-conductors
- B) Nickel
- C) Copper
- D) Platinum

xi) In measurements system, which of the following static characteristics are desirable ?
- A) Accuracy
- B) Sensitivity
- C) Reproducibility
- D) All of the above

SLR-EP – 70

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
METROLOGY AND MECHANICAL MEASUREMENTS

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Question No.* ***2*** *and* ***7*** *are* ***compulsory****.*
2) Answer ***any two*** *questions from the remaining in* ***each*** *Section.*
3) ***Use*** *of non-programmable calculator is* ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) Explain the principle of Vernier. In a Bevel Protractor, 12 divisions of vernier scale are matching with 11 divisions of the main angular scale having one degree division. Find the least count. **5**

   b) For each of the following cases find minimum and maximum clearance/interference and identify the type of fit.

      i) Hole 50 H, tolerance 0.05 mm, shaft sizes 50 mm + 0.005, + 0.07 mm

      ii) Shaft 60 h, tolerance 120 microns hole sizes 60.010 and 60.030. **10**

   c) Explain the principle of Autocollimator with a sketch. **5**

3. a) Explain the concept of measurement and distinguish between precision and accuracy. **5**

   b) Compare hole basis and shaft basis systems. **5**

4. A 200 mm sine bar is to be set to measure an angle of 32 degree. Find the suitable combination of minimum no. of slip gauges to form the necessary height. Which of the two sets M-45 or M-87 would you prefer ? Why ? Sketch the setup. **10**

5. Explain the base tangent method used for gear tooth thickness measurement with neat sketch. Write the expression for the measurement. Compare it to measurement with constant chord method. **10**

6. Write short notes on (**any two**) : **10**

   a) Accumulation of tolerances

   b) Co-ordinate measuring machine

   c) Laser measurement.

SECTION – II

7. A) Explain drift, dead zone and constancy. **5**

   B) Explain calibration of Thermocouple. **5**

   C) Explain working of Rotameter and explain the equation for the flow rate. **5**

   D) Explain the working of Wheatstone's bridge network using electric strain gauges. **5**

8. Identify and explain various basic functional elements in Bourdon tube pressure gauge in the form of different stages of the generalised measurements system. **10**

9. A) Define the following term : **5**
      i) Pressure
      ii) Atmospheric pressure
      iii) Gauge pressure
      iv) Absolute pressure
      v) Static pressure.

   B) Describe briefly the Gas flow meter. **5**

10. A) How are tachometers classified ? **5**

    B) Explain briefly the Hydraulic load cell. **5**

SLR-EP – 71

Seat No.	

Set P

T.E. (Mechanical) (Part – II) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Tuesday, 22-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 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) Assume suitable data if **necessary**.*
*4) Use of non-programmable calculator is **allowed**.*
*5) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) For same compression ratio and heat addition Otto cycle efficiency with respect to diesel cycle efficiency is
   a) Greater than b) Smaller than c) Equal to d) None of the above

2) The function of quench area in a wedge shaped SI engine combustion chamber
   a) Improve the compression ratio
   b) Cool the end gas
   c) Decrease the volume of combustion chamber
   d) Increase the area of combustion chamber

3) Multi point fuel injection system uses
   a) Direct injection b) Port injection
   c) Throttle body injection d) Both (b) and (c)

4) Lubrication system used in racing car
   a) Petrol b) Splash system
   c) Pressure system d) Dry sump lubrication

5) Valve overlap is the period in which
   a) Intake valve closed while exhaust valve close
   b) Intake valve open while exhaust valve is open
   c) Both intake and exhaust valves are open
   d) Both intake and exhaust valves are closed

6) In case of fuel injector spring tension and valve opening pressure is controlled by
   a) Lock nut b) Adjusting screw
   c) Plunger d) None of the above

P.T.O.

7) The function of distributor in case of battery ignition system
   a) Distribute the fuel to ignition coil
   b) Storage of energy in primary and secondary winding
   c) Determine the firing sequence of spark plug
   d) None of the above

8) In CI engines with increase in compression ratio the delay period
   a) Increases b) Decreases
   c) First increase then decreases d) Not affected

9) CO in the exhaust of a car should not more than
   a) 0.5% b) 2% c) 5% d) 10%

10) Brake thermal efficiency of SI engine is in the range
   a) 35% to 60% b) 25% to 35%
   c) 60% to 80% d) None of the above

11) Dissociation of CO_2 and H_2O takes place above
   a) 200°C and 400°C b) 1000°C and 1300°C
   c) 600°C and 800°C d) None of the above

12) The octane number iso-octane is
   a) 0 b) 10 c) 80 d) 100

13) The volumetric efficiency of SI engine is comparatively
   a) Lower than CI engine b) Higher than CI engine
   c) Will be same as CI engine d) None of the above

14) The component which converts reciprocatory motion into rotary motion in engines is
   a) gudgeon pin b) piston rings c) crank shaft d) camshaft

15) From the engine indicator diagram we obtain
   a) IMEP b) BMEP
   c) Mechanical efficiency d) Relative efficiency

16) Supercharging increases the power output by increasing
   a) Charge temperature b) Charge pressure
   c) Speed of engine d) Quantity of fuel admitted

17) Increasing the compression ratio in SI engines the knocking tendency
   a) Decreases b) Increases
   c) Not affected d) None of the above

18) Spark advance is usually specified in terms of
   a) degrees of crank rotation b) time in seconds
   c) engine speed in rev/min d) none of the above

19) The fuel air ratio for maximum power in SI engine should be
   a) Lean b) Rich
   c) May be lean or rich d) Chemically correct

20) In cooling system of the engine the purpose of thermostat is to keep the engine
   a) Hot b) Cool
   c) At desired temperature d) None of the above

SLR-EP – 71

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Answer **any two** questions from **each** Section.*
*2) Assume suitable data if **necessary**.*
*3) Use of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Derive an equation for air fuel ratio for carburetor using exact method. **6**

   b) Explain selection of I.C. Engine for power generation and automobile application. **6**

   c) Discuss the following losses which occur in an actual engine : **8**
      I) Exhaust blow down losses.
      II) Pumping losses.
      III) Time losses.

3. a) The venturi of simple carburetor has throat diameter of 35 mm and co-efficient of air flow is 0.85. The fuel orifice has a diameter of 2.3 mm and co-efficient of fuel flow is 0.66. The petrol surface is 5 mm below the throat. Find **8**
      i) The air fuel ratio for pressure drop of 0.07 bar when the nozzle lip is neglected.
      ii) The air fuel ratio when the nozzle lip is taken in to account.
      iii) The minimum velocity of air (critical air velocity) required to start the fuel flow when nozzle lip is provided.

      The density of air and fuel as 1.2 and 750 kg/m^3 respectively.

   b) Explain valve timing diagram for two stroke and four stroke engine. **6**

   c) What are the steady state and transient operation of engine ? Explain requirement of air fuel mixture for these operations. **6**

4. a) A 16 cylinder diesel engine has power output of 800 kW at 900 rpm. The engine works on four stroke cycle and has fuel consumption of 234 gm/kW-hr. The pressure in the cylinder at the beginning of the injection is 32.4 bar and maximum pressure in the cylinder is 55 bar. The injector is set at 214 bar and the maximum pressure at the injector is expected to be about 600 bar. The coefficient of discharge for the injector is 0.6. The specific gravity of fuel is 0.86. Calculate the orifice area required per injector if injection takes place over 10 degree crank angle. **8**

   b) Classify lubrication system of I.C. engine. Explain pressure lubrication with figure. **6**

   c) Discuss the requirements of an injection system and explain distributor type injection system. **6**

Set P

SECTION – II

5. a) Compare the knocking in SI engines and CI engines. **8**

   b) Differentiate between : **8**
      1) Pre-ignition and auto ignition.
      2) Open combustion chamber and pre combustion chamber.

   c) Write a short notes on importance of air motion in C.I. combustion. **4**

6. a) Explain Turbo charging and its suitability in I.C. Engines. Also explain its difference from supercharging. **8**

   b) Enlist the different techniques of using alcohol in diesel engines. **4**

   c) The air flow to four cylinder four stroke petrol engine is measured by means of a 7.5 cm diameter sharp edge orifice, Cd = 0.6. During a test on the engine following data were recorded :

      Bore = 11 cm, stroke = 13 cm, Engine speed = 2250 rpm, Brake power = 36 kW, Fuel consumption = 10.5 kg/h, Calorific value of fuel = 42000 kJ/kg, Pressure drop across the orifice = 4.1 cm of water. Atmospheric temperature and pressure are 15°C and 1.013 bar. Calculate :
      i) Thermal efficiency on brake power basis.
      ii) Brake mean effective pressure.
      iii) Volumetric efficiency based on free air condition. **8**

7. a) Explain the attractive features of hydrogen as an I.C. Engine fuel and discuss its suitability for S.I. engines and C.I. engines. **8**

   b) What are the different pollutants emitted by the petrol engines ? Explain methods used to control these pollutants. **8**

   c) Write a short note on EGR. **4**

SLR-EP – 71

Seat No.	

Set Q

T.E. (Mechanical) (Part – II) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Tuesday, 22-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 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.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Supercharging increases the power output by increasing
   a) Charge temperature b) Charge pressure
   c) Speed of engine d) Quantity of fuel admitted

2) Increasing the compression ratio in SI engines the knocking tendency
   a) Decreases b) Increases
   c) Not affected d) None of the above

3) Spark advance is usually specified in terms of
   a) degrees of crank rotation b) time in seconds
   c) engine speed in rev/min d) none of the above

4) The fuel air ratio for maximum power in SI engine should be
   a) Lean b) Rich
   c) May be lean or rich d) Chemically correct

5) In cooling system of the engine the purpose of thermostat is to keep the engine
   a) Hot b) Cool
   c) At desired temperature d) None of the above

6) For same compression ratio and heat addition Otto cycle efficiency with respect to diesel cycle efficiency is
   a) Greater than b) Smaller than c) Equal to d) None of the above

7) The function of quench area in a wedge shaped SI engine combustion chamber
   a) Improve the compression ratio
   b) Cool the end gas
   c) Decrease the volume of combustion chamber
   d) Increase the area of combustion chamber

P.T.O.

8) Multi point fuel injection system uses
   a) Direct injection
   b) Port injection
   c) Throttle body injection
   d) Both (b) and (c)

9) Lubrication system used in racing car
   a) Petrol
   b) Splash system
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10) Valve overlap is the period in which
   a) Intake valve closed while exhaust valve close
   b) Intake valve open while exhaust valve is open
   c) Both intake and exhaust valves are open
   d) Both intake and exhaust valves are closed

11) In case of fuel injector spring tension and valve opening pressure is controlled by
   a) Lock nut
   b) Adjusting screw
   c) Plunger
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12) The function of distributor in case of battery ignition system
   a) Distribute the fuel to ignition coil
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13) In CI engines with increase in compression ratio the delay period
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   a) Lower than CI engine
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19) The component which converts reciprocatory motion into rotary motion in engines is
   a) gudgeon pin b) piston rings c) crank shaft d) camshaft

20) From the engine indicator diagram we obtain
   a) IMEP
   b) BMEP
   c) Mechanical efficiency
   d) Relative efficiency

SLR-EP – 71

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Answer **any two** questions from **each** Section.*
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SECTION – I

2. a) Derive an equation for air fuel ratio for carburetor using exact method. **6**

   b) Explain selection of I.C. Engine for power generation and automobile application. **6**

   c) Discuss the following losses which occur in an actual engine : **8**
      I) Exhaust blow down losses.
      II) Pumping losses.
      III) Time losses.

3. a) The venturi of simple carburetor has throat diameter of 35 mm and co-efficient of air flow is 0.85. The fuel orifice has a diameter of 2.3 mm and co-efficient of fuel flow is 0.66. The petrol surface is 5 mm below the throat. Find **8**
      i) The air fuel ratio for pressure drop of 0.07 bar when the nozzle lip is neglected.
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      iii) The minimum velocity of air (critical air velocity) required to start the fuel flow when nozzle lip is provided.

      The density of air and fuel as 1.2 and 750 kg/m^3 respectively.

   b) Explain valve timing diagram for two stroke and four stroke engine. **6**

   c) What are the steady state and transient operation of engine ? Explain requirement of air fuel mixture for these operations. **6**

4. a) A 16 cylinder diesel engine has power output of 800 kW at 900 rpm. The engine works on four stroke cycle and has fuel consumption of 234 gm/kW-hr. The pressure in the cylinder at the beginning of the injection is 32.4 bar and maximum pressure in the cylinder is 55 bar. The injector is set at 214 bar and the maximum pressure at the injector is expected to be about 600 bar. The coefficient of discharge for the injector is 0.6. The specific gravity of fuel is 0.86. Calculate the orifice area required per injector if injection takes place over 10 degree crank angle. **8**

   b) Classify lubrication system of I.C. engine. Explain pressure lubrication with figure. **6**

   c) Discuss the requirements of an injection system and explain distributor type injection system. **6**

Set Q

SECTION – II

5. a) Compare the knocking in SI engines and CI engines. **8**

   b) Differentiate between : **8**
      1) Pre-ignition and auto ignition.
      2) Open combustion chamber and pre combustion chamber.

   c) Write a short notes on importance of air motion in C.I. combustion. **4**

6. a) Explain Turbo charging and its suitability in I.C. Engines. Also explain its difference from supercharging. **8**

   b) Enlist the different techniques of using alcohol in diesel engines. **4**

   c) The air flow to four cylinder four stroke petrol engine is measured by means of a 7.5 cm diameter sharp edge orifice, Cd = 0.6. During a test on the engine following data were recorded :

      Bore = 11 cm, stroke = 13 cm, Engine speed = 2250 rpm, Brake power = 36 kW, Fuel consumption = 10.5 kg/h, Calorific value of fuel = 42000 kJ/kg, Pressure drop across the orifice = 4.1 cm of water. Atmospheric temperature and pressure are 15°C and 1.013 bar. Calculate :
      i) Thermal efficiency on brake power basis.
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7. a) Explain the attractive features of hydrogen as an I.C. Engine fuel and discuss its suitability for S.I. engines and C.I. engines. **8**

   b) What are the different pollutants emitted by the petrol engines ? Explain methods used to control these pollutants. **8**

   c) Write a short note on EGR. **4**

SLR-EP – 71

Seat No.	

Set R

T.E. (Mechanical) (Part – II) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Tuesday, 22-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Dissociation of CO_2 and H_2O takes place above
   a) 200°C and 400°C b) 1000°C and 1300°C
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2) The octane number iso-octane is
   a) 0 b) 10 c) 80 d) 100

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   a) degrees of crank rotation b) time in seconds
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P.T.O.

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SLR-EP – 71

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Answer **any two** questions from **each** Section.*
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SECTION – I

2. a) Derive an equation for air fuel ratio for carburetor using exact method. **6**

   b) Explain selection of I.C. Engine for power generation and automobile application. **6**

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   b) Classify lubrication system of I.C. engine. Explain pressure lubrication with figure. **6**

   c) Discuss the requirements of an injection system and explain distributor type injection system. **6**

Set R

SECTION – II

5. a) Compare the knocking in SI engines and CI engines. **8**

   b) Differentiate between : **8**
      1) Pre-ignition and auto ignition.
      2) Open combustion chamber and pre combustion chamber.

   c) Write a short notes on importance of air motion in C.I. combustion. **4**

6. a) Explain Turbo charging and its suitability in I.C. Engines. Also explain its difference from supercharging. **8**

   b) Enlist the different techniques of using alcohol in diesel engines. **4**

   c) The air flow to four cylinder four stroke petrol engine is measured by means of a 7.5 cm diameter sharp edge orifice, Cd = 0.6. During a test on the engine following data were recorded :

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      i) Thermal efficiency on brake power basis.
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7. a) Explain the attractive features of hydrogen as an I.C. Engine fuel and discuss its suitability for S.I. engines and C.I. engines. **8**

   b) What are the different pollutants emitted by the petrol engines ? Explain methods used to control these pollutants. **8**

   c) Write a short note on EGR. **4**

SLR-EP – 71

Seat No.	

Set S

T.E. (Mechanical) (Part – II) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Tuesday, 22-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 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) Assume suitable data if **necessary**.*
*4) Use of non-programmable calculator is **allowed**.*
*5) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) In case of fuel injector spring tension and valve opening pressure is controlled by
   a) Lock nut b) Adjusting screw
   c) Plunger d) None of the above

2) The function of distributor in case of battery ignition system
   a) Distribute the fuel to ignition coil
   b) Storage of energy in primary and secondary winding
   c) Determine the firing sequence of spark plug
   d) None of the above

3) In CI engines with increase in compression ratio the delay period
   a) Increases b) Decreases
   c) First increase then decreases d) Not affected

4) CO in the exhaust of a car should not more than
   a) 0.5% b) 2% c) 5% d) 10%

5) Brake thermal efficiency of SI engine is in the range
   a) 35% to 60% b) 25% to 35%
   c) 60% to 80% d) None of the above

6) Dissociation of CO_2 and H_2O takes place above
   a) 200°C and 400°C b) 1000°C and 1300°C
   c) 600°C and 800°C d) None of the above

7) The octane number iso-octane is
   a) 0 b) 10 c) 80 d) 100

8) The volumetric efficiency of SI engine is comparatively
   a) Lower than CI engine b) Higher than CI engine
   c) Will be same as CI engine d) None of the above

P.T.O.

9) The component which converts reciprocatory motion into rotary motion in engines is
   a) gudgeon pin b) piston rings c) crank shaft d) camshaft

10) From the engine indicator diagram we obtain
   a) IMEP b) BMEP
   c) Mechanical efficiency d) Relative efficiency

11) Supercharging increases the power output by increasing
   a) Charge temperature b) Charge pressure
   c) Speed of engine d) Quantity of fuel admitted

12) Increasing the compression ratio in SI engines the knocking tendency
   a) Decreases b) Increases
   c) Not affected d) None of the above

13) Spark advance is usually specified in terms of
   a) degrees of crank rotation b) time in seconds
   c) engine speed in rev/min d) none of the above

14) The fuel air ratio for maximum power in SI engine should be
   a) Lean b) Rich
   c) May be lean or rich d) Chemically correct

15) In cooling system of the engine the purpose of thermostat is to keep the engine
   a) Hot b) Cool
   c) At desired temperature d) None of the above

16) For same compression ratio and heat addition Otto cycle efficiency with respect to diesel cycle efficiency is
   a) Greater than b) Smaller than c) Equal to d) None of the above

17) The function of quench area in a wedge shaped SI engine combustion chamber
   a) Improve the compression ratio
   b) Cool the end gas
   c) Decrease the volume of combustion chamber
   d) Increase the area of combustion chamber

18) Multi point fuel injection system uses
   a) Direct injection b) Port injection
   c) Throttle body injection d) Both (b) and (c)

19) Lubrication system used in racing car
   a) Petrol b) Splash system
   c) Pressure system d) Dry sump lubrication

20) Valve overlap is the period in which
   a) Intake valve closed while exhaust valve close
   b) Intake valve open while exhaust valve is open
   c) Both intake and exhaust valves are open
   d) Both intake and exhaust valves are closed

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Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Answer **any two** questions from **each** Section.*
*2) Assume suitable data if **necessary**.*
*3) Use of non-programmable calculator is **allowed**.*
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SECTION – I

2. a) Derive an equation for air fuel ratio for carburetor using exact method. **6**

   b) Explain selection of I.C. Engine for power generation and automobile application. **6**

   c) Discuss the following losses which occur in an actual engine : **8**
      I) Exhaust blow down losses.
      II) Pumping losses.
      III) Time losses.

3. a) The venturi of simple carburetor has throat diameter of 35 mm and co-efficient of air flow is 0.85. The fuel orifice has a diameter of 2.3 mm and co-efficient of fuel flow is 0.66. The petrol surface is 5 mm below the throat. Find **8**
      i) The air fuel ratio for pressure drop of 0.07 bar when the nozzle lip is neglected.
      ii) The air fuel ratio when the nozzle lip is taken in to account.
      iii) The minimum velocity of air (critical air velocity) required to start the fuel flow when nozzle lip is provided.

      The density of air and fuel as 1.2 and 750 kg/m^3 respectively.

   b) Explain valve timing diagram for two stroke and four stroke engine. **6**

   c) What are the steady state and transient operation of engine ? Explain requirement of air fuel mixture for these operations. **6**

4. a) A 16 cylinder diesel engine has power output of 800 kW at 900 rpm. The engine works on four stroke cycle and has fuel consumption of 234 gm/kW-hr. The pressure in the cylinder at the beginning of the injection is 32.4 bar and maximum pressure in the cylinder is 55 bar. The injector is set at 214 bar and the maximum pressure at the injector is expected to be about 600 bar. The coefficient of discharge for the injector is 0.6. The specific gravity of fuel is 0.86. Calculate the orifice area required per injector if injection takes place over 10 degree crank angle. **8**

   b) Classify lubrication system of I.C. engine. Explain pressure lubrication with figure. **6**

   c) Discuss the requirements of an injection system and explain distributor type injection system. **6**

Set S

SECTION – II

5. a) Compare the knocking in SI engines and CI engines. **8**

   b) Differentiate between : **8**
      1) Pre-ignition and auto ignition.
      2) Open combustion chamber and pre combustion chamber.

   c) Write a short notes on importance of air motion in C.I. combustion. **4**

6. a) Explain Turbo charging and its suitability in I.C. Engines. Also explain its difference from supercharging. **8**

   b) Enlist the different techniques of using alcohol in diesel engines. **4**

   c) The air flow to four cylinder four stroke petrol engine is measured by means of a 7.5 cm diameter sharp edge orifice, Cd = 0.6. During a test on the engine following data were recorded :

      Bore = 11 cm, stroke = 13 cm, Engine speed = 2250 rpm, Brake power = 36 kW, Fuel consumption = 10.5 kg/h, Calorific value of fuel = 42000 kJ/kg, Pressure drop across the orifice = 4.1 cm of water. Atmospheric temperature and pressure are 15°C and 1.013 bar. Calculate :
      i) Thermal efficiency on brake power basis.
      ii) Brake mean effective pressure.
      iii) Volumetric efficiency based on free air condition. **8**

7. a) Explain the attractive features of hydrogen as an I.C. Engine fuel and discuss its suitability for S.I. engines and C.I. engines. **8**

   b) What are the different pollutants emitted by the petrol engines ? Explain methods used to control these pollutants. **8**

   c) Write a short note on EGR. **4**

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Seat No.	

Set P

T.E. (Mechanical Engineering) (Part – II) Examination, 2016
CAD/CAM

Day and Date : Wednesday, 23-11-2016 Total Marks : 100
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*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 : **(20×1=20)**

1) Which of the following is not the product of Dassault Systems ?
A) CATIA B) COSMOS C) Solidworks D) SolidEdge

2) Tool and fixture design is the task under
A) CAD B) CAM C) CAE D) None of these

3) In homogeneous transformation system the inverse of rotation matrix is

A) $\begin{bmatrix} \cos(-\theta) & \sin(-\theta) & 0 \\ -\sin(-\theta) & \cos(-\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix}$ B) $\begin{bmatrix} \cos(\theta) & \sin(\theta) & 0 \\ -\sin(\theta) & \cos(\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix}$

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4) _____ is the type of graphics standards.
A) PHIGS B) CORE C) GKS D) All of these

5) In the following geometric modeling which is not 3D modeling ?
A) Wireframe modeling B) Drafting
C) Surface modeling D) Solid Modeling

6) In any curve representation, the shape associated with control points is called as
A) Uniform curve B) Rectangle C) Circle D) Control Polygon

7) Which of the following is the module of CIM ?
A) CAD B) CAM
C) Business data functions D) All of these

P.T.O.

8) Retrieval type and generative type are the types of
   A) FMS B) GT
   C) CAPP D) CNC programming

9) Which of the following is the rapid prototyping method ?
   A) Stereolithography B) Selective Laser Sintering
   C) Fused Deposition Modeling D) All of these

10) DC Servo motors are used as drive motors in
   A) Open loop control B) Close loop control
   C) Both A) and B) D) None of the above

11) Which one of the following is not CNC controller ?
   A) SINUMERIK B) CINCINNATI C) PEARSON D) FANUC

12) Following is the basic component of CNC machine.
   A) Programme of instructions B) MCU
   C) Machine tool D) All of the above

13) In numerical control systems, DNC stands for
   A) Dedicated Numerical Control B) Directional Numerical Control
   C) Distributed Numerical Control D) None of these

14) NC machines used for drilling, boring, reaming, tapping is
   A) Contouring type B) Straight cut
   C) Point-to-point D) None of the above

15) Which type of tool magazines are generally used to handle large number of tools ?
   A) Drum type B) Chain type C) Turret type D) Both A) & B)

16) Multiple pallets are used in CNC machine tools, basically for
   A) Increasing the cost of machine B) Ease of handing job
   C) Increase machine utilization D) All of these

17) The preparatory function used for circular clockwise interpolation function is
   A) G03 B) G02 C) G04 D) G01

18) The miscellaneous function words consist of _____ digits.
   A) One B) Two C) Three D) Four

19) The machine zero on lathe is generally set on the machine at
   A) Top right side B) Top left side
   C) At top mid position D) None of the above

20) Canned cycles are generally used for
   A) Turning B) Drilling C) Threading D) Both A) and C)

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SLR-EP – 72

Seat No.	

T.E. (Mechanical Engineering) (Part – II) Examination, 2016
CAD/CAM

Day and Date : Wednesday, 23-11-2016 Marks : 80
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SECTION – I

2. a) Explain in detail input devices in CAD hardware. **6**

   b) Explain in detail the various functions graphics software can perform. **7**

3. a) Translate a triangle with coordinates A(1, 1), B(3, 3) and C(4, 1) by 4 units in X-direction and 2 units in Y-direction. Write the equation and draw the translation. **7**

   b) Explain the need of homogeneous transformations ? Write the homogeneous matrices for translation, rotation, scaling, reflection and shear. **6**

4. a) Merits and Demerits of Group Technology. **6**

   b) Differentiate between Wireframe and Surface models. **7**

5. Write notes on **any three** : **14**

   a) CAD/CAM product cycle.

   b) Coordinate Transformations.

   c) Computer Integrated Manufacturing (CIM).

   d) Data exchange formats.

SECTION – II

6. a) With reference to component drawing given below prepare CNC part program using G & M codes

Prepare :

1) Sequence of operation

2) Process sheet.

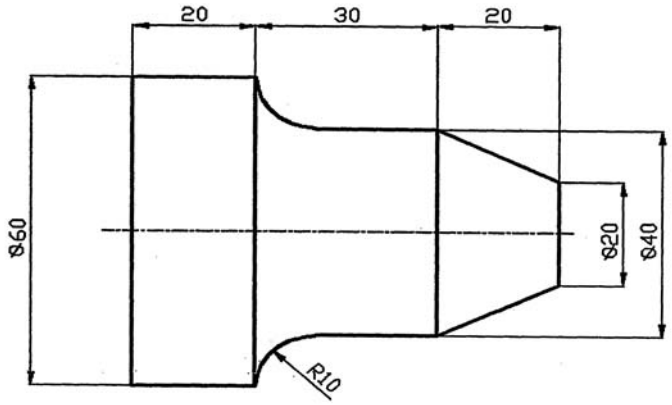
Assume suitable Job zero/Machine zero/home position of tool etc. and state it clearly.

Given :

Tool material : H.S.S Work Material : M.S.

Spindle speed : 2000 rpm Feed rate : 400 mm/min

All dimensions are in mm. **10**



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7. a) Classification of NC machine system. **7**

b) Explain briefly CNC controllers. **6**

8. a) Explain in detail adaptive control of CNC machine tools. **7**

b) Explain in detail various tool holding devices on CNC machines. **6**

9. Write short notes on (**any three**) : **13**

a) Diameter Vs. radius programming.

b) Canned cycles.

c) Pallets in CNC.

d) DNC machines.

SLR-EP – 72

Seat No.	

Set Q

T.E. (Mechanical Engineering) (Part – II) Examination, 2016
CAD/CAM

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Duration : 30 Minutes Marks : 20

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P.T.O.

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SLR-EP – 72

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CAD/CAM

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5. Write notes on **any three** : **14**

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Set Q

SECTION – II

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Prepare :

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Given :

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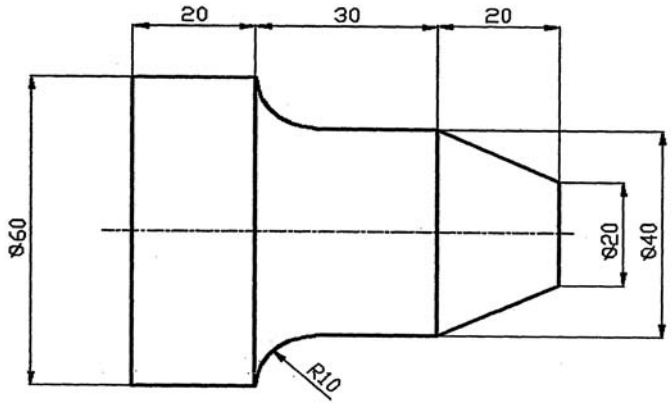
All dimensions are in mm. **10**



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b) Explain in detail various tool holding devices on CNC machines. **6**

9. Write short notes on (**any three**) : **13**

a) Diameter Vs. radius programming.

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SLR-EP – 72

Seat No.	

Set **R**

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CAD/CAM

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P.T.O.

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Seat No.	

T.E. (Mechanical Engineering) (Part – II) Examination, 2016
CAD/CAM

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SECTION – I

2. a) Explain in detail input devices in CAD hardware. **6**

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5. Write notes on **any three** : **14**

   a) CAD/CAM product cycle.

   b) Coordinate Transformations.

   c) Computer Integrated Manufacturing (CIM).

   d) Data exchange formats.

Set R

SECTION – II

6. a) With reference to component drawing given below prepare CNC part program using G & M codes

Prepare :

1) Sequence of operation

2) Process sheet.

Assume suitable Job zero/Machine zero/home position of tool etc. and state it clearly.

Given :

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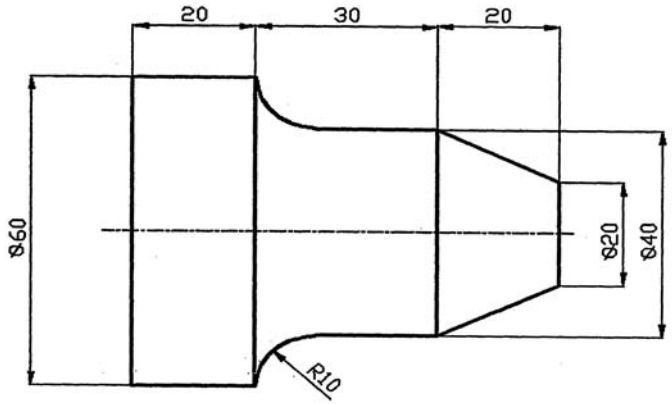

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9. Write short notes on (**any three**) : **13**

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b) Canned cycles.

c) Pallets in CNC.

d) DNC machines.

SLR-EP – 72

Seat No.	

Set **S**

T.E. (Mechanical Engineering) (Part – II) Examination, 2016
CAD/CAM

Day and Date : Wednesday, 23-11-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Note** : 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 : **(20×1=20)**

1) In any curve representation, the shape associated with control points is called as
A) Uniform curve B) Rectangle C) Circle D) Control Polygon

2) Which of the following is the module of CIM ?
A) CAD B) CAM
C) Business data functions D) All of these

3) Retrieval type and generative type are the types of
A) FMS B) GT
C) CAPP D) CNC programming

4) Which of the following is the rapid prototyping method ?
A) Stereolithography B) Selective Laser Sintering
C) Fused Deposition Modeling D) All of these

5) DC Servo motors are used as drive motors in
A) Open loop control B) Close loop control
C) Both A) and B) D) None of the above

6) Which one of the following is not CNC controller ?
A) SINUMERIK B) CINCINNATI C) PEARSON D) FANUC

7) Following is the basic component of CNC machine.
A) Programme of instructions B) MCU
C) Machine tool D) All of the above

8) In numerical control systems, DNC stands for
A) Dedicated Numerical Control B) Directional Numerical Control
C) Distributed Numerical Control D) None of these

9) NC machines used for drilling, boring, reaming, tapping is
A) Contouring type B) Straight cut
C) Point-to-point D) None of the above

P.T.O.

10) Which type of tool magazines are generally used to handle large number of tools ?
A) Drum type B) Chain type C) Turret type D) Both A) & B)

11) Multiple pallets are used in CNC machine tools, basically for
A) Increasing the cost of machine B) Ease of handing job
C) Increase machine utilization D) All of these

12) The preparatory function used for circular clockwise interpolation function is
A) G03 B) G02 C) G04 D) G01

13) The miscellaneous function words consist of _____ digits.
A) One B) Two C) Three D) Four

14) The machine zero on lathe is generally set on the machine at
A) Top right side B) Top left side
C) At top mid position D) None of the above

15) Canned cycles are generally used for
A) Turning B) Drilling C) Threading D) Both A) and C)

16) Which of the following is not the product of Dassault Systems ?
A) CATIA B) COSMOS C) Solidworks D) SolidEdge

17) Tool and fixture design is the task under
A) CAD B) CAM C) CAE D) None of these

18) In homogeneous transformation system the inverse of rotation matrix is

A) $\begin{bmatrix} \cos(-\theta) & \sin(-\theta) & 0 \\ -\sin(-\theta) & \cos(-\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix}$ B) $\begin{bmatrix} \cos(\theta) & \sin(\theta) & 0 \\ -\sin(\theta) & \cos(\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix}$

C) $\begin{bmatrix} \sin(-\theta) & \cos(-\theta) & 0 \\ \cos(-\theta) & -\sin(-\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix}$ D) $\begin{bmatrix} -\sin(-\theta) & \cos(-\theta) & 0 \\ \cos(-\theta) & \sin(-\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix}$

19) _____ is the type of graphics standards.
A) PHIGS B) CORE C) GKS D) All of these

20) In the following geometric modeling which is not 3D modeling ?
A) Wireframe modeling B) Drafting
C) Surface modeling D) Solid Modeling

_____

SLR-EP – 72

Seat No.	

T.E. (Mechanical Engineering) (Part – II) Examination, 2016
CAD/CAM

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Note : *1) Attempt **any three** questions from Section – **I**.*
*2) Q. No. **6** is **compulsory** from Section – **II** and solve **any two** from remaining questions.*
*3) Draw meaningful sketches **wherever** necessary with pencil **only**.*
*4) Figures to **right** indicate **full** marks.*
*5) Make suitable assumptions, **if** required and state them **clearly**.*

SECTION – I

2. a) Explain in detail input devices in CAD hardware. **6**

   b) Explain in detail the various functions graphics software can perform. **7**

3. a) Translate a triangle with coordinates A(1, 1), B(3, 3) and C(4, 1) by 4 units in X-direction and 2 units in Y-direction. Write the equation and draw the translation. **7**

   b) Explain the need of homogeneous transformations ? Write the homogeneous matrices for translation, rotation, scaling, reflection and shear. **6**

4. a) Merits and Demerits of Group Technology. **6**

   b) Differentiate between Wireframe and Surface models. **7**

5. Write notes on **any three** : **14**

   a) CAD/CAM product cycle.

   b) Coordinate Transformations.

   c) Computer Integrated Manufacturing (CIM).

   d) Data exchange formats.

SECTION – II

6. a) With reference to component drawing given below prepare CNC part program using G & M codes

Prepare :

1) Sequence of operation

2) Process sheet.

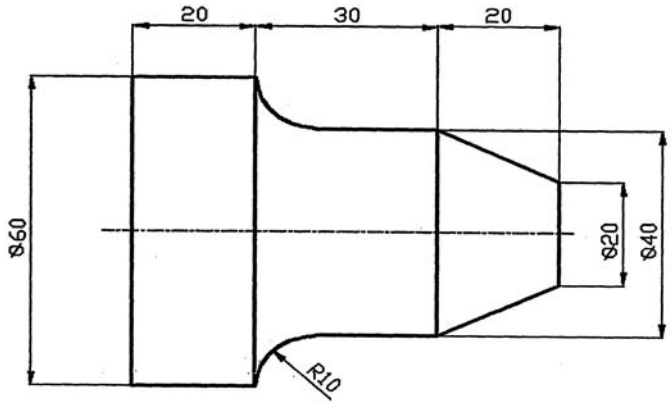
Assume suitable Job zero/Machine zero/home position of tool etc. and state it clearly.

Given :

Tool material : H.S.S Work Material : M.S.

Spindle speed : 2000 rpm Feed rate : 400 mm/min

All dimensions are in mm. **10**



b) Differentiate between open loop and closed loop control systems. **4**

7. a) Classification of NC machine system. **7**

b) Explain briefly CNC controllers. **6**

8. a) Explain in detail adaptive control of CNC machine tools. **7**

b) Explain in detail various tool holding devices on CNC machines. **6**

9. Write short notes on (**any three**) : **13**

a) Diameter Vs. radius programming.

b) Canned cycles.

c) Pallets in CNC.

d) DNC machines.

SLR-EP – 73

Seat No.	

Set P

T.E. (Mechanical) (Part – II) Examination, 2016
MACHINE DESIGN – II

Day and Date : Thursday, 24-11-2016 Max. Marks : 100

Time : 10.00 a.m. to 1.00 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.***

3) Figures to the right indicate ***full*** *marks.*

4) ***Assume*** *suitable data if necessary and mention it clearly.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Match the pairs : **5**

Column – I	Column – II
A) Design of pipe with C40 material	P) Lame's equation
B) Short bearing	Q) Antifriction bearing
C) Journal bearing	R) L/D ratio greater than 1
D) Design of cylinder with FG350 material	S) L/D ratio less than 1
E) Rolling contact bearing	T) Sommerfield number
	U) Birnie's equation

II. Multiple choice questions. (**Two** marks **each**) : **8**

1) The center to center distance between two helical gears depends upon
   a) Helix angle b) Number of teeth
   c) Pressure angle d) Transverse circular pitch

2) The length of root of worm wheel depends upon
   a) Number of starts b) Effective face width
   c) Clearance d) Speed factor for worm wheel

3) Wear strength of the bevel gears depends upon
   a) Material constant b) Pitch angle
   c) Velocity ratio d) Pitch circle diameter

4) The aims of optimum design are
   a) Minimization of life b) Maximization of stresses
   c) Minimization of weight d) Maximization of life

P.T.O.

III. Single correct answer type questions (carry **one** mark **each**) : **7**

1) The minimum number of teeth depends upon
   a) Module
   b) Pressure angle
   c) Face width
   d) Pitch circle diameter

2) When bevel gears having equal teeth and equal pitch angles connect two shafts intersecting at 90° then they are known as
   a) Angular bevel gears
   b) Crown bevel gears
   c) Internal bevel gears
   d) Mitre gears

3) In helical gears, the distance between similar faces of adjacent teeth along a helix on the pitch cylinders normal to the teeth, is called
   a) Normal pitch
   b) Axial pitch
   c) Diametral pitch
   d) Module

4) The worm wheel should be
   a) Embeddable and conformable
   b) Hard and conformable
   c) Hard and embeddable
   d) None of the above

5) When the gears are dipped in a bath of mineral oil in a gear box, it is known as
   a) Spray lubrication
   b) Dipped lubrication
   c) Self lubrication
   d) Splash lubrication

6) When diameter of journal is less than the length of bearing, it is called as
   a) Short bearing
   b) Long bearing
   c) Square bearing
   d) All of these

7) According to IS 2825 : 1969 code for pressure vessels subjected to the lethal substances, the weld efficiency must be
   a) 50%
   b) 75%
   c) 85%
   d) 100%

———————

SLR-EP – 73

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
MACHINE DESIGN – II

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: i) Answer* ***any two*** *questions from* ***each*** *Section.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) ***Assume*** *suitable data* ***if necessary*** *and mention it* ***clearly****.*

SECTION – I

2. a) Explain static and dynamic load in spur gears. **5**

   b) Explain Herringbone gears with neat sketch. **5**

   c) It is required to design a pair of spur gears with 20° full depth involute teeth and number of teeth on pinion as 18. The input shaft rotates at 720 rpm and receives 5 kW power through flexible coupling. The speed of the output shaft is 144 rpm. The pinion as well as the gear are made of steel Fe 410(Sut = 410 N/mm^2). The service factor for the application is 1.25. The gears are machined to meet the specifications of grade 8. Tooth error for grade 8 is

   $e = 16 + 1.25[m + 0.25\sqrt{d}]$ in microns.

   Lewis form factor Y = 0.308 for 18 teeth.

   Determine :

   i) For preliminary calculations, assume pitch line velocity as 5 m/sec. and the factor of safety as 2 against bending failure. Estimate the module and select first preference value of module. Use $C_v = 3/(3 + v)$.

   ii) Calculate the dynamic load by Spott's equation.

   iii) Using factor of safety of 2 for wear strength, calculate the effective load and specify the surface hardness for gears. **10**

3. a) Explain adequate and optimum design of mechanical components with one example of each. **5**

   b) Explain the various design equations used in optimum design. **5**

   c) A pair of parallel helical gears consists of 25 teeth pinion meshing with a 85 teeth gear. The pinion rotates at 720 rpm. The normal pressure angle is 20° while the helix angle is 25°. The normal module is 4 mm and the face width is 40 mm. Both the gears are made of steel (Sut = 600 N/mm^2) and heat treated to 300 BHN. The service factor and the factor of safety are 1.5 and 2 respectively. Assume that the velocity factor accounts for the dynamic load and calculate the power transmitting capacity of gear pair.

Assume form factor $Y = 0.484 - \frac{2.87}{z'}$

$C_v = \frac{5.6}{5.6 + \sqrt{v}}$.

Where, z' = formative number of teeth and v = Pitch line velocity in m/s. **10**

4. a) Explain the types of pressure vessel supports with the help of neat sketches. **8**

   b) A cylindrical pressure vessel of 1250 mm inner diameter and 20 mm thickness is provided with a nozzle of 200 mm inner diameter and 15 mm thickness. The extension of the nozzle inside the vessel is 15 mm. The corrosion allowance is 2 mm, while the weld joint efficiency for shell as well as nozzle is 85%. The design pressure is 3 MPa. The yield strength of the material for the shell and nozzle is 200 N/mm^2 and factor of safety as 1.5. Determine whether or not reinforcing pad is required for the opening. If so, determine the dimensions of the reinforcing pad made out of a plate of 14 mm thickness. **12**

SECTION – II

5. a) Derive the expression for beam strength of straight teeth bevel gear. **5**

   b) Discuss the various failure criteria used in design of worm gear drive. **5**

   c) Explain the working of hydrodynamic journal bearing with neat sketches. **5**

   d) Derive the expression for static load carrying capacity of rolling contact bearing. **5**

6. a) A straight teeth bevel pinion transmits 5 KW power at 1000 rpm to a gear rotating at 500 rpm. The module of the gears measured at larger end is 4 mm and the facewidth of the gears is 35 mm. The number of teeth on pinion are 20 and the normal pressure angle is 20°. Calculate the tangential, axial and radial components of resultant tooth force acting on pinion and gear meshing teeth. Draw free body diagram of forces acting on pinion and gear. **10**

   b) A single row deep groove ball bearing having bore diameter of 50 mm and inner race is rotating at 1440 rpm. The bearing is subjected to a radial load of 2500 N and axial load of 1200 N. The expected life of the bearing is 30000 working hours. Calculate the required basic dynamic capacity of bearing and select from the manufacturer's catalogue given below : **10**

e	Pa/Pr ≤ e		Pa/Pr>e	
	X	Y	X	Y
0.31	1	0	0.56	1.4
0.31	1	0	0.56	1.2
0.44	1	0	0.56	1.0

Bearing No.	Dynamic capacity (in N)
6209	33200
6309	52700
6210	35100
6310	61800

7. a) A pair of worm gear is designated as 1/54/10/5 consists of worm gear made of phosphor bronze (centrifugally cast) and worm gear made of case hardened alloy steel. The normal pressure angle is 20° and the coefficient of friction between worm and worm gear teeth is 0.04. The external surface area of housing is 0.7 m^2 and the overall heat transfer coefficient is 28 $W/m^2°C$. The worm rotates at 1000 rpm. The permissible temperature rise of lubricating oil is 50°C. Calculate the input power rating of worm gear drive based on

   i) Wear strength rating

   ii) Thermal considerations.

   Use : $X_{c1} = 0.14$ $X_{c2} = 0.35$ $S_{c1} = 5.41$ $S_{c2} = 1.55$ $Y_z = 1.143$. **10**

   b) The following data is given for 360° hydrodynamic journal bearing.

   Radial load = 5 kN

   Journal speed = 1500 rpm

   Diameter of Journal = 50 mm

   Clearance = 25 microns

   Eccentricity = 20 microns

   l/d = 1

   Calculate :

   i) Eccentricity ratio

   ii) Viscosity of oil

   iii) Minimum oil film thickness

   iv) Total oil flow

   Use following table

€	$\frac{h_O}{c}$	S	$\left(\frac{r}{c}\right)f$	$\frac{Q}{rcn_s l}$
0.2	0.8	0.631	12.8	3.59
0.4	0.6	0.264	5.79	3.99
0.6	0.4	0.121	3.22	4.33
0.8	0.2	0.0446	1.70	4.62

10

Set P

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Seat No.	

Set Q

T.E. (Mechanical) (Part – II) Examination, 2016
MACHINE DESIGN – II

Day and Date : Thursday, 24-11-2016 Max. Marks : 100

Time : 10.00 a.m. to 1.00 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.***

3) Figures to the right indicate ***full*** *marks.*

4) ***Assume*** *suitable data if necessary and mention it clearly.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Single correct answer type questions (carry **one** mark **each**) : **7**

1) The worm wheel should be

a) Embeddable and conformable b) Hard and conformable

c) Hard and embeddable d) None of the above

2) When the gears are dipped in a bath of mineral oil in a gear box, it is known as

a) Spray lubrication b) Dipped lubrication

c) Self lubrication d) Splash lubrication

3) When diameter of journal is less than the length of bearing, it is called as

a) Short bearing b) Long bearing

c) Square bearing d) All of these

4) According to IS 2825 : 1969 code for pressure vessels subjected to the lethal substances, the weld efficiency must be

a) 50% b) 75%

c) 85% d) 100%

5) The minimum number of teeth depends upon

a) Module b) Pressure angle

c) Face width d) Pitch circle diameter

P.T.O.

6) When bevel gears having equal teeth and equal pitch angles connect two shafts intersecting at 90° then they are known as
   a) Angular bevel gears
   b) Crown bevel gears
   c) Internal bevel gears
   d) Mitre gears

7) In helical gears, the distance between similar faces of adjacent teeth along a helix on the pitch cylinders normal to the teeth, is called
   a) Normal pitch
   b) Axial pitch
   c) Diametral pitch
   d) Module

II. Multiple choice questions. (**Two** marks **each**) : **8**

1) Wear strength of the bevel gears depends upon
   a) Material constant
   b) Pitch angle
   c) Velocity ratio
   d) Pitch circle diameter

2) The aims of optimum design are
   a) Minimization of life
   b) Maximization of stresses
   c) Minimization of weight
   d) Maximization of life

3) The center to center distance between two helical gears depends upon
   a) Helix angle
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   c) Pressure angle
   d) Transverse circular pitch

4) The length of root of worm wheel depends upon
   a) Number of starts
   b) Effective face width
   c) Clearance
   d) Speed factor for worm wheel

III. Match the pairs : **5**

Column – I	**Column – II**
A) Design of pipe with C40 material	P) Lame's equation
B) Short bearing	Q) Antifriction bearing
C) Journal bearing	R) L/D ratio greater than 1
D) Design of cylinder with FG350 material	S) L/D ratio less than 1
E) Rolling contact bearing	T) Sommerfield number
	U) Birnie's equation

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SLR-EP – 73

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
MACHINE DESIGN – II

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: i) Answer* ***any two*** *questions from* ***each*** *Section.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) ***Assume*** *suitable data* ***if necessary*** *and mention it* ***clearly****.*

SECTION – I

2. a) Explain static and dynamic load in spur gears. **5**

   b) Explain Herringbone gears with neat sketch. **5**

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   Lewis form factor Y = 0.308 for 18 teeth.

   Determine :

   i) For preliminary calculations, assume pitch line velocity as 5 m/sec. and the factor of safety as 2 against bending failure. Estimate the module and select first preference value of module. Use $C_v = 3/(3 + v)$.

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   iii) Using factor of safety of 2 for wear strength, calculate the effective load and specify the surface hardness for gears. **10**

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   b) Explain the various design equations used in optimum design. **5**

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SECTION – II

5. a) Derive the expression for beam strength of straight teeth bevel gear. **5**

   b) Discuss the various failure criteria used in design of worm gear drive. **5**

   c) Explain the working of hydrodynamic journal bearing with neat sketches. **5**

   d) Derive the expression for static load carrying capacity of rolling contact bearing. **5**

6. a) A straight teeth bevel pinion transmits 5 KW power at 1000 rpm to a gear rotating at 500 rpm. The module of the gears measured at larger end is 4 mm and the facewidth of the gears is 35 mm. The number of teeth on pinion are 20 and the normal pressure angle is 20°. Calculate the tangential, axial and radial components of resultant tooth force acting on pinion and gear meshing teeth. Draw free body diagram of forces acting on pinion and gear. **10**

   b) A single row deep groove ball bearing having bore diameter of 50 mm and inner race is rotating at 1440 rpm. The bearing is subjected to a radial load of 2500 N and axial load of 1200 N. The expected life of the bearing is 30000 working hours. Calculate the required basic dynamic capacity of bearing and select from the manufacturer's catalogue given below : **10**

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   Use : $X_{c1} = 0.14$ $X_{c2} = 0.35$ $S_{c1} = 5.41$ $S_{c2} = 1.55$ $Y_z = 1.143$. **10**

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   Clearance = 25 microns

   Eccentricity = 20 microns

   l/d = 1

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   i) Eccentricity ratio

   ii) Viscosity of oil

   iii) Minimum oil film thickness

   iv) Total oil flow

   Use following table

€	$\frac{h_o}{c}$	S	$\left(\frac{r}{c}\right)f$	$\frac{Q}{rcn_s l}$
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0.6	0.4	0.121	3.22	4.33
0.8	0.2	0.0446	1.70	4.62

10

Set Q

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Seat No.	

Set R

T.E. (Mechanical) (Part – II) Examination, 2016
MACHINE DESIGN – II

Day and Date : Thursday, 24-11-2016 Max. Marks : 100

Time : 10.00 a.m. to 1.00 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.***

3) Figures to the right indicate ***full*** *marks.*

4) ***Assume*** *suitable data if necessary and mention it clearly.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Multiple choice questions. (**Two** marks **each**) : **8**

1) The length of root of worm wheel depends upon
   a) Number of starts b) Effective face width
   c) Clearance d) Speed factor for worm wheel

2) Wear strength of the bevel gears depends upon
   a) Material constant b) Pitch angle
   c) Velocity ratio d) Pitch circle diameter

3) The aims of optimum design are
   a) Minimization of life b) Maximization of stresses
   c) Minimization of weight d) Maximization of life

4) The center to center distance between two helical gears depends upon
   a) Helix angle b) Number of teeth
   c) Pressure angle d) Transverse circular pitch

II. Match the pairs : **5**

Column – I	Column – II
A) Design of pipe with C40 material	P) Lame's equation
B) Short bearing	Q) Antifriction bearing
C) Journal bearing	R) L/D ratio greater than 1
D) Design of cylinder with FG350 material	S) L/D ratio less than 1
E) Rolling contact bearing	T) Sommerfield number
	U) Birnie's equation

P.T.O.

III. Single correct answer type questions (carry **one** mark **each**) : **7**

1) When diameter of journal is less than the length of bearing, it is called as
   a) Short bearing
   b) Long bearing
   c) Square bearing
   d) All of these

2) According to IS 2825 : 1969 code for pressure vessels subjected to the lethal substances, the weld efficiency must be
   a) 50%
   b) 75%
   c) 85%
   d) 100%

3) The minimum number of teeth depends upon
   a) Module
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4) When bevel gears having equal teeth and equal pitch angles connect two shafts intersecting at 90° then they are known as
   a) Angular bevel gears
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   c) Self lubrication
   d) Splash lubrication

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Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
MACHINE DESIGN – II

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: i) Answer* ***any two*** *questions from* ***each*** *Section.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) ***Assume*** *suitable data* ***if necessary*** *and mention it* ***clearly****.*

SECTION – I

2. a) Explain static and dynamic load in spur gears. **5**

   b) Explain Herringbone gears with neat sketch. **5**

   c) It is required to design a pair of spur gears with 20° full depth involute teeth and number of teeth on pinion as 18. The input shaft rotates at 720 rpm and receives 5 kW power through flexible coupling. The speed of the output shaft is 144 rpm. The pinion as well as the gear are made of steel Fe 410(Sut = 410 N/mm^2). The service factor for the application is 1.25. The gears are machined to meet the specifications of grade 8. Tooth error for grade 8 is

   $e = 16 + 1.25[m + 0.25\sqrt{d}]$ in microns.

   Lewis form factor Y = 0.308 for 18 teeth.

   Determine :

   i) For preliminary calculations, assume pitch line velocity as 5 m/sec. and the factor of safety as 2 against bending failure. Estimate the module and select first preference value of module. Use $C_v = 3/(3 + v)$.

   ii) Calculate the dynamic load by Spott's equation.

   iii) Using factor of safety of 2 for wear strength, calculate the effective load and specify the surface hardness for gears. **10**

3. a) Explain adequate and optimum design of mechanical components with one example of each. **5**

   b) Explain the various design equations used in optimum design. **5**

   c) A pair of parallel helical gears consists of 25 teeth pinion meshing with a 85 teeth gear. The pinion rotates at 720 rpm. The normal pressure angle is 20° while the helix angle is 25°. The normal module is 4 mm and the face width is 40 mm. Both the gears are made of steel (Sut = 600 N/mm^2) and heat treated to 300 BHN. The service factor and the factor of safety are 1.5 and 2 respectively. Assume that the velocity factor accounts for the dynamic load and calculate the power transmitting capacity of gear pair.

Assume form factor $Y = 0.484 - \frac{2.87}{z'}$

$C_v = \frac{5.6}{5.6 + \sqrt{v}}$.

Where, z' = formative number of teeth and v = Pitch line velocity in m/s. **10**

4. a) Explain the types of pressure vessel supports with the help of neat sketches. **8**

   b) A cylindrical pressure vessel of 1250 mm inner diameter and 20 mm thickness is provided with a nozzle of 200 mm inner diameter and 15 mm thickness. The extension of the nozzle inside the vessel is 15 mm. The corrosion allowance is 2 mm, while the weld joint efficiency for shell as well as nozzle is 85%. The design pressure is 3 MPa. The yield strength of the material for the shell and nozzle is 200 N/mm^2 and factor of safety as 1.5. Determine whether or not reinforcing pad is required for the opening. If so, determine the dimensions of the reinforcing pad made out of a plate of 14 mm thickness. **12**

SECTION – II

5. a) Derive the expression for beam strength of straight teeth bevel gear. **5**

   b) Discuss the various failure criteria used in design of worm gear drive. **5**

   c) Explain the working of hydrodynamic journal bearing with neat sketches. **5**

   d) Derive the expression for static load carrying capacity of rolling contact bearing. **5**

6. a) A straight teeth bevel pinion transmits 5 KW power at 1000 rpm to a gear rotating at 500 rpm. The module of the gears measured at larger end is 4 mm and the facewidth of the gears is 35 mm. The number of teeth on pinion are 20 and the normal pressure angle is 20°. Calculate the tangential, axial and radial components of resultant tooth force acting on pinion and gear meshing teeth. Draw free body diagram of forces acting on pinion and gear. **10**

   b) A single row deep groove ball bearing having bore diameter of 50 mm and inner race is rotating at 1440 rpm. The bearing is subjected to a radial load of 2500 N and axial load of 1200 N. The expected life of the bearing is 30000 working hours. Calculate the required basic dynamic capacity of bearing and select from the manufacturer's catalogue given below : **10**

e	Pa/Pr ≤ e		Pa/Pr>e	
	X	Y	X	Y
0.31	1	0	0.56	1.4
0.31	1	0	0.56	1.2
0.44	1	0	0.56	1.0

Bearing No.	Dynamic capacity (in N)
6209	33200
6309	52700
6210	35100
6310	61800

7. a) A pair of worm gear is designated as 1/54/10/5 consists of worm gear made of phosphor bronze (centrifugally cast) and worm gear made of case hardened alloy steel. The normal pressure angle is 20° and the coefficient of friction between worm and worm gear teeth is 0.04. The external surface area of housing is 0.7 m^2 and the overall heat transfer coefficient is 28 $W/m^2°C$. The worm rotates at 1000 rpm. The permissible temperature rise of lubricating oil is 50°C. Calculate the input power rating of worm gear drive based on

   i) Wear strength rating

   ii) Thermal considerations.

   Use : $X_{c1} = 0.14$ $X_{c2} = 0.35$ $S_{c1} = 5.41$ $S_{c2} = 1.55$ $Y_z = 1.143$. **10**

   b) The following data is given for 360° hydrodynamic journal bearing.

   Radial load = 5 kN

   Journal speed = 1500 rpm

   Diameter of Journal = 50 mm

   Clearance = 25 microns

   Eccentricity = 20 microns

   l/d = 1

   Calculate :

   i) Eccentricity ratio

   ii) Viscosity of oil

   iii) Minimum oil film thickness

   iv) Total oil flow

   Use following table

€	$\frac{h_O}{c}$	S	$\left(\frac{r}{c}\right)f$	$\frac{Q}{rcn_s l}$
0.2	0.8	0.631	12.8	3.59
0.4	0.6	0.264	5.79	3.99
0.6	0.4	0.121	3.22	4.33
0.8	0.2	0.0446	1.70	4.62

10

Set R

SLR-EP – 73

Seat No.	

Set S

T.E. (Mechanical) (Part – II) Examination, 2016
MACHINE DESIGN – II

Day and Date : Thursday, 24-11-2016 Max. Marks : 100

Time : 10.00 a.m. to 1.00 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.***

3) Figures to the right indicate ***full*** *marks.*

4) ***Assume*** *suitable data if necessary and mention it clearly.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

I. Single correct answer type questions (carry **one** mark **each**) : **7**

1) When bevel gears having equal teeth and equal pitch angles connect two shafts intersecting at 90° then they are known as

a) Angular bevel gears b) Crown bevel gears

c) Internal bevel gears d) Mitre gears

2) In helical gears, the distance between similar faces of adjacent teeth along a helix on the pitch cylinders normal to the teeth, is called

a) Normal pitch b) Axial pitch

c) Diametral pitch d) Module

3) The worm wheel should be

a) Embeddable and conformable b) Hard and conformable

c) Hard and embeddable d) None of the above

4) When the gears are dipped in a bath of mineral oil in a gear box, it is known as

a) Spray lubrication b) Dipped lubrication

c) Self lubrication d) Splash lubrication

P.T.O.

5) When diameter of journal is less than the length of bearing, it is called as
   a) Short bearing b) Long bearing
   c) Square bearing d) All of these

6) According to IS 2825 : 1969 code for pressure vessels subjected to the lethal substances, the weld efficiency must be
   a) 50% b) 75%
   c) 85% d) 100%

7) The minimum number of teeth depends upon
   a) Module b) Pressure angle
   c) Face width d) Pitch circle diameter

II. Multiple choice questions. (**Two** marks **each**) : **8**

1) The aims of optimum design are
   a) Minimization of life b) Maximization of stresses
   c) Minimization of weight d) Maximization of life

2) The center to center distance between two helical gears depends upon
   a) Helix angle b) Number of teeth
   c) Pressure angle d) Transverse circular pitch

3) The length of root of worm wheel depends upon
   a) Number of starts b) Effective face width
   c) Clearance d) Speed factor for worm wheel

4) Wear strength of the bevel gears depends upon
   a) Material constant b) Pitch angle
   c) Velocity ratio d) Pitch circle diameter

III. Match the pairs : **5**

Column – I	**Column – II**
A) Design of pipe with C40 material	P) Lame's equation
B) Short bearing	Q) Antifriction bearing
C) Journal bearing	R) L/D ratio greater than 1
D) Design of cylinder with FG350 material	S) L/D ratio less than 1
E) Rolling contact bearing	T) Sommerfield number
	U) Birnie's equation

Set S

SLR-EP – 73

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
MACHINE DESIGN – II

Day and Date : Thursday, 24-11-2016 Marks : 80

Time : 10.00 a.m. to 1.00 p.m.

Instructions *: i) Answer* ***any two*** *questions from* ***each*** *Section.*
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SECTION – I

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   Determine :

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SECTION – II

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   b) Discuss the various failure criteria used in design of worm gear drive. **5**

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   l/d = 1

   Calculate :

   i) Eccentricity ratio

   ii) Viscosity of oil

   iii) Minimum oil film thickness

   iv) Total oil flow

   Use following table

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0.6	0.4	0.121	3.22	4.33
0.8	0.2	0.0446	1.70	4.62

10

Set S

SLR-EP – 75

Seat No.	

Set P

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMATIC CONTROL ENGINEERING

Day and Date : Tuesday, 29-11-2016 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 : **(20×1=20)**

1) Washing machine with cleanliness of clothes as a controlled variable is an example of
   a) Open loop control system b) Closed loop control system
   c) Natural control system d) None of these

2) In rotational mechanical system inertia is represented by
   a) Mass moment of inertia b) Polar moment of inertia
   c) Mass d) Torsional spring

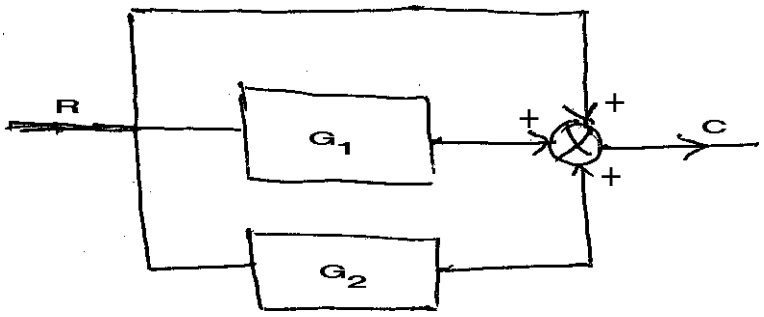
3) For a orifice with pressure difference across it as $(P_1 - P)$ and having resistance R_F, as per the direct analogy volume flow Q through orifice is analogous to
   a) Voltage b) Current c) Flux d) Charge

4) In a two phase AC servo motor, voltage across one of the phase is constant and across another phase is
   a) Controlled voltage for speed control of motor b) Constant
   c) Having any magnitude d) None of these

5) For mechanical elements in parallel _____ through each element remain same.
   a) Velocity b) Displacement c) Force d) Acceleration

6) In hydraulic servomotor the walking beam linkage acts as a
   a) Input lever b) Output lever
   c) Take off point d) Comparator or summing point

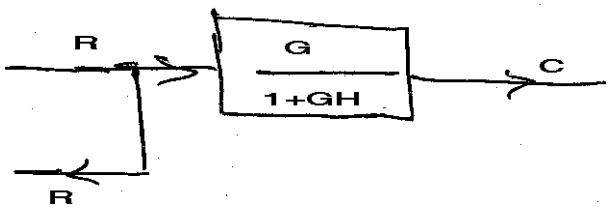
7) The output of the system shown in figure below is



a) $G_1 + G_2$ b) $1 + G_1 + G_2$ c) $\left(\frac{1}{1+G_1+G_2}\right)R$ d) $(1 + G_1 + G_2)R$

P.T.O.

8) For a partial block diagram shown in figure below, for shifting a take off point after a block, modification needed in take off signal is



a) Adding a block with TF of block as, $\frac{G}{1+GH}$ b) Adding a block with TF of block as, $\frac{1+GH}{G}$

c) Adding a block with TF of block as, G d) Adding a block with TF of block as, 1 + G

9) For integral control mode, the value of steady state constant K_{G1} is
a) 0 b) $G_1(D)$
c) CO d) Some finite number

10) The steady state constants are B = – 5, K_H = 0.5 and KG_1 = 1, the slope of the controller line is
a) 0.5 b) – 5 c) – 2.5 d) – 0.5

11) The best control is achieved with
a) P control b) I-control
c) P + D control d) P + I + D control

12) A system will have the roots placed symmetrically about the origin if its Routh's array has
a) A row of all zero terms
b) Two sign changes in the first column
c) All positive terms in the first column
d) None of the above

13) 'Partial Fractions' are used in which of the following techniques of programming ?
a) Series programming b) Parallel programming
c) Direct programming d) General programming

14) Which of the following controllers will give zero output if error is constant with time ?
a) P-controller b) I-controller c) D-controller d) P + I controller

15) If a system has two poles at the origin, then the starting slope of its magnitude plot is
a) 20 db/decade b) 40 db/decade
c) – 40 db/decade d) – 20 db/decade

16) A 'Root Locus' will have the branches starting from infinity if,
a) P = Z b) Z > P c) P > Z d) P = O

17) In bode plots, gain-margin is calculated at
a) Gain crossover frequency b) Corner frequency
c) Phase crossover frequency d) Any frequency

18) The 'Centroid' of asymptotes in Root Locus
a) Always lies on Root Locus b) Never lies on Root Locus
c) May or may not lie on Root Locus d) Is always having positive x-coordinate

19) Addition of poles makes a system
a) More stable b) More unstable
c) Marginally stable d) Oscillatory

20) In magnitude plot, the slope changes at
a) Every corner frequency b) Gain crossover frequency
c) Phase crossover frequency d) Zero decibel magnitude

SLR-EP – 75

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMATIC CONTROL ENGINEERING

Day and Date : Tuesday, 29-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of non-programmable calculators is **allowed**.*
*4) Assume **any** additional data if **necessary** and state it **clearly**.*
*5) **Use** university graph papers and **semi-log** papers if needed.*

SECTION – I

2. a) Explain open loop control system in detail. **6**

b) For the mechanical system shown in figure (2 – b) find relation between **7**

a) x to f

b) y to f

c) y to x

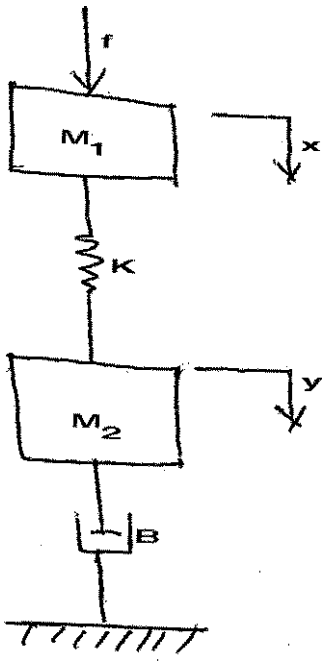


Figure (2 – b)

Set P

3. a) Explain jet pipe amplifier and derive the transfer function between piston position 'y' and input position 'x'. **6**

   b) Find overall transfer function of system shown in figure (3 – b). **7**

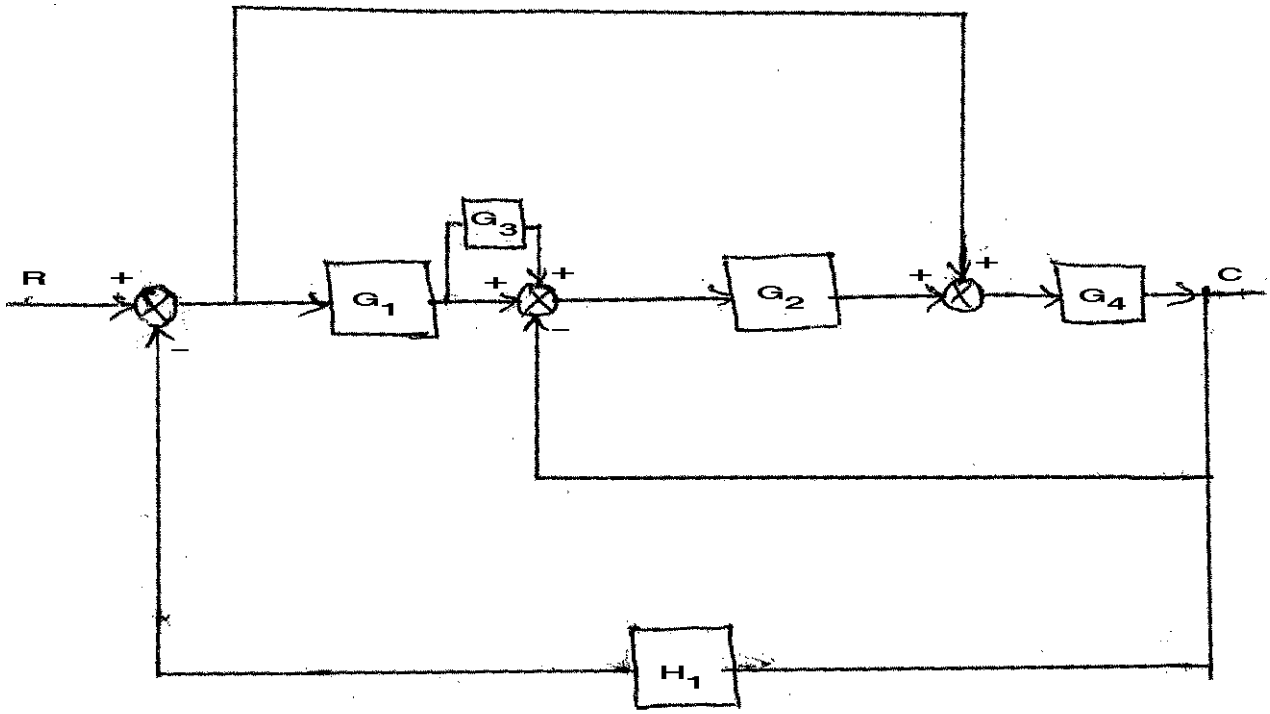


Figure (3 – b)

4. a) For electrical system shown in figure (4 – a) determine relation between input voltage V_1 and output voltage V_2. **6**

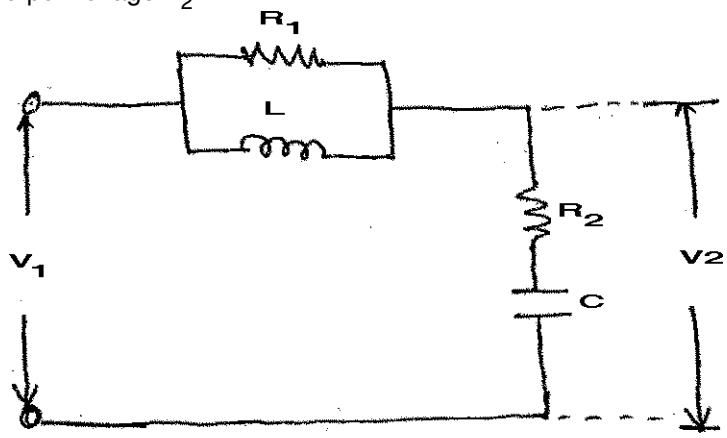


Figure (4 – a)

   b) Effect the linear approximation for pressure 'p' in the equation of state PV = mRT. The reference condition are

   $P_i = 8265.6$ N/m^2, $r_i = 1$ m^3, $m_i = 0.1$ kg, $T_i = 15°C$. **7**

   Determine the percentage error in using this approximation for 'p' when V = 1.1 m^3 and T = 17°C and 'm' remains same. Take characteristics gas constant, R as 0.287 KJ/kg.k R is constant.

5. a) A typical family of steady state operating curves for unity feedback system is shown in figure (5 – a). At the reference condition (point 'A') $V_i = 4000$, $M_i = 1000$, $U_i = 200$ and $C_i = 4{,}000$. Construct a block diagram that describes steady state operation of this system. Also find steady state relation. **7**

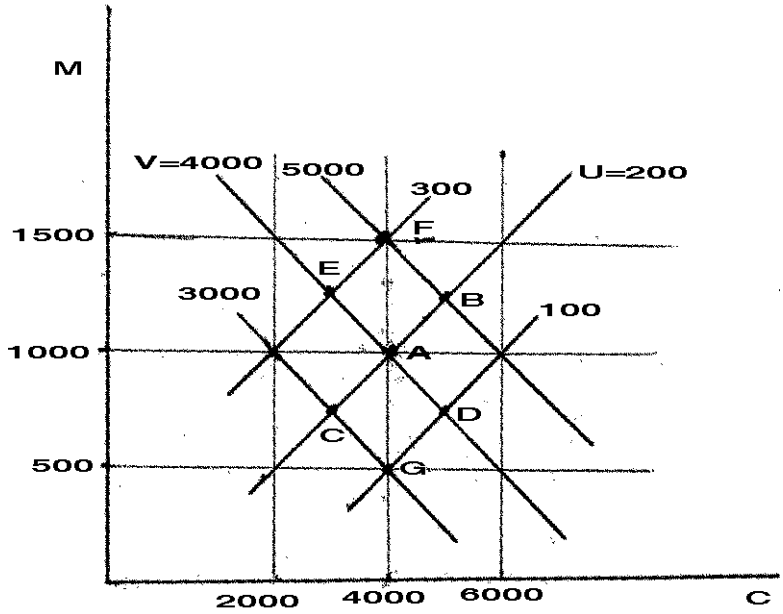


Figure (5 – a)

b) The characteristics of an engine described by the family of curves shown in figure (5 – b). Determine the linear approximation for the change in torque 't' delivered by engine. The difference between torque 't' produced by engine and load torque is used to accelerate the engine $J\frac{dn}{dt}$ and to overcome viscous friction Bn. Thus $t - t_L = J\frac{dn}{dt} + Bn$. For J = 0.02 and B = 0.03 determine the differential equation relating the change in speed 'n' to the change in fuel 'q' and change in load torque t_L. Also find time constant of engine. **7**

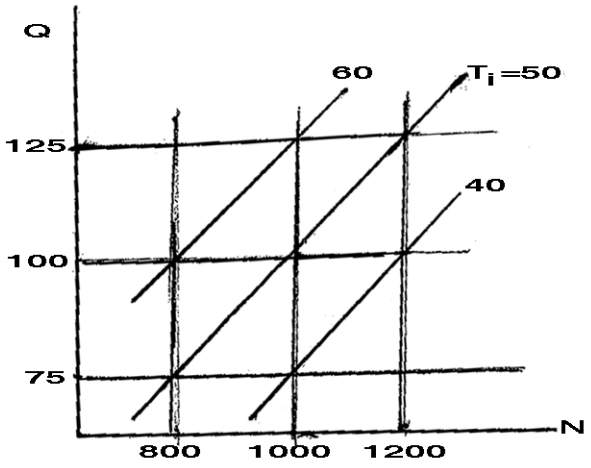


Figure (5 – b)

SECTION – II

6. a) Sketch the complete 'Root Loans' for a system having $G(S)H(S) = \frac{K(S+5)}{S^2+4S+20}$ comment on the system stability. **9**

   b) Explain Bode-Plots for zeros at the origin. **5**

7. a) A system has a characteristic equation $S^5 + 3S^4 + 2S^3 + 6S^2 + 9S + 3 = 0$. Determine whether it has any roots to the right of the imaginary axis. **8**

   b) Explain P and P + I control actions with necessary equations and plots. **5**

8. a) A unity feedback control system has, $G(S) = \frac{400}{S(S+2)(S+20)}$. Sketch the Bode-Plots and comment on system stability. **8**

   b) Explain angle and magnitude conditions in Root Locus. **5**

9. a) Obtain state space representation using 'Parallel Programming' and also draw a computer diagram for a feedback control system with

   $$Y(t) = \frac{D+4}{(D+2)(D+3)(D+5)} f(t)$$ **8**

   b) What are various modes of control ? State the advantages and limitations of each. **5**

SLR-EP – 75

Seat No.	

Set Q

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMATIC CONTROL ENGINEERING

Day and Date : Tuesday, 29-11-2016 Max. Marks : 100

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

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) A 'Root Locus' will have the branches starting from infinity if,
   a) P = Z b) Z > P c) P > Z d) P = O

2) In bode plots, gain-margin is calculated at
   a) Gain crossover frequency b) Corner frequency
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3) The 'Centroid' of asymptotes in Root Locus
   a) Always lies on Root Locus b) Never lies on Root Locus
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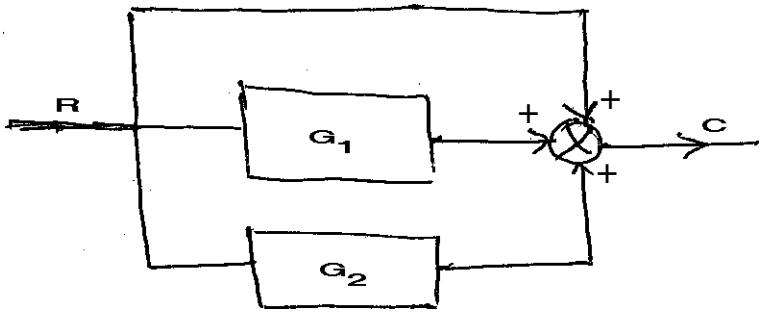
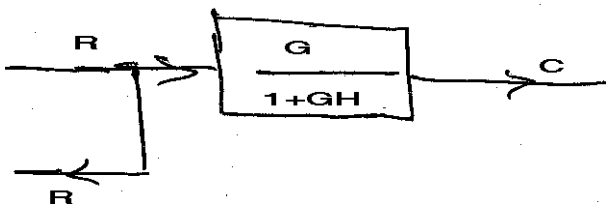
P.T.O.

12) The output of the system shown in figure below is



a) $G_1 + G_2$ b) $1 + G_1 + G_2$ c) $\left(\frac{1}{1+G_1+G_2}\right)R$ d) $(1 + G_1 + G_2)R$

13) For a partial block diagram shown in figure below, for shifting a take off point after a block, modification needed in take off signal is



a) Adding a block with TF of block as, $\frac{G}{1+GH}$ b) Adding a block with TF of block as, $\frac{1+GH}{G}$

c) Adding a block with TF of block as, G d) Adding a block with TF of block as, 1 + G

14) For integral control mode, the value of steady state constant K_{G1} is
a) 0 b) $G_1(D)$
c) CO d) Some finite number

15) The steady state constants are B = – 5, K_H = 0.5 and KG_1 = 1, the slope of the controller line is
a) 0.5 b) – 5 c) – 2.5 d) – 0.5

16) The best control is achieved with
a) P control b) I-control
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17) A system will have the roots placed symmetrically about the origin if its Routh's array has
a) A row of all zero terms
b) Two sign changes in the first column
c) All positive terms in the first column
d) None of the above

18) 'Partial Fractions' are used in which of the following techniques of programming ?
a) Series programming b) Parallel programming
c) Direct programming d) General programming

19) Which of the following controllers will give zero output if error is constant with time ?
a) P-controller b) I-controller c) D-controller d) P + I controller

20) If a system has two poles at the origin, then the starting slope of its magnitude plot is
a) 20 db/decade b) 40 db/decade
c) – 40 db/decade d) – 20 db/decade

SLR-EP – 75

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMATIC CONTROL ENGINEERING

Day and Date : Tuesday, 29-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any three** questions from **each** Section.*
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SECTION – I

2. a) Explain open loop control system in detail. **6**

b) For the mechanical system shown in figure (2 – b) find relation between **7**

a) x to f

b) y to f

c) y to x

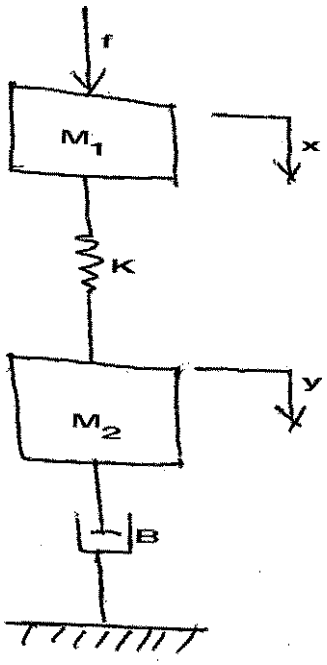

Figure (2 – b)

Set Q

3. a) Explain jet pipe amplifier and derive the transfer function between piston position 'y' and input position 'x'. **6**

   b) Find overall transfer function of system shown in figure (3 – b). **7**

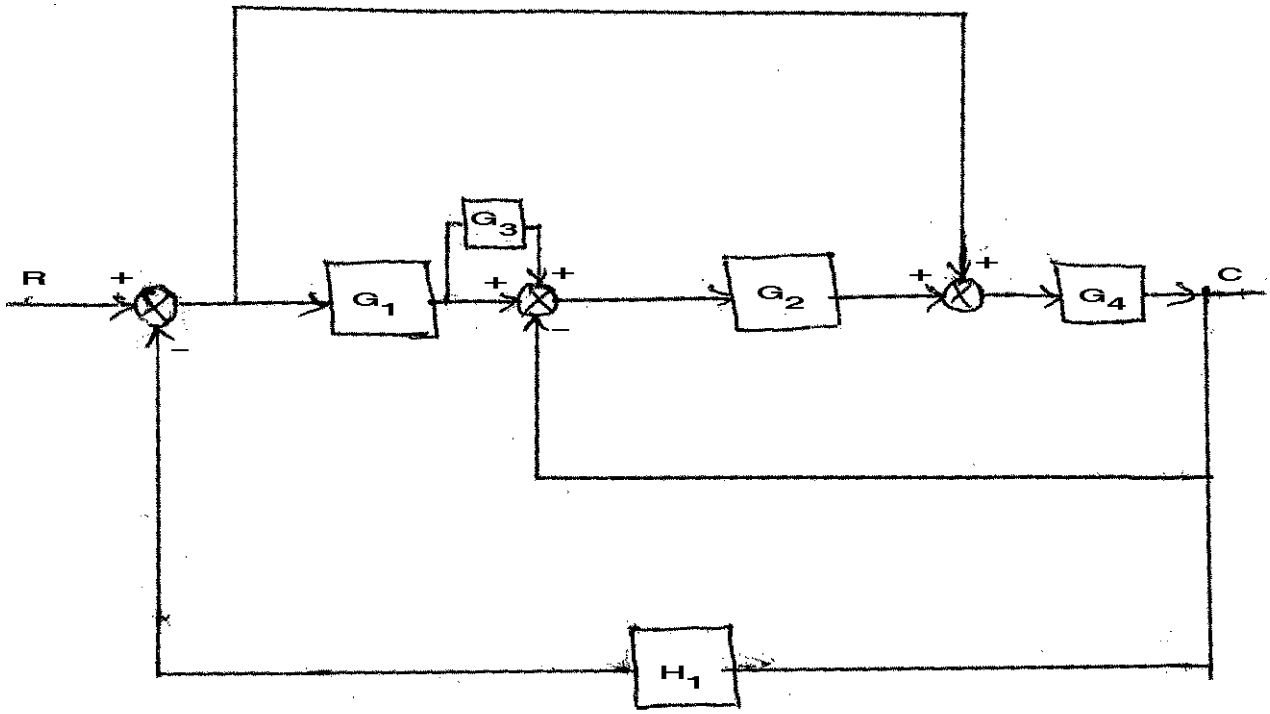

Figure (3 – b)

4. a) For electrical system shown in figure (4 – a) determine relation between input voltage V_1 and output voltage V_2. **6**

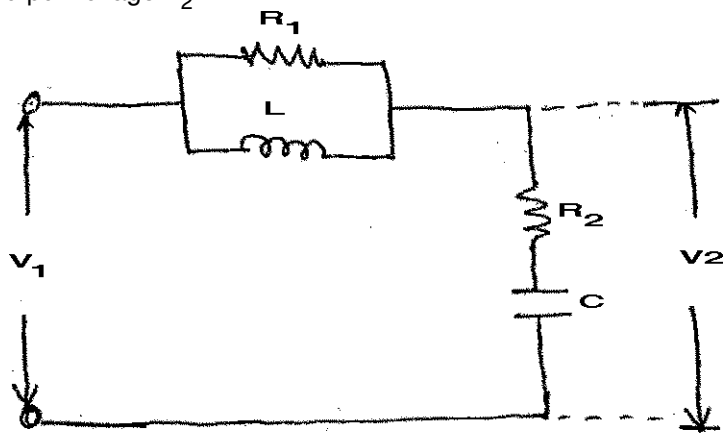

Figure (4 – a)

   b) Effect the linear approximation for pressure 'p' in the equation of state PV = mRT. The reference condition are

   $P_i = 8265.6$ N/m^2, $r_i = 1$ m^3, $m_i = 0.1$ kg, $T_i = 15°C$. **7**

   Determine the percentage error in using this approximation for 'p' when V = 1.1 m^3 and T = 17°C and 'm' remains same. Take characteristics gas constant, R as 0.287 KJ/kg.k R is constant.

Set Q

5. a) A typical family of steady state operating curves for unity feedback system is shown in figure (5 – a). At the reference condition (point 'A') $V_i = 4000$, $M_i = 1000$, $U_i = 200$ and $C_i = 4{,}000$. Construct a block diagram that describes steady state operation of this system. Also find steady state relation. **7**

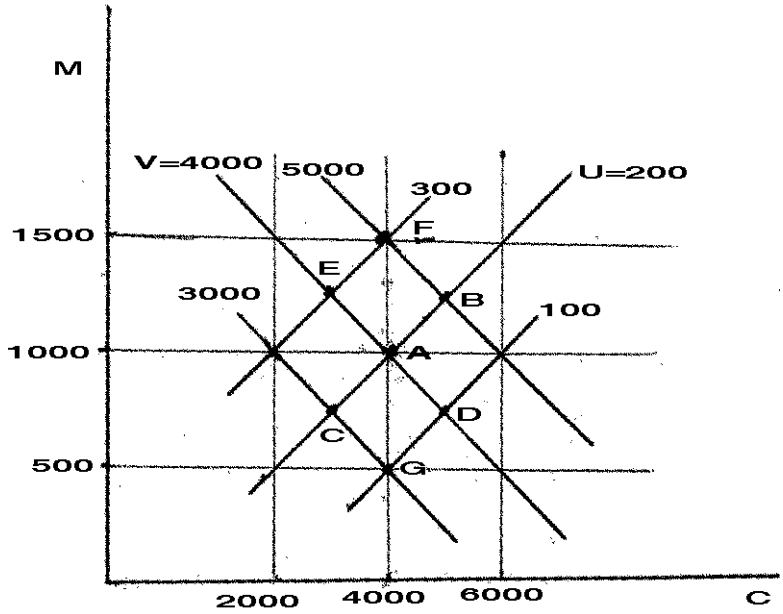

Figure (5 – a)

b) The characteristics of an engine described by the family of curves shown in figure (5 – b). Determine the linear approximation for the change in torque 't' delivered by engine. The difference between torque 't' produced by engine and load torque is used to accelerate the engine $J\frac{dn}{dt}$ and to overcome viscous friction Bn. Thus $t - t_L = J\frac{dn}{dt} + Bn$. For J = 0.02 and B = 0.03 determine the differential equation relating the change in speed 'n' to the change in fuel 'q' and change in load torque t_L. Also find time constant of engine. **7**

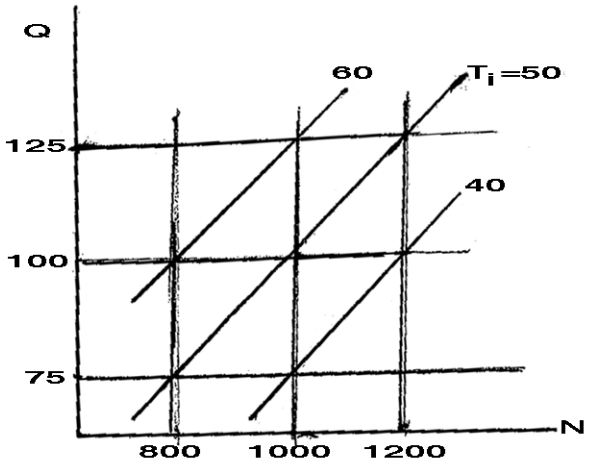

Figure (5 – b)

SECTION – II

6. a) Sketch the complete 'Root Loans' for a system having $G(S)H(S) = \frac{K(S+5)}{S^2+4S+20}$ comment on the system stability. **9**

   b) Explain Bode-Plots for zeros at the origin. **5**

7. a) A system has a characteristic equation $S^5 + 3S^4 + 2S^3 + 6S^2 + 9S + 3 = 0$. Determine whether it has any roots to the right of the imaginary axis. **8**

   b) Explain P and P + I control actions with necessary equations and plots. **5**

8. a) A unity feedback control system has, $G(S) = \frac{400}{S(S+2)(S+20)}$. Sketch the Bode-Plots and comment on system stability. **8**

   b) Explain angle and magnitude conditions in Root Locus. **5**

9. a) Obtain state space representation using 'Parallel Programming' and also draw a computer diagram for a feedback control system with

   $$Y(t) = \frac{D+4}{(D+2)(D+3)(D+5)} f(t)$$ **8**

   b) What are various modes of control ? State the advantages and limitations of each. **5**

SLR-EP – 75

Seat No.	

Set **R**

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMATIC CONTROL ENGINEERING

Day and Date : Tuesday, 29-11-2016 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 : **(20×1=20)**

1) The best control is achieved with
   a) P control b) I-control
   c) P + D control d) P + I + D control

2) A system will have the roots placed symmetrically about the origin if its Routh's array has
   a) A row of all zero terms
   b) Two sign changes in the first column
   c) All positive terms in the first column
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3) 'Partial Fractions' are used in which of the following techniques of programming ?
   a) Series programming b) Parallel programming
   c) Direct programming d) General programming

4) Which of the following controllers will give zero output if error is constant with time ?
   a) P-controller b) I-controller c) D-controller d) P + I controller

5) If a system has two poles at the origin, then the starting slope of its magnitude plot is
   a) 20 db/decade b) 40 db/decade
   c) – 40 db/decade d) – 20 db/decade

6) A 'Root Locus' will have the branches starting from infinity if,
   a) P = Z b) Z > P c) P > Z d) P = O

7) In bode plots, gain-margin is calculated at
   a) Gain crossover frequency b) Corner frequency
   c) Phase crossover frequency d) Any frequency

8) The 'Centroid' of asymptotes in Root Locus
   a) Always lies on Root Locus b) Never lies on Root Locus
   c) May or may not lie on Root Locus d) Is always having positive x-coordinate

9) Addition of poles makes a system
   a) More stable b) More unstable
   c) Marginally stable d) Oscillatory

10) In magnitude plot, the slope changes at
   a) Every corner frequency b) Gain crossover frequency
   c) Phase crossover frequency d) Zero decibel magnitude

P.T.O.

11) Washing machine with cleanliness of clothes as a controlled variable is an example of
a) Open loop control system b) Closed loop control system
c) Natural control system d) None of these

12) In rotational mechanical system inertia is represented by
a) Mass moment of inertia b) Polar moment of inertia
c) Mass d) Torsional spring

13) For a orifice with pressure difference across it as $(P_1 - P)$ and having resistance R_F, as per the direct analogy volume flow Q through orifice is analogous to
a) Voltage b) Current c) Flux d) Charge

14) In a two phase AC servo motor, voltage across one of the phase is constant and across another phase is
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15) For mechanical elements in parallel _____ through each element remain same.
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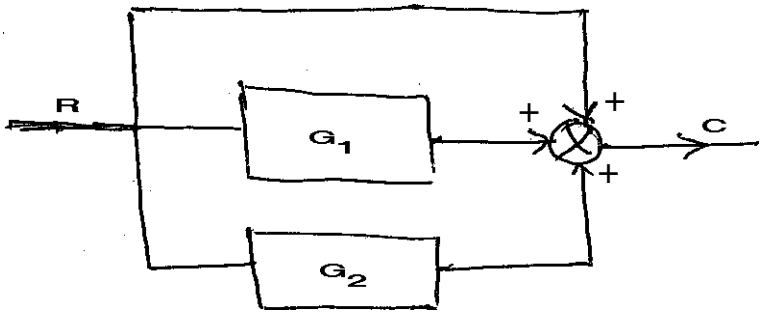

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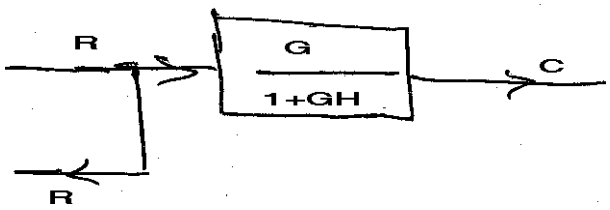

a) Adding a block with TF of block as, $\frac{G}{1+GH}$ b) Adding a block with TF of block as, $\frac{1+GH}{G}$
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19) For integral control mode, the value of steady state constant K_{G1} is
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Set R

SLR-EP – 75

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMATIC CONTROL ENGINEERING

Day and Date : Tuesday, 29-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any three** questions from **each** Section.*
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SECTION – I

2. a) Explain open loop control system in detail. **6**

b) For the mechanical system shown in figure (2 – b) find relation between **7**

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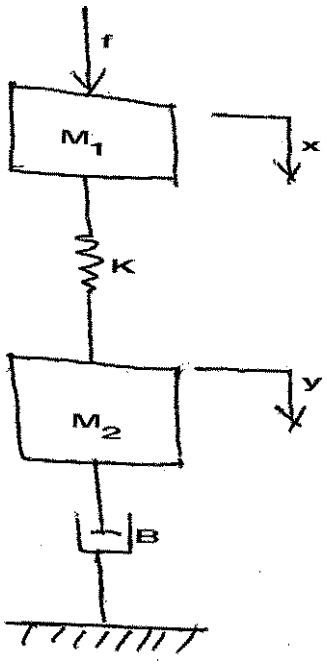

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Set R

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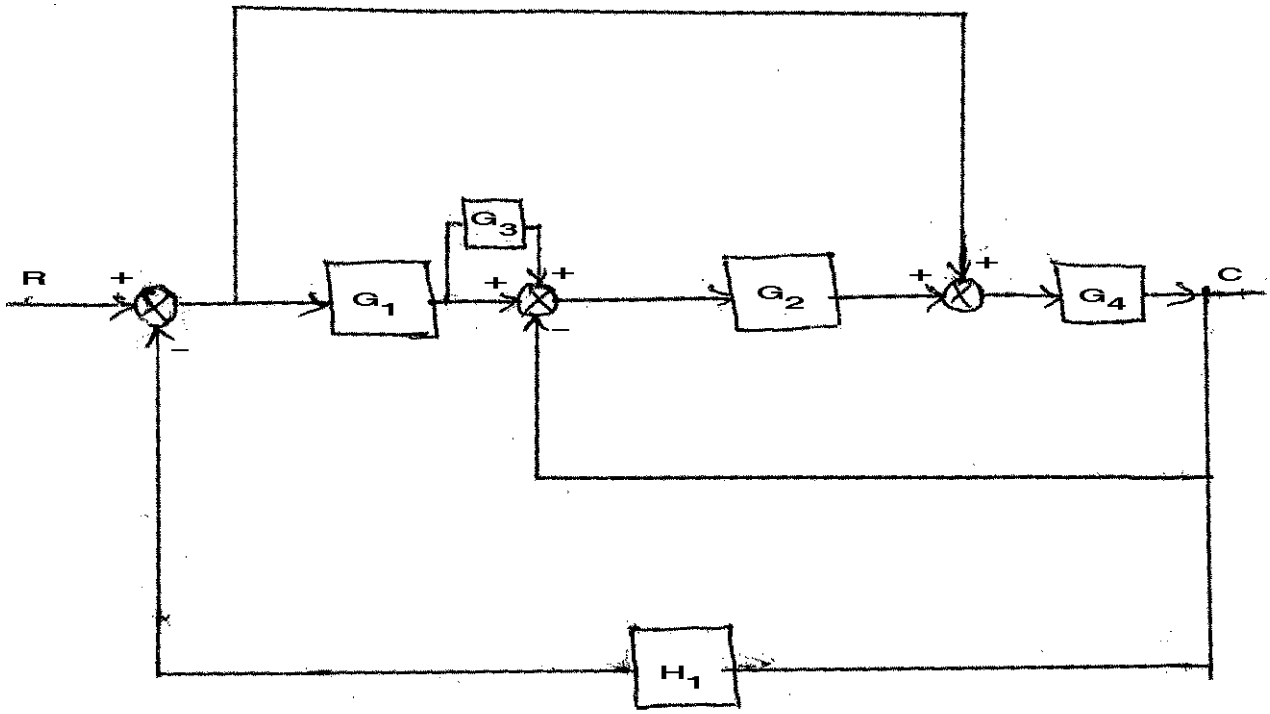

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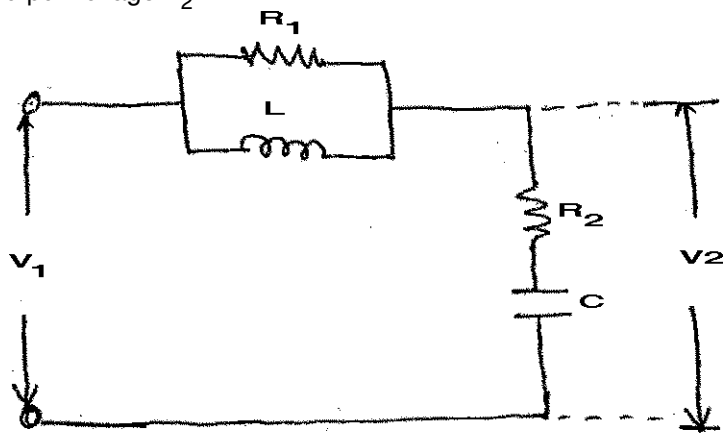

Figure (4 – a)

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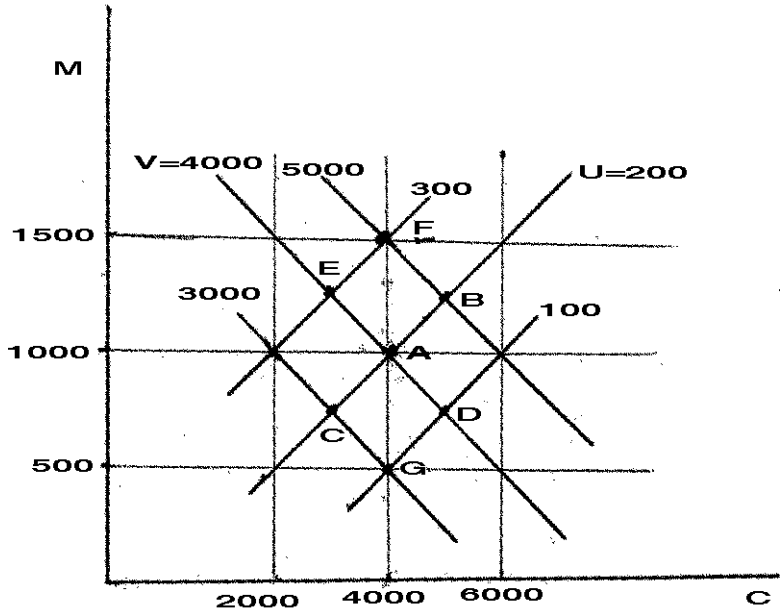

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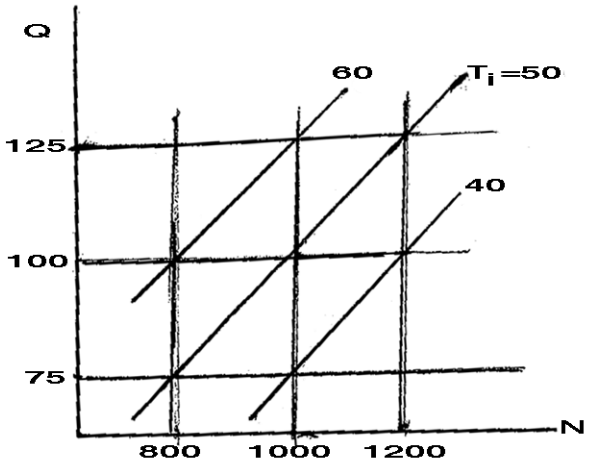

Figure (5 – b)

SECTION – II

6. a) Sketch the complete 'Root Loans' for a system having $G(S)H(S) = \frac{K(S+5)}{S^2+4S+20}$ comment on the system stability. **9**

   b) Explain Bode-Plots for zeros at the origin. **5**

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SLR-EP – 75

Seat No.	

Set **S**

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMATIC CONTROL ENGINEERING

Day and Date : Tuesday, 29-11-2016 Max. Marks : 100

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

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

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1) In hydraulic servomotor the walking beam linkage acts as a
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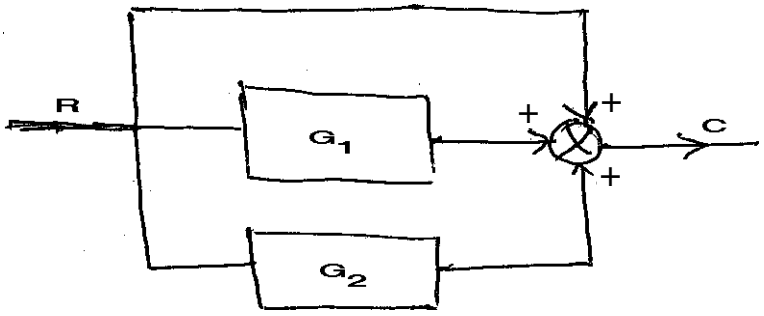

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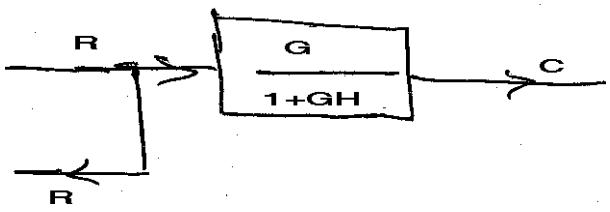

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SLR-EP – 75

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMATIC CONTROL ENGINEERING

Day and Date : Tuesday, 29-11-2016 Marks : 80
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SECTION – I

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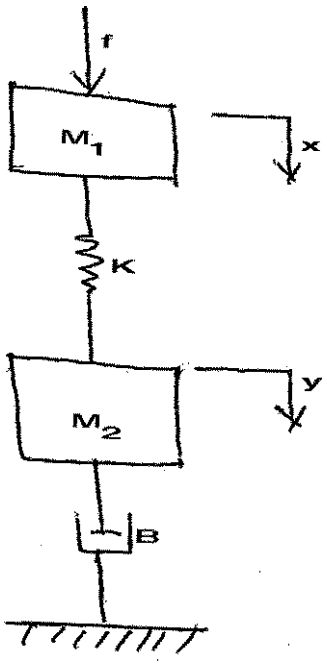

Figure (2 – b)

3. a) Explain jet pipe amplifier and derive the transfer function between piston position 'y' and input position 'x'. **6**

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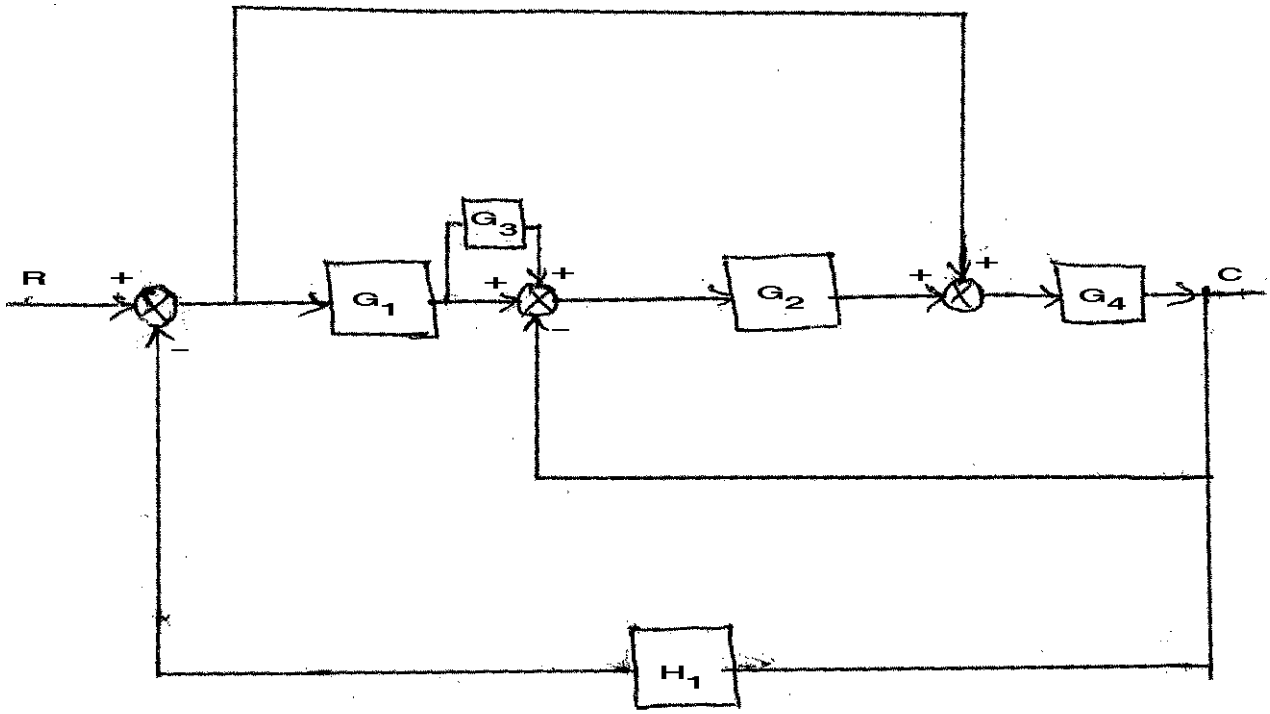

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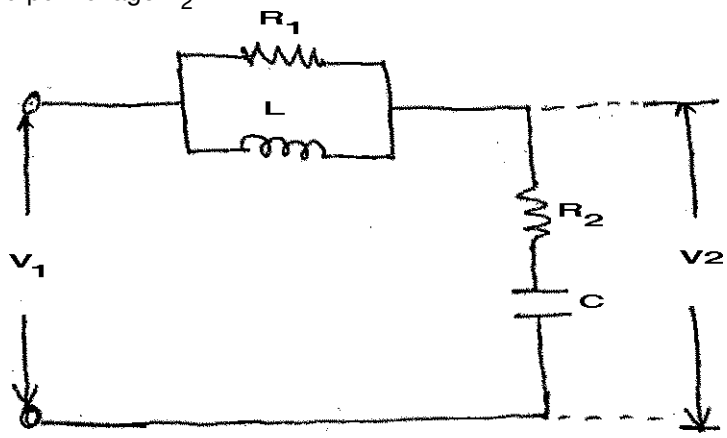

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   $P_i = 8265.6$ N/m^2, $r_i = 1$ m^3, $m_i = 0.1$ kg, $T_i = 15°C$. **7**

   Determine the percentage error in using this approximation for 'p' when V = 1.1 m^3 and T = 17°C and 'm' remains same. Take characteristics gas constant, R as 0.287 KJ/kg.k R is constant.

5. a) A typical family of steady state operating curves for unity feedback system is shown in figure (5 – a). At the reference condition (point 'A') $V_i = 4000$, $M_i = 1000$, $U_i = 200$ and $C_i = 4{,}000$. Construct a block diagram that describes steady state operation of this system. Also find steady state relation. **7**

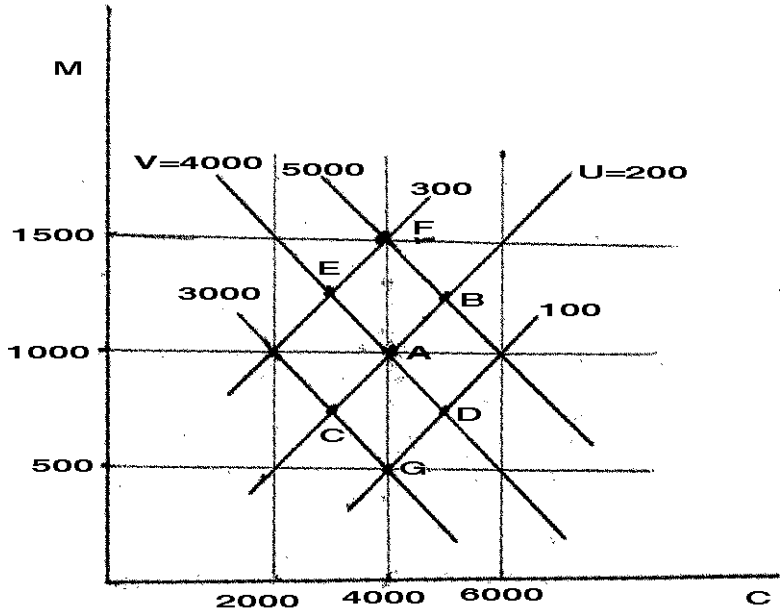

Figure (5 – a)

b) The characteristics of an engine described by the family of curves shown in figure (5 – b). Determine the linear approximation for the change in torque 't' delivered by engine. The difference between torque 't' produced by engine and load torque is used to accelerate the engine $J\frac{dn}{dt}$ and to overcome viscous friction Bn. Thus $t - t_L = J\frac{dn}{dt} + Bn$. For J = 0.02 and B = 0.03 determine the differential equation relating the change in speed 'n' to the change in fuel 'q' and change in load torque t_L. Also find time constant of engine. **7**

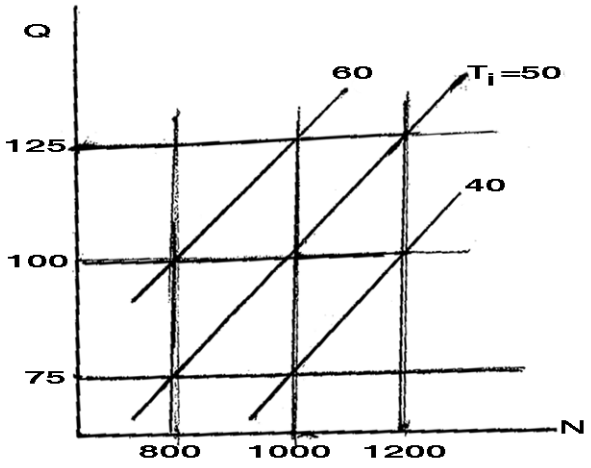

Figure (5 – b)

SECTION – II

6. a) Sketch the complete 'Root Loans' for a system having $G(S)H(S) = \frac{K(S+5)}{S^2+4S+20}$ comment on the system stability. **9**

   b) Explain Bode-Plots for zeros at the origin. **5**

7. a) A system has a characteristic equation $S^5 + 3S^4 + 2S^3 + 6S^2 + 9S + 3 = 0$. Determine whether it has any roots to the right of the imaginary axis. **8**

   b) Explain P and P + I control actions with necessary equations and plots. **5**

8. a) A unity feedback control system has, $G(S) = \frac{400}{S(S+2)(S+20)}$. Sketch the Bode-Plots and comment on system stability. **8**

   b) Explain angle and magnitude conditions in Root Locus. **5**

9. a) Obtain state space representation using 'Parallel Programming' and also draw a computer diagram for a feedback control system with

   $$Y(t) = \frac{D+4}{(D+2)(D+3)(D+5)} f(t)$$ **8**

   b) What are various modes of control ? State the advantages and limitations of each. **5**

SLR-EP – 76

Seat No.	

Set P

B.E. Mechanical (Part – I) Examination, 2016
OPERATIONS RESEARCH

Day and Date : Thursday, 1-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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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. **Type I** question. **Each** question carries **one** mark. **10**

1) Operations Research approach is
   a) Qualitative managerial skills
   b) Operational management skills
   c) Scientific approaches to decision making
   d) Quantitative management skills

2) A feasible solution to LPP
   a) Must satisfy all the constraints simultaneously
   b) Need not satisfy all the constraints
   c) Must be a corner point of feasible region
   d) Must optimize the objective function

3) The dual of the primal maximization LPP having "m" constraints and "n" variables should
   a) Be a minimization problem
   b) Have "n" constraints and "m" variables
   c) Both a and b
   d) None of the above

4) For minimization LP problem, the objective function coefficient for the slack variable is
   a) +M b) – M
   c) Zero d) None of the above

5) The dummy source or destination in transportation problem is added to
   a) Satisfy the rim conditions
   b) Prevent the solution from being becoming degenerate
   c) Modify the allocations
   d) All of the above

6) In case of assignment problems, at any stage of allocations to zero cells, minimum number of lines covering all the zeros is
   a) Less than number of allocations b) Equal to the number of allocations
   c) More than number of allocations d) None of the above

7) A game is said to fair if
   a) Both upper and lower values of the game are zero
   b) Upper and lower values are not zero
   c) Upper and lower values are equal but not zero
   d) All of the above

8) A factor used in replacement analysis with change in money value is called as
   a) Discount factor b) Present Worth factor
   c) Depreciation factor d) All of these

9) In group replacement policy, if any item fails before optimal time
   a) It is replaced individually b) It is not replaced individually
   c) It is replaced in a group d) None of above

10) The value of the coefficient of optimism (α) is needed while using the criterion of
   a) Equal probability b) Realism
   c) Maximin d) Minimax

Type II question. **Each** question carries **two** marks. **10**

1) For the Payoff $\begin{bmatrix} 4 & 3 \\ 3 & 2 \end{bmatrix}$. The optimal strategy for the row player will be
   a) First strategy b) Second strategy
   c) Mixed strategy d) None of these

2) In PERT, the three time estimates used to calculate expected duration, are supposed to follow the distribution curve called as
   a) Poison curve b) Normal curve c) Beta curve d) Gamma curve

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SLR-EP – 76

Seat No.	

B.E. Mechanical (Part – I) Examination, 2016
OPERATIONS RESEARCH

Day and Date : Thursday, 1-12-2016 Marks : 80

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

Instructions : *i) Solve **any two** questions from **each** Section.*

*ii) Figures to the **right** indicate full marks.*

*iii) **Use** of non programmable calculator is **allowed**.*

SECTION – I

2. a) Explain the applications of O.R. in industry. **3**

b) Solve the following L.P.P. using Big-M method. **12**

Min. $Z = 2X_1 + 3X_2$

Subject to,

$X_1 + X_2 \geq 5$

$X_1 + 2X_2 \geq 6$

Where $X_1, X_2 \geq 0$

c) Solve the following L.P.P. using graphical method. **5**

Min. $Z = 4X_1 + X_2$

Subjected to the constraints,

$3X_1 + 4X_2 \geq 20$

$-X_1 - 5X_2 \leq -15$

Where $X_1, X_2 \geq 0$

3. a) Find the optimal assignment schedule for installing machines to the locations given with cost of assignment in 100's of rupees. **10**

Machines	Locations				
	A	B	C	D	E
M_1	9	11	15	10	11
M_2	12	9	–	10	9
M_3	–	11	14	11	7
M_4	14	8	12	7	8

b) Explain the Bellman's principle used in dynamic programming. **5**

c) Discuss the mathematical formulation of transportation problem. **5**

4. a) Explain in brief the various phases in O.R. **5**

b) Solve the following transportation problem so as to minimize the transportation cost in rupees using VAM. **10**

		Stores				
		1	**2**	**3**	**4**	**supply**
Factory	**A**	4	6	8	13	50
	B	13	11	10	8	70
	C	14	4	10	13	30
	D	9	11	13	8	50
	Demand	25	35	105	20	

c) Explain sensitivity analysis in L.P.P. **5**

Set P

SECTION – II

5. a) Two player A and B without showing each other, put on a table a coin with head or tail up. A wins Rs. 8 when both coins show head and Rs. 1 when both are tails. Player B wins 3 Rs. when the coins do not match, being a matching player A what would be your strategy and value of the game ? **7**

   b) Solve the game by graphical method whose payoff matrix is **7**

		B	
		I	II
A	I	2	4
	II	2	3
	III	3	2
	IV	– 2	6

   c) The demand of an item in a store is 18000 units per year. The purchase price of the item is Rs. 5 per unit and its carrying cost is Rs. 1.2 per unit per year and the ording cost is Rs. 400 per order. The shortage cost is Rs. 5 per unit per year. Find the EOQ and the corresponding number orders per year, the maximum inventory, maximum shortage quantity and the total cost of the system. **6**

6. a) Different time estimates of the activities for a certain project are mentioned below. (Time in weeks)

Activity	1 – 2	2 – 3	2 – 4	3 – 4	3 – 5	3 – 7	4 – 5	4 – 6	5 – 6	5 – 7	6 – 7
Optimistic time	1	1	2	0	2	6	4	3	1	5	3
Most likely time	2	4	4	0	3	8	6	5	5	7	5
Pessimistic time	9	7	12	0	4	16	8	7	15	15	13

   I) Draw the project network and determine the expected project duration.

   II) Find the critical path. **10**

b) Explain inventory model with instantaneous replenishment and without shortages. **5**

c) What are the types of floats ? State the significance. **5**

7. a) What is Laplace criterion and Herwicz principle ? **6**

b) A firm is considering replacement of an equipment whose purchased cost is Rs. 4,000 and the scrap value is negligible. Based on experience it is been found the maintenance cost over the years as given below. Determine the optimal replacement age of the machine if the money value changing 12%. **8**

Year	1	2	3	4	5	6	7
Maintenance cost in rupees	0	1000	1300	1600	1900	2200	2500

c) Explain the following terms in brief.

i) Decision tree

ii) Pure and mixed strategy

iii) PERT and CPM. **6**

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SLR-EP – 76

Seat No.	

Set **Q**

B.E. Mechanical (Part – I) Examination, 2016
OPERATIONS RESEARCH

Day and Date : Thursday, 1-12-2016 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. **Type I** question. **Each** question carries **one** mark. **10**

1) In group replacement policy, if any item fails before optimal time
   a) It is replaced individually
   b) It is not replaced individually
   c) It is replaced in a group
   d) None of above

2) The value of the coefficient of optimism (α) is needed while using the criterion of
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3) The dummy source or destination in transportation problem is added to
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   b) Prevent the solution from being becoming degenerate
   c) Modify the allocations
   d) All of the above

4) In case of assignment problems, at any stage of allocations to zero cells, minimum number of lines covering all the zeros is
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   b) Equal to the number of allocations
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5) The dual of the primal maximization LPP having "m" constraints and "n" variables should
   a) Be a minimization problem
   b) Have "n" constraints and "m" variables
   c) Both a and b
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6) For minimization LP problem, the objective function coefficient for the slack variable is
   a) +M
   b) – M
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P.T.O.

7) Operations Research approach is
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8) A feasible solution to LPP
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10) A factor used in replacement analysis with change in money value is called as
   a) Discount factor b) Present Worth factor
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Type II question. **Each** question carries **two** marks. **10**

1) Re order level for inventory item depends upon
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2) When money value is changing with time is 12%, the discount factor for the third year is
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SLR-EP – 76

Seat No.	

B.E. Mechanical (Part – I) Examination, 2016
OPERATIONS RESEARCH

Day and Date : Thursday, 1-12-2016 Marks : 80

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

Instructions : *i) Solve **any two** questions from **each** Section.*

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SECTION – I

2. a) Explain the applications of O.R. in industry. **3**

b) Solve the following L.P.P. using Big-M method. **12**

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Subject to,

$X_1 + X_2 \geq 5$

$X_1 + 2X_2 \geq 6$

Where $X_1, X_2 \geq 0$

c) Solve the following L.P.P. using graphical method. **5**

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3. a) Find the optimal assignment schedule for installing machines to the locations given with cost of assignment in 100's of rupees. **10**

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b) Explain the Bellman's principle used in dynamic programming. **5**

c) Discuss the mathematical formulation of transportation problem. **5**

4. a) Explain in brief the various phases in O.R. **5**

b) Solve the following transportation problem so as to minimize the transportation cost in rupees using VAM. **10**

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		1	**2**	**3**	**4**	**supply**
Factory	**A**	4	6	8	13	50
	B	13	11	10	8	70
	C	14	4	10	13	30
	D	9	11	13	8	50
	Demand	25	35	105	20	

c) Explain sensitivity analysis in L.P.P. **5**

SECTION – II

5. a) Two player A and B without showing each other, put on a table a coin with head or tail up. A wins Rs. 8 when both coins show head and Rs. 1 when both are tails. Player B wins 3 Rs. when the coins do not match, being a matching player A what would be your strategy and value of the game ? **7**

   b) Solve the game by graphical method whose payoff matrix is **7**

		B	
		I	II
A	I	2	4
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   c) The demand of an item in a store is 18000 units per year. The purchase price of the item is Rs. 5 per unit and its carrying cost is Rs. 1.2 per unit per year and the ording cost is Rs. 400 per order. The shortage cost is Rs. 5 per unit per year. Find the EOQ and the corresponding number orders per year, the maximum inventory, maximum shortage quantity and the total cost of the system. **6**

6. a) Different time estimates of the activities for a certain project are mentioned below. (Time in weeks)

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Pessimistic time	9	7	12	0	4	16	8	7	15	15	13

   I) Draw the project network and determine the expected project duration.

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Set Q

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c) What are the types of floats ? State the significance. **5**

7. a) What is Laplace criterion and Herwicz principle ? **6**

b) A firm is considering replacement of an equipment whose purchased cost is Rs. 4,000 and the scrap value is negligible. Based on experience it is been found the maintenance cost over the years as given below. Determine the optimal replacement age of the machine if the money value changing 12%. **8**

Year	1	2	3	4	5	6	7
Maintenance cost in rupees	0	1000	1300	1600	1900	2200	2500

c) Explain the following terms in brief.

i) Decision tree

ii) Pure and mixed strategy

iii) PERT and CPM. **6**

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SLR-EP – 76

Seat No.	

Set R

B.E. Mechanical (Part – I) Examination, 2016
OPERATIONS RESEARCH

Day and Date : Thursday, 1-12-2016 Max. Marks : 100
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

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SLR-EP – 76

Seat No.	

B.E. Mechanical (Part – I) Examination, 2016
OPERATIONS RESEARCH

Day and Date : Thursday, 1-12-2016 Marks : 80

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SECTION – I

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SECTION – II

5. a) Two player A and B without showing each other, put on a table a coin with head or tail up. A wins Rs. 8 when both coins show head and Rs. 1 when both are tails. Player B wins 3 Rs. when the coins do not match, being a matching player A what would be your strategy and value of the game ? **7**

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Pessimistic time	9	7	12	0	4	16	8	7	15	15	13

   I) Draw the project network and determine the expected project duration.

   II) Find the critical path. **10**

b) Explain inventory model with instantaneous replenishment and without shortages. **5**

c) What are the types of floats ? State the significance. **5**

7. a) What is Laplace criterion and Herwicz principle ? **6**

b) A firm is considering replacement of an equipment whose purchased cost is Rs. 4,000 and the scrap value is negligible. Based on experience it is been found the maintenance cost over the years as given below. Determine the optimal replacement age of the machine if the money value changing 12%. **8**

Year	1	2	3	4	5	6	7
Maintenance cost in rupees	0	1000	1300	1600	1900	2200	2500

c) Explain the following terms in brief.

i) Decision tree

ii) Pure and mixed strategy

iii) PERT and CPM. **6**

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SLR-EP – 76

Seat No.	

Set S

B.E. Mechanical (Part – I) Examination, 2016
OPERATIONS RESEARCH

Day and Date : Thursday, 1-12-2016 Max. Marks : 100
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. **Type I** question. **Each** question carries **one** mark. **10**

1) A game is said to fair if
   a) Both upper and lower values of the game are zero
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   c) Depreciation factor d) All of these

3) Operations Research approach is
   a) Qualitative managerial skills
   b) Operational management skills
   c) Scientific approaches to decision making
   d) Quantitative management skills

4) A feasible solution to LPP
   a) Must satisfy all the constraints simultaneously
   b) Need not satisfy all the constraints
   c) Must be a corner point of feasible region
   d) Must optimize the objective function

5) In group replacement policy, if any item fails before optimal time
   a) It is replaced individually b) It is not replaced individually
   c) It is replaced in a group d) None of above

6) The value of the coefficient of optimism (α) is needed while using the criterion of
   a) Equal probability b) Realism
   c) Maximin d) Minimax

P.T.O.

7) The dummy source or destination in transportation problem is added to
   a) Satisfy the rim conditions
   b) Prevent the solution from being becoming degenerate
   c) Modify the allocations
   d) All of the above

8) In case of assignment problems, at any stage of allocations to zero cells, minimum number of lines covering all the zeros is
   a) Less than number of allocations b) Equal to the number of allocations
   c) More than number of allocations d) None of the above

9) The dual of the primal maximization LPP having "m" constraints and "n" variables should
   a) Be a minimization problem
   b) Have "n" constraints and "m" variables
   c) Both a and b
   d) None of the above

10) For minimization LP problem, the objective function coefficient for the slack variable is
   a) +M b) – M
   c) Zero d) None of the above

Type II question. **Each** question carries **two** marks. **10**

1) The estimated duration of times of a certain activity in PERT network under worst condition is 12 days while under the ideal conditions it is 6 days. Then the variance for the activity will be
   a) 2 days b) 6 days c) one day d) 8 days

2) Re order level for inventory item depends upon
   a) Lead time b) Economic order quantity
   c) Safety Stock d) All of these

3) For the Payoff $\begin{bmatrix} 4 & 3 \\ 3 & 2 \end{bmatrix}$. The optimal strategy for the row player will be
   a) First strategy b) Second strategy
   c) Mixed strategy d) None of these

4) In PERT, the three time estimates used to calculate expected duration, are supposed to follow the distribution curve called as
   a) Poison curve b) Normal curve c) Beta curve d) Gamma curve

5) When money value is changing with time is 12%, the discount factor for the third year is
   a) one b) 0.797 c) 0.711 d) zero

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SLR-EP – 76

Seat No.	

B.E. Mechanical (Part – I) Examination, 2016
OPERATIONS RESEARCH

Day and Date : Thursday, 1-12-2016 Marks : 80

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

Instructions : *i) Solve **any two** questions from **each** Section.*

*ii) Figures to the **right** indicate full marks.*

*iii) **Use** of non programmable calculator is **allowed**.*

SECTION – I

2. a) Explain the applications of O.R. in industry. **3**

b) Solve the following L.P.P. using Big-M method. **12**

Min. $Z = 2X_1 + 3X_2$

Subject to,

$X_1 + X_2 \geq 5$

$X_1 + 2X_2 \geq 6$

Where $X_1, X_2 \geq 0$

c) Solve the following L.P.P. using graphical method. **5**

Min. $Z = 4X_1 + X_2$

Subjected to the constraints,

$3X_1 + 4X_2 \geq 20$

$-X_1 - 5X_2 \leq -15$

Where $X_1, X_2 \geq 0$

3. a) Find the optimal assignment schedule for installing machines to the locations given with cost of assignment in 100's of rupees. **10**

Machines	Locations				
	A	B	C	D	E
M_1	9	11	15	10	11
M_2	12	9	–	10	9
M_3	–	11	14	11	7
M_4	14	8	12	7	8

b) Explain the Bellman's principle used in dynamic programming. **5**

c) Discuss the mathematical formulation of transportation problem. **5**

4. a) Explain in brief the various phases in O.R. **5**

b) Solve the following transportation problem so as to minimize the transportation cost in rupees using VAM. **10**

		Stores				
		1	**2**	**3**	**4**	**supply**
Factory	**A**	4	6	8	13	50
	B	13	11	10	8	70
	C	14	4	10	13	30
	D	9	11	13	8	50
	Demand	25	35	105	20	

c) Explain sensitivity analysis in L.P.P. **5**

SECTION – II

5. a) Two player A and B without showing each other, put on a table a coin with head or tail up. A wins Rs. 8 when both coins show head and Rs. 1 when both are tails. Player B wins 3 Rs. when the coins do not match, being a matching player A what would be your strategy and value of the game ? **7**

   b) Solve the game by graphical method whose payoff matrix is **7**

		B	
		I	II
A	I	2	4
	II	2	3
	III	3	2
	IV	– 2	6

   c) The demand of an item in a store is 18000 units per year. The purchase price of the item is Rs. 5 per unit and its carrying cost is Rs. 1.2 per unit per year and the ording cost is Rs. 400 per order. The shortage cost is Rs. 5 per unit per year. Find the EOQ and the corresponding number orders per year, the maximum inventory, maximum shortage quantity and the total cost of the system. **6**

6. a) Different time estimates of the activities for a certain project are mentioned below. (Time in weeks)

Activity	1 – 2	2 – 3	2 – 4	3 – 4	3 – 5	3 – 7	4 – 5	4 – 6	5 – 6	5 – 7	6 – 7
Optimistic time	1	1	2	0	2	6	4	3	1	5	3
Most likely time	2	4	4	0	3	8	6	5	5	7	5
Pessimistic time	9	7	12	0	4	16	8	7	15	15	13

   I) Draw the project network and determine the expected project duration.

   II) Find the critical path. **10**

b) Explain inventory model with instantaneous replenishment and without shortages. **5**

c) What are the types of floats ? State the significance. **5**

7. a) What is Laplace criterion and Herwicz principle ? **6**

b) A firm is considering replacement of an equipment whose purchased cost is Rs. 4,000 and the scrap value is negligible. Based on experience it is been found the maintenance cost over the years as given below. Determine the optimal replacement age of the machine if the money value changing 12%. **8**

Year	1	2	3	4	5	6	7
Maintenance cost in rupees	0	1000	1300	1600	1900	2200	2500

c) Explain the following terms in brief.

i) Decision tree

ii) Pure and mixed strategy

iii) PERT and CPM. **6**

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SLR-EP – 77

Seat No.	

Set P

B.E. (Mech.) (Part – I) Examination, 2016
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : i) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*ii) **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 : **(1×20=20)**

1) The refrigerant used in vapour absorption system is
   a) Ammonia b) Water c) R-12 d) Aqua-ammonia

2) A electrolux refrigerator is called a
   a) Single fluid absorption system b) Two fluid absorption system
   c) Three fluid absorption system d) None of the above

3) In Lithium-bromide absorption system
   a) Lithium bromide is used as refrigerant and water as absorbent
   b) Water is used as refrigerant and Lithium bromide as absorbent
   c) Ammonia is used as refrigerant and Lithium bromide as absorbent
   d) None of the above

4) In aqua-ammonia and Li-Br water absorption refrigeration systems, the refrigerants used are
   a) Water and water b) Water and Li-Br
   c) NH_3 and Li-Br d) NH_3 and water

5) The critical temperature of a refrigerant is that temperature
   a) Above which the gas explodes
   b) Above which gas cannot be liquefied
   c) Below which gas does not follow gas laws
   d) None of the above

6) A multipressure system uses
   a) Different refrigerants for different stages
   b) Different refrigerants with different compressors
   c) Single refrigerant with number of compressors same as number of stages
   d) None of the above

P.T.O.

7) The ozone friendly refrigerant, R-134 a contains
   a) Only one chlorine atom
   b) Only two chlorine atom
   c) No chlorine atom
   d) None of the above

8) Equal friction method of designing ducts
   a) Is ideal when system is not balanced
   b) Is ideal when system is balanced
   c) Is ideal for return ducts only
   d) Is not ideal for any of the above

9) Static regain method of duct designing ducts as compared to equal friction method
   a) Reduces the cost of sheet metal for duct
   b) Increases the cost of sheet metal for duct
   c) Increases balancing problem
   d) Increases the problem of maintaining pressure at the supply terminals

10) The COP of a Cascade system is
   a) Lower than low temperature system of cascade
   b) Lower than high temperature system of cascade
   c) Lower than low temperature as well as high temperature system
   d) None of the above

11) The R.H. during sensible cooling
   a) Increases
   b) Decreases
   c) Remains same
   d) May increase or decrease

12) The vapor pressure during sensible heating
   a) Increases
   b) Decreases
   c) Remains same
   d) May increase or decrease

13) The specific humidity is the mass of water vapour present in
   a) 1 kg of wet air
   b) 1 kg of dry air
   c) 1 m^3 of wet air
   d) 1 m^3 of dry air

14) When DBT and WBT are same, then the R.H. will be
   a) 0 %
   b) 50 %
   c) 75 %
   d) 100 %

15) The temperature at which, the vapour starts condensing out of air is known as
   a) DPT
   b) WBT
   c) DBT
   d) None of the above

16) The sling-psychrometer measures
   a) DBT
   b) WBT
   c) DPT
   d) DBT and WBT

17) The condensation of moisture from the air starts when its temperature falls below
   a) WBT
   b) DBT
   c) DPT
   d) Any of the above

18) The performance of evaporative condenser largely depends upon
   a) DBT
   b) WBT
   c) DPT of air
   d) None of the above

19) The human body feels comfortable when the heat produced by the body is equal to
   a) heat dissipated to the surrounding
   b) heat stored in the body
   c) sum of a) and b)
   d) difference between a) and b)

20) The process used for winter air conditioning is
   a) Humidification
   b) Heating and humidification
   c) Dehumidification
   d) Cooling and humidification

SLR-EP – 77

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 3-12-2016 Marks : 80

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

***Instructions** : i) Attempt **any two** questions from **each** Section.*

*ii) Assume suitable data if **necessary**.*

*iii) **Use** of steam tables, Psychrometry chart and non-programmable calculator is **allowed**.*

SECTION – I

2. a) Explain with neat sketch the working principle of Electrolux Refrigerator. **6**

   b) Enumerate the various methods of aircraft refrigeration system and explain regenerative air cooling system. **8**

   c) Define Primary refrigerants and classify primary refrigerants. Explain any two in detail. **6**

3. a) A refrigerator system operating an a reversed Carnot cycle produces 400 kg/hr of ice at – 5°C from water at 25°C make calculation for

      i) Power required to derive the machine

      ii) Heat rejected from the system.

      Take latent heat of freezing = 335 kj/kg and specific latent heat of ice = 2.1 kj/kg. **6**

   b) Discuss the nomenclature refrigerant. **6**

   c) Explain with schematic diagram the two stage compression system with flash gas removal. Show the process on p-h diagram. **8**

4. Write short notes on : **(5×4=20)**

   i) Nano refrigerant

   ii) Enthalpy concentration chart

   iii) Need of refrigeration in aircrafts

   iv) Lithium Bromide refrigeration system.

SECTION – II

5. a) Define the following terms : **6**
   i) Degree of saturation
   ii) Specific humidity
   iii) Dew point temperature
   iv) Relative humidity

   b) For a sample of air having 22°C DBT, relative humidity 30 % at barometric pressure of 760 mm of Hg. Calculate
   i) Vapour pressure
   ii) Humidity ratio
   iii) Vapour density
   iv) Enthalpy. **8**

   c) Discuss the factors affecting thermal balance between human body and environment. **6**

6. a) An air conditioned auditorium is to be maintained at 27°C DBT and 60 % relative humidity. The ambient condition is 40°C DBT 30°C WBT. The total sensible heat load is 1,00,000 Kj/hr and the total latent heat load is 40,000 kj/hr 60 % of the return air is recirculated and mixed with 40 % of make up air after the cooling coil. The condition for air leaving the cooling coil is at 18°C.

   Determine
   i) RSHF
   ii) The conditioned of air entering the auditorium
   iii) The amount of make air
   iv) Apparatus dew point and
   v) Bypass factor of the cooling coil.

   Show the process on the Psychrometric chart. **12**

   b) Describe the various components of cooling load estimation. **8**

7. a) What is Cascade refrigeration system ? Draw a schematic diagram of a cascade system of refrigeration and explain with the help of P-h diagram. **10**

   b) Describe the thermal exchange of human body and environment. **6**

   c) Write short note on Duct material. **4**

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Seat No.	

Set Q

B.E. (Mech.) (Part – I) Examination, 2016
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : i) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*ii) **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 : **(1×20=20)**

1) The sling-psychrometer measures
a) DBT b) WBT c) DPT d) DBT and WBT

2) The condensation of moisture from the air starts when its temperature falls below
a) WBT b) DBT c) DPT d) Any of the above

3) The performance of evaporative condenser largely depends upon
a) DBT b) WBT c) DPT of air d) None of the above

4) The human body feels comfortable when the heat produced by the body is equal to
a) heat dissipated to the surrounding b) heat stored in the body
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5) The process used for winter air conditioning is
a) Humidification b) Heating and humidification
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6) The refrigerant used in vapour absorption system is
a) Ammonia b) Water c) R-12 d) Aqua-ammonia

7) A electrolux refrigerator is called a
a) Single fluid absorption system b) Two fluid absorption system
c) Three fluid absorption system d) None of the above

8) In Lithium-bromide absorption system
a) Lithium bromide is used as refrigerant and water as absorbent
b) Water is used as refrigerant and Lithium bromide as absorbent
c) Ammonia is used as refrigerant and Lithium bromide as absorbent
d) None of the above

9) In aqua-ammonia and Li-Br water absorption refrigeration systems, the refrigerants used are
a) Water and water b) Water and Li-Br
c) NH_3 and Li-Br d) NH_3 and water

P.T.O.

10) The critical temperature of a refrigerant is that temperature
   a) Above which the gas explodes
   b) Above which gas cannot be liquefied
   c) Below which gas does not follow gas laws
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11) A multipressure system uses
   a) Different refrigerants for different stages
   b) Different refrigerants with different compressors
   c) Single refrigerant with number of compressors same as number of stages
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12) The ozone friendly refrigerant, R-134 a contains
   a) Only one chlorine atom
   b) Only two chlorine atom
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13) Equal friction method of designing ducts
   a) Is ideal when system is not balanced
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   a) 1 kg of wet air b) 1 kg of dry air c) 1 m^3 of wet air d) 1 m^3 of dry air

19) When DBT and WBT are same, then the R.H. will be
   a) 0 % b) 50 % c) 75 % d) 100 %

20) The temperature at which, the vapour starts condensing out of air is known as
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SLR-EP – 77

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 3-12-2016 Marks : 80

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

***Instructions** : i) Attempt **any two** questions from **each** Section.*

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SECTION – I

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      i) Power required to derive the machine

      ii) Heat rejected from the system.

      Take latent heat of freezing = 335 kj/kg and specific latent heat of ice = 2.1 kj/kg. **6**

   b) Discuss the nomenclature refrigerant. **6**

   c) Explain with schematic diagram the two stage compression system with flash gas removal. Show the process on p-h diagram. **8**

4. Write short notes on : **(5×4=20)**

   i) Nano refrigerant

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   iii) Need of refrigeration in aircrafts

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Set Q

SECTION – II

5. a) Define the following terms : **6**
   i) Degree of saturation
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   b) For a sample of air having 22°C DBT, relative humidity 30 % at barometric pressure of 760 mm of Hg. Calculate
   i) Vapour pressure
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   c) Discuss the factors affecting thermal balance between human body and environment. **6**

6. a) An air conditioned auditorium is to be maintained at 27°C DBT and 60 % relative humidity. The ambient condition is 40°C DBT 30°C WBT. The total sensible heat load is 1,00,000 Kj/hr and the total latent heat load is 40,000 kj/hr 60 % of the return air is recirculated and mixed with 40 % of make up air after the cooling coil. The condition for air leaving the cooling coil is at 18°C.

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   Show the process on the Psychrometric chart. **12**

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   c) Write short note on Duct material. **4**

SLR-EP – 77

Seat No.	

Set R

B.E. (Mech.) (Part – I) Examination, 2016
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The R.H. during sensible cooling
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a) Ammonia b) Water c) R-12 d) Aqua-ammonia

P.T.O.

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SLR-EP – 77

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 3-12-2016 Marks : 80

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SECTION – I

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   b) Discuss the nomenclature refrigerant. **6**

   c) Explain with schematic diagram the two stage compression system with flash gas removal. Show the process on p-h diagram. **8**

4. Write short notes on : **(5×4=20)**

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   ii) Enthalpy concentration chart

   iii) Need of refrigeration in aircrafts

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Set R

SECTION – II

5. a) Define the following terms : **6**
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   b) For a sample of air having 22°C DBT, relative humidity 30 % at barometric pressure of 760 mm of Hg. Calculate
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   Show the process on the Psychrometric chart. **12**

   b) Describe the various components of cooling load estimation. **8**

7. a) What is Cascade refrigeration system ? Draw a schematic diagram of a cascade system of refrigeration and explain with the help of P-h diagram. **10**

   b) Describe the thermal exchange of human body and environment. **6**

   c) Write short note on Duct material. **4**

SLR-EP – 77

Seat No.	

Set S

B.E. (Mech.) (Part – I) Examination, 2016
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 3-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : i) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*ii) **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 : **(1×20=20)**

1) A multipressure system uses
   a) Different refrigerants for different stages
   b) Different refrigerants with different compressors
   c) Single refrigerant with number of compressors same as number of stages
   d) None of the above

2) The ozone friendly refrigerant, R-134 a contains
   a) Only one chlorine atom b) Only two chlorine atom
   c) No chlorine atom d) None of the above

3) Equal friction method of designing ducts
   a) Is ideal when system is not balanced b) Is ideal when system is balanced
   c) Is ideal for return ducts only d) Is not ideal for any of the above

4) Static regain method of duct designing ducts as compared to equal friction method
   a) Reduces the cost of sheet metal for duct
   b) Increases the cost of sheet metal for duct
   c) Increases balancing problem
   d) Increases the problem of maintaining pressure at the supply terminals

5) The COP of a Cascade system is
   a) Lower than low temperature system of cascade
   b) Lower than high temperature system of cascade
   c) Lower than low temperature as well as high temperature system
   d) None of the above

6) The R.H. during sensible cooling
   a) Increases b) Decreases
   c) Remains same d) May increase or decrease

7) The vapor pressure during sensible heating
   a) Increases b) Decreases
   c) Remains same d) May increase or decrease

P.T.O.

8) The specific humidity is the mass of water vapour present in
   a) 1 kg of wet air b) 1 kg of dry air c) 1 m^3 of wet air d) 1 m^3 of dry air

9) When DBT and WBT are same, then the R.H. will be
   a) 0 % b) 50 % c) 75 % d) 100 %

10) The temperature at which, the vapour starts condensing out of air is known as
   a) DPT b) WBT c) DBT d) None of the above

11) The sling-psychrometer measures
   a) DBT b) WBT c) DPT d) DBT and WBT

12) The condensation of moisture from the air starts when its temperature falls below
   a) WBT b) DBT c) DPT d) Any of the above

13) The performance of evaporative condenser largely depends upon
   a) DBT b) WBT c) DPT of air d) None of the above

14) The human body feels comfortable when the heat produced by the body is equal to
   a) heat dissipated to the surrounding b) heat stored in the body
   c) sum of a) and b) d) difference between a) and b)

15) The process used for winter air conditioning is
   a) Humidification b) Heating and humidification
   c) Dehumidification d) Cooling and humidification

16) The refrigerant used in vapour absorption system is
   a) Ammonia b) Water c) R-12 d) Aqua-ammonia

17) A electrolux refrigerator is called a
   a) Single fluid absorption system b) Two fluid absorption system
   c) Three fluid absorption system d) None of the above

18) In Lithium-bromide absorption system
   a) Lithium bromide is used as refrigerant and water as absorbent
   b) Water is used as refrigerant and Lithium bromide as absorbent
   c) Ammonia is used as refrigerant and Lithium bromide as absorbent
   d) None of the above

19) In aqua-ammonia and Li-Br water absorption refrigeration systems, the refrigerants used are
   a) Water and water b) Water and Li-Br
   c) NH_3 and Li-Br d) NH_3 and water

20) The critical temperature of a refrigerant is that temperature
   a) Above which the gas explodes
   b) Above which gas cannot be liquefied
   c) Below which gas does not follow gas laws
   d) None of the above

SLR-EP – 77

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 3-12-2016 Marks : 80

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

***Instructions** : i) Attempt **any two** questions from **each** Section.*

*ii) Assume suitable data if **necessary**.*

*iii) **Use** of steam tables, Psychrometry chart and non-programmable calculator is **allowed**.*

SECTION – I

2. a) Explain with neat sketch the working principle of Electrolux Refrigerator. **6**

   b) Enumerate the various methods of aircraft refrigeration system and explain regenerative air cooling system. **8**

   c) Define Primary refrigerants and classify primary refrigerants. Explain any two in detail. **6**

3. a) A refrigerator system operating an a reversed Carnot cycle produces 400 kg/hr of ice at – 5°C from water at 25°C make calculation for

      i) Power required to derive the machine

      ii) Heat rejected from the system.

      Take latent heat of freezing = 335 kj/kg and specific latent heat of ice = 2.1 kj/kg. **6**

   b) Discuss the nomenclature refrigerant. **6**

   c) Explain with schematic diagram the two stage compression system with flash gas removal. Show the process on p-h diagram. **8**

4. Write short notes on : **(5×4=20)**

   i) Nano refrigerant

   ii) Enthalpy concentration chart

   iii) Need of refrigeration in aircrafts

   iv) Lithium Bromide refrigeration system.

SECTION – II

5. a) Define the following terms : **6**
   i) Degree of saturation
   ii) Specific humidity
   iii) Dew point temperature
   iv) Relative humidity

   b) For a sample of air having 22°C DBT, relative humidity 30 % at barometric pressure of 760 mm of Hg. Calculate
   i) Vapour pressure
   ii) Humidity ratio
   iii) Vapour density
   iv) Enthalpy. **8**

   c) Discuss the factors affecting thermal balance between human body and environment. **6**

6. a) An air conditioned auditorium is to be maintained at 27°C DBT and 60 % relative humidity. The ambient condition is 40°C DBT 30°C WBT. The total sensible heat load is 1,00,000 Kj/hr and the total latent heat load is 40,000 kj/hr 60 % of the return air is recirculated and mixed with 40 % of make up air after the cooling coil. The condition for air leaving the cooling coil is at 18°C.

   Determine
   i) RSHF
   ii) The conditioned of air entering the auditorium
   iii) The amount of make air
   iv) Apparatus dew point and
   v) Bypass factor of the cooling coil.

   Show the process on the Psychrometric chart. **12**

   b) Describe the various components of cooling load estimation. **8**

7. a) What is Cascade refrigeration system ? Draw a schematic diagram of a cascade system of refrigeration and explain with the help of P-h diagram. **10**

   b) Describe the thermal exchange of human body and environment. **6**

   c) Write short note on Duct material. **4**

SLR-EP – 80

Seat No.	

Set **P**

B.E. (Mechanical) (Part – I) (Old) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Saturday, 10-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 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) Answer ***any two*** *questions from* ***each*** *Section.*
4) Assume suitable data ***if*** *necessary.*
5) Use of non-programmable calculator is ***allowed****.*
6) Figures to the ***right*** *indicate* ***full*** *marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Modern heavy duty engines exhaust valves made of
   a) High carbon steel b) Cobalt alloy
   c) Nimonic alloys d) None of the above

2) Main advantage of Pintaux nozzle is
   a) Better cold starting performance b) Ability to distribute the fuel
   c) Good penetration d) Good atomization

3) Throttle valve controls the supply of
   a) Air only b) Fuel only
   c) Air-fuel mixture d) None of the above

4) The rotational speed of cam shaft with respect to crankshaft in 4 stroke engine
   a) Half b) Double c) Equal d) Four times

5) The choke valve is closed when engine is
   a) Accelerating b) Hot c) Cold d) Idling

6) Supercharging increases the power output by increasing
   a) Charge temperature b) Charge pressure
   c) Speed of engine d) Quantity of fuel admitted

7) In an actual SI engine the pumping loss with respect to speed
   a) Decreases b) Increases
   c) Remains constant d) Nothing to do with speed

8) In carburetor lean mixture is required during
   a) Idling b) Starting c) Accelerating d) Cruising

P.T.O.

9) Compared to 4 stroke engine, 2 stroke Engines are
   a) Are light in weight comparatively
   b) Are simple in construction
   c) Have uniform torque output at crankshaft
   d) All of the above

10) For same compression ratio and heat rejection Otto cycle efficiency with respect to diesel cycle efficiency is
   a) Greater b) Smaller c) Equal d) None of the above

11) The knocking in SI engines gets reduced
   a) By increasing the compression ratio
   b) By retarding the spark advance
   c) By increasing inlet air temperature
   d) By increasing the cooling water temperature

12) With increase in compression ratio flame speed
   a) Increases b) Decreases
   c) Remains the same d) None of the above

13) For diesel engine the type of governing used is
   a) Quantity governing b) Quality governing
   c) Hit and mis governing d) None of the above

14) Open combustion chambers in CI engines require
   a) High injection pressures
   b) Accurate metering of fuel by the injection system
   c) Both (a) and (b)
   d) None of the above

15) In turbo charging air compressor is driven by
   a) Exhaust gas turbine b) Engine itself
   c) Separate electrical motor d) None of the above

16) The ratio of indicated thermal efficiency to the corresponding air standard cycle efficiency is called
   a) Net efficiency b) Efficiency ratio
   c) Relative efficiency d) Overall efficiency

17) Alcohols alone cannot be used in CI engines as
   a) Their self ignition temperature is high
   b) Latent heat of vaporization is low
   c) Both (a) and (b)
   d) None of the above

18) Decrease in air-fuel ratio in SI engine results in
   a) Increase of NOx b) Decrease of CO and UBHC
   c) Increase of CO and UBHC d) None of the above

19) Lead was added in gasoline for
   a) Reducing HC emissions b) Reducing knocking
   c) Reducing exhaust temperature d) Increase power output

20) Three way catalytic converters reduce emission of
   a) CO, CO_2 and HC b) CO, NOx and HC
   c) CO_2, NOx and HC d) CO, HC and soot

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Set P

SLR-EP – 80

Seat No.	

B.E. (Mechanical) (Part – I) (Old) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Saturday, 10-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer **any two** questions from **each** Section.*
*2) Assume suitable data **if** necessary.*
*3) Use of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Explain assumption made for fuel-air cycle analysis. **6**
   b) Explain valve timing diagram for four stroke engine, also discuss valve overlap. **6**
   c) Compare Diesel Cycle with Otto cycle. **8**

3. a) State and explain requirement of an air fuel ratio for petrol engine from no load to full load. **10**
   b) A petrol engine has carburetor of 32 mm ventury size, jet diameter 2 mm, pressure difference at throat is 50 mm of Hg, Atmospheric pressure is 1 bar and temperature is 27°C, coefficient of discharge for ventury is 0.85 and fuel jet 0.66, density of petrol is 740 kg/m^3, nozzle lip is zero. Neglect compressibility of air. Find : **10**
      i) Fuel velocity at throat
      ii) Fuel flow
      iii) Air velocity at throat
      iv) Air flow

4. a) Determine quantity of fuel to be injected per cycle per cylinder for a 6 cylinder 4 stroke diesel engine having bsfc 245 gm/kW.hr and developing 89 kW at 2500 rpm. Take specific gravity as 0.84. **6**
   b) List the advantages and limitations of supercharging. **6**
   c) Explain selection of I.C. Engine for power generation and agriculture application. **8**

Set P

SECTION – II

5. a) Discuss the different stages of combustion in SI engines with the help of a neat p-θ diagram. **6**

   b) Explain what you mean by physical delay and chemical delay period with respect to CI Engine combustion ? What are the factors affecting the delay period ? **6**

   c) Write short notes on : **8**
      1) HUCR
      2) Requirement of combustion chambers for SI Engines.

6. a) The bore and stroke of a water cooled, vertical single cylinder four stroke diesel engine are 80 mm and 110 mm respectively and the torque is 23.5 Nm. Calculate the brake mean effective pressure of the engine. **4**

   b) What are various methods of measurement of brake power ? Explain any two methods. **8**

   c) Write short notes on : **8**
      1) Turbo charging
      2) NOx emissions control.

7. a) Explain the suitability of alcohol as an alternative fuel and list the advantages and disadvantages of use of alcohol in IC engines. **6**

   b) What are the different pollutants emitted by the petrol engines ? State methods used to control these pollutants. **6**

   c) Write short notes on : **8**
      1) Heat balance sheet
      2) Variable valve timing.

SLR-EP – 80

Seat No.	

Set **Q**

B.E. (Mechanical) (Part – I) (Old) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Saturday, 10-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 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) Answer **any two** questions from **each** Section.*
*4) Assume suitable data **if** necessary.*
*5) Use of non-programmable calculator is **allowed**.*
*6) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The ratio of indicated thermal efficiency to the corresponding air standard cycle efficiency is called
   a) Net efficiency b) Efficiency ratio
   c) Relative efficiency d) Overall efficiency

2) Alcohols alone cannot be used in CI engines as
   a) Their self ignition temperature is high
   b) Latent heat of vaporization is low
   c) Both (a) and (b)
   d) None of the above

3) Decrease in air-fuel ratio in SI engine results in
   a) Increase of NOx b) Decrease of CO and UBHC
   c) Increase of CO and UBHC d) None of the above

4) Lead was added in gasoline for
   a) Reducing HC emissions b) Reducing knocking
   c) Reducing exhaust temperature d) Increase power output

5) Three way catalytic converters reduce emission of
   a) CO, CO_2 and HC b) CO, NOx and HC
   c) CO_2, NOx and HC d) CO, HC and soot

6) Modern heavy duty engines exhaust valves made of
   a) High carbon steel b) Cobalt alloy
   c) Nimonic alloys d) None of the above

7) Main advantage of Pintaux nozzle is
   a) Better cold starting performance b) Ability to distribute the fuel
   c) Good penetration d) Good atomization

P.T.O.

8) Throttle valve controls the supply of
   a) Air only b) Fuel only
   c) Air-fuel mixture d) None of the above

9) The rotational speed of cam shaft with respect to crankshaft in 4 stroke engine
   a) Half b) Double c) Equal d) Four times

10) The choke valve is closed when engine is
   a) Accelerating b) Hot c) Cold d) Idling

11) Supercharging increases the power output by increasing
   a) Charge temperature b) Charge pressure
   c) Speed of engine d) Quantity of fuel admitted

12) In an actual SI engine the pumping loss with respect to speed
   a) Decreases b) Increases
   c) Remains constant d) Nothing to do with speed

13) In carburetor lean mixture is required during
   a) Idling b) Starting c) Accelerating d) Cruising

14) Compared to 4 stroke engine, 2 stroke Engines are
   a) Are light in weight comparatively
   b) Are simple in construction
   c) Have uniform torque output at crankshaft
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15) For same compression ratio and heat rejection Otto cycle efficiency with respect to diesel cycle efficiency is
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16) The knocking in SI engines gets reduced
   a) By increasing the compression ratio
   b) By retarding the spark advance
   c) By increasing inlet air temperature
   d) By increasing the cooling water temperature

17) With increase in compression ratio flame speed
   a) Increases b) Decreases
   c) Remains the same d) None of the above

18) For diesel engine the type of governing used is
   a) Quantity governing b) Quality governing
   c) Hit and mis governing d) None of the above

19) Open combustion chambers in CI engines require
   a) High injection pressures
   b) Accurate metering of fuel by the injection system
   c) Both (a) and (b)
   d) None of the above

20) In turbo charging air compressor is driven by
   a) Exhaust gas turbine b) Engine itself
   c) Separate electrical motor d) None of the above

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SLR-EP – 80

Seat No.	

B.E. (Mechanical) (Part – I) (Old) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Saturday, 10-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer **any two** questions from **each** Section.*
*2) Assume suitable data **if** necessary.*
*3) Use of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Explain assumption made for fuel-air cycle analysis. **6**
   b) Explain valve timing diagram for four stroke engine, also discuss valve overlap. **6**
   c) Compare Diesel Cycle with Otto cycle. **8**

3. a) State and explain requirement of an air fuel ratio for petrol engine from no load to full load. **10**
   b) A petrol engine has carburetor of 32 mm ventury size, jet diameter 2 mm, pressure difference at throat is 50 mm of Hg, Atmospheric pressure is 1 bar and temperature is 27°C, coefficient of discharge for ventury is 0.85 and fuel jet 0.66, density of petrol is 740 kg/m^3, nozzle lip is zero. Neglect compressibility of air. Find : **10**
      i) Fuel velocity at throat
      ii) Fuel flow
      iii) Air velocity at throat
      iv) Air flow

4. a) Determine quantity of fuel to be injected per cycle per cylinder for a 6 cylinder 4 stroke diesel engine having bsfc 245 gm/kW.hr and developing 89 kW at 2500 rpm. Take specific gravity as 0.84. **6**
   b) List the advantages and limitations of supercharging. **6**
   c) Explain selection of I.C. Engine for power generation and agriculture application. **8**

Set Q

SECTION – II

5. a) Discuss the different stages of combustion in SI engines with the help of a neat p-θ diagram. **6**

   b) Explain what you mean by physical delay and chemical delay period with respect to CI Engine combustion ? What are the factors affecting the delay period ? **6**

   c) Write short notes on : **8**
      1) HUCR
      2) Requirement of combustion chambers for SI Engines.

6. a) The bore and stroke of a water cooled, vertical single cylinder four stroke diesel engine are 80 mm and 110 mm respectively and the torque is 23.5 Nm. Calculate the brake mean effective pressure of the engine. **4**

   b) What are various methods of measurement of brake power ? Explain any two methods. **8**

   c) Write short notes on : **8**
      1) Turbo charging
      2) NOx emissions control.

7. a) Explain the suitability of alcohol as an alternative fuel and list the advantages and disadvantages of use of alcohol in IC engines. **6**

   b) What are the different pollutants emitted by the petrol engines ? State methods used to control these pollutants. **6**

   c) Write short notes on : **8**
      1) Heat balance sheet
      2) Variable valve timing.

SLR-EP – 80

Seat No.	

Set R

B.E. (Mechanical) (Part – I) (Old) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Saturday, 10-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 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) Answer **any two** questions from **each** Section.*
*4) Assume suitable data **if** necessary.*
*5) Use of non-programmable calculator is **allowed**.*
*6) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The knocking in SI engines gets reduced
   a) By increasing the compression ratio
   b) By retarding the spark advance
   c) By increasing inlet air temperature
   d) By increasing the cooling water temperature

2) With increase in compression ratio flame speed
   a) Increases b) Decreases
   c) Remains the same d) None of the above

3) For diesel engine the type of governing used is
   a) Quantity governing b) Quality governing
   c) Hit and mis governing d) None of the above

4) Open combustion chambers in CI engines require
   a) High injection pressures
   b) Accurate metering of fuel by the injection system
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   d) None of the above

5) In turbo charging air compressor is driven by
   a) Exhaust gas turbine b) Engine itself
   c) Separate electrical motor d) None of the above

6) The ratio of indicated thermal efficiency to the corresponding air standard cycle efficiency is called
   a) Net efficiency b) Efficiency ratio
   c) Relative efficiency d) Overall efficiency

P.T.O.

7) Alcohols alone cannot be used in CI engines as
   a) Their self ignition temperature is high
   b) Latent heat of vaporization is low
   c) Both (a) and (b)
   d) None of the above

8) Decrease in air-fuel ratio in SI engine results in
   a) Increase of NOx
   b) Decrease of CO and UBHC
   c) Increase of CO and UBHC
   d) None of the above

9) Lead was added in gasoline for
   a) Reducing HC emissions
   b) Reducing knocking
   c) Reducing exhaust temperature
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10) Three way catalytic converters reduce emission of
   a) CO, CO_2 and HC
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11) Modern heavy duty engines exhaust valves made of
   a) High carbon steel
   b) Cobalt alloy
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   a) Better cold starting performance
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   b) Fuel only
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   a) Half b) Double c) Equal d) Four times

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   b) Charge pressure
   c) Speed of engine
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   a) Decreases
   b) Increases
   c) Remains constant
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18) In carburetor lean mixture is required during
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SLR-EP – 80

Seat No.	

B.E. (Mechanical) (Part – I) (Old) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Saturday, 10-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer **any two** questions from **each** Section.*
*2) Assume suitable data **if** necessary.*
*3) Use of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Explain assumption made for fuel-air cycle analysis. **6**
   b) Explain valve timing diagram for four stroke engine, also discuss valve overlap. **6**
   c) Compare Diesel Cycle with Otto cycle. **8**

3. a) State and explain requirement of an air fuel ratio for petrol engine from no load to full load. **10**
   b) A petrol engine has carburetor of 32 mm ventury size, jet diameter 2 mm, pressure difference at throat is 50 mm of Hg, Atmospheric pressure is 1 bar and temperature is 27°C, coefficient of discharge for ventury is 0.85 and fuel jet 0.66, density of petrol is 740 kg/m^3, nozzle lip is zero. Neglect compressibility of air. Find : **10**
      i) Fuel velocity at throat
      ii) Fuel flow
      iii) Air velocity at throat
      iv) Air flow

4. a) Determine quantity of fuel to be injected per cycle per cylinder for a 6 cylinder 4 stroke diesel engine having bsfc 245 gm/kW.hr and developing 89 kW at 2500 rpm. Take specific gravity as 0.84. **6**
   b) List the advantages and limitations of supercharging. **6**
   c) Explain selection of I.C. Engine for power generation and agriculture application. **8**

Set R

SECTION – II

5. a) Discuss the different stages of combustion in SI engines with the help of a neat p-θ diagram. **6**

   b) Explain what you mean by physical delay and chemical delay period with respect to CI Engine combustion ? What are the factors affecting the delay period ? **6**

   c) Write short notes on : **8**
      1) HUCR
      2) Requirement of combustion chambers for SI Engines.

6. a) The bore and stroke of a water cooled, vertical single cylinder four stroke diesel engine are 80 mm and 110 mm respectively and the torque is 23.5 Nm. Calculate the brake mean effective pressure of the engine. **4**

   b) What are various methods of measurement of brake power ? Explain any two methods. **8**

   c) Write short notes on : **8**
      1) Turbo charging
      2) NOx emissions control.

7. a) Explain the suitability of alcohol as an alternative fuel and list the advantages and disadvantages of use of alcohol in IC engines. **6**

   b) What are the different pollutants emitted by the petrol engines ? State methods used to control these pollutants. **6**

   c) Write short notes on : **8**
      1) Heat balance sheet
      2) Variable valve timing.

SLR-EP – 80

Seat No.	

Set **S**

B.E. (Mechanical) (Part – I) (Old) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Saturday, 10-12-2016 Total Marks : 100
Time : 10.00 a.m. to 1.00 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) Answer ***any two*** *questions from* ***each*** *Section.*
4) Assume suitable data ***if*** *necessary.*
5) Use of non-programmable calculator is ***allowed****.*
6) Figures to the ***right*** *indicate* ***full*** *marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Supercharging increases the power output by increasing
   a) Charge temperature b) Charge pressure
   c) Speed of engine d) Quantity of fuel admitted

2) In an actual SI engine the pumping loss with respect to speed
   a) Decreases b) Increases
   c) Remains constant d) Nothing to do with speed

3) In carburetor lean mixture is required during
   a) Idling b) Starting c) Accelerating d) Cruising

4) Compared to 4 stroke engine, 2 stroke Engines are
   a) Are light in weight comparatively
   b) Are simple in construction
   c) Have uniform torque output at crankshaft
   d) All of the above

5) For same compression ratio and heat rejection Otto cycle efficiency with respect to diesel cycle efficiency is
   a) Greater b) Smaller c) Equal d) None of the above

6) The knocking in SI engines gets reduced
   a) By increasing the compression ratio
   b) By retarding the spark advance
   c) By increasing inlet air temperature
   d) By increasing the cooling water temperature

7) With increase in compression ratio flame speed
   a) Increases b) Decreases
   c) Remains the same d) None of the above

P.T.O.

8) For diesel engine the type of governing used is
   a) Quantity governing b) Quality governing
   c) Hit and mis governing d) None of the above

9) Open combustion chambers in CI engines require
   a) High injection pressures
   b) Accurate metering of fuel by the injection system
   c) Both (a) and (b)
   d) None of the above

10) In turbo charging air compressor is driven by
   a) Exhaust gas turbine b) Engine itself
   c) Separate electrical motor d) None of the above

11) The ratio of indicated thermal efficiency to the corresponding air standard cycle efficiency is called
   a) Net efficiency b) Efficiency ratio
   c) Relative efficiency d) Overall efficiency

12) Alcohols alone cannot be used in CI engines as
   a) Their self ignition temperature is high
   b) Latent heat of vaporization is low
   c) Both (a) and (b)
   d) None of the above

13) Decrease in air-fuel ratio in SI engine results in
   a) Increase of NOx b) Decrease of CO and UBHC
   c) Increase of CO and UBHC d) None of the above

14) Lead was added in gasoline for
   a) Reducing HC emissions b) Reducing knocking
   c) Reducing exhaust temperature d) Increase power output

15) Three way catalytic converters reduce emission of
   a) CO, CO_2 and HC b) CO, NOx and HC
   c) CO_2, NOx and HC d) CO, HC and soot

16) Modern heavy duty engines exhaust valves made of
   a) High carbon steel b) Cobalt alloy
   c) Nimonic alloys d) None of the above

17) Main advantage of Pintaux nozzle is
   a) Better cold starting performance b) Ability to distribute the fuel
   c) Good penetration d) Good atomization

18) Throttle valve controls the supply of
   a) Air only b) Fuel only
   c) Air-fuel mixture d) None of the above

19) The rotational speed of cam shaft with respect to crankshaft in 4 stroke engine
   a) Half b) Double c) Equal d) Four times

20) The choke valve is closed when engine is
   a) Accelerating b) Hot c) Cold d) Idling

SLR-EP – 80

Seat No.	

B.E. (Mechanical) (Part – I) (Old) Examination, 2016
INTERNAL COMBUSTION ENGINE

Day and Date : Saturday, 10-12-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer **any two** questions from **each** Section.*
*2) Assume suitable data **if** necessary.*
*3) Use of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Explain assumption made for fuel-air cycle analysis. **6**
   b) Explain valve timing diagram for four stroke engine, also discuss valve overlap. **6**
   c) Compare Diesel Cycle with Otto cycle. **8**

3. a) State and explain requirement of an air fuel ratio for petrol engine from no load to full load. **10**
   b) A petrol engine has carburetor of 32 mm ventury size, jet diameter 2 mm, pressure difference at throat is 50 mm of Hg, Atmospheric pressure is 1 bar and temperature is 27°C, coefficient of discharge for ventury is 0.85 and fuel jet 0.66, density of petrol is 740 kg/m^3, nozzle lip is zero. Neglect compressibility of air. Find : **10**
      i) Fuel velocity at throat
      ii) Fuel flow
      iii) Air velocity at throat
      iv) Air flow

4. a) Determine quantity of fuel to be injected per cycle per cylinder for a 6 cylinder 4 stroke diesel engine having bsfc 245 gm/kW.hr and developing 89 kW at 2500 rpm. Take specific gravity as 0.84. **6**
   b) List the advantages and limitations of supercharging. **6**
   c) Explain selection of I.C. Engine for power generation and agriculture application. **8**

Set S

SECTION – II

5. a) Discuss the different stages of combustion in SI engines with the help of a neat p-θ diagram. **6**

   b) Explain what you mean by physical delay and chemical delay period with respect to CI Engine combustion ? What are the factors affecting the delay period ? **6**

   c) Write short notes on : **8**
      1) HUCR
      2) Requirement of combustion chambers for SI Engines.

6. a) The bore and stroke of a water cooled, vertical single cylinder four stroke diesel engine are 80 mm and 110 mm respectively and the torque is 23.5 Nm. Calculate the brake mean effective pressure of the engine. **4**

   b) What are various methods of measurement of brake power ? Explain any two methods. **8**

   c) Write short notes on : **8**
      1) Turbo charging
      2) NOx emissions control.

7. a) Explain the suitability of alcohol as an alternative fuel and list the advantages and disadvantages of use of alcohol in IC engines. **6**

   b) What are the different pollutants emitted by the petrol engines ? State methods used to control these pollutants. **6**

   c) Write short notes on : **8**
      1) Heat balance sheet
      2) Variable valve timing.

SLR-EP – 81

Seat No.	

Set P

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
REFRIGERATION AND AIR-CONDITIONING (Old)

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) Psychrometry chart, refrigerant tables and charts, steam table are **allowed.***
*3) **Assume** suitable data **whenever** necessary, mention it **clearly**.*
*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 : 20

1. Choose the correct answer : **(1×20=20)**

1) In evaporative condenser, the condensation of refrigerant takes place by
A) evaporation of water B) fusion of water
C) solidification of water D) none of the above

2) Electrolux vapour absorption system is
A) single fluid B) two fluid
C) three fluid D) none of the above

3) Generally brine is used as
A) primary refrigerant B) secondary refrigerant
C) third refrigerant D) none of the above

4) Cascade refrigeration system uses
A) one refrigerant B) two refrigerant
C) three refrigerants D) four refrigerants

5) Which is the following comfort condition ?
A) 0°C DBT and 0% RH B) 100°C DBT and 100% RH
C) 10°C DBT and 10% RH D) 22°C DBT and 60% RH

6) The saturated air has
A) DBT < WBT B) DBT > WBT
C) DBT = WBT D) None of the above

P.T.O.

7) ERSH is equal to
A) RSH/RTH B) RLH/RTH C) RTH/RSH D) RTH/RLH

8) One ron of refrigeration is equal to
A) 3.5 kW B) 3 kW C) 2.5 kW D) 1.5 kW

9) Bypass of the cooling coil should be
A) low B) high
C) depends on application D) none of the above

10) In aqua-ammonia vapour absorption system, which is used as refrigerant
A) Aqua B) R22 C) water D) ammonia

11) In vapour refrigeration system, the capillary tube is placed between
A) compressor and condenser B) condenser and evaporator
C) evaporator and compressor D) none of the above

12) Thermostatic Expansion Valve (TEV) is preferred for
A) low capacity B) high capacity
C) never used D) none of the above

13) Joule Thomson coefficient for refrigeration is
A) = 0 B) > 0 C) < 0 D) none of the above

14) The required input to the steam jet refrigeration systems is in the form of
A) Mechanical energy B) Thermal energy
C) High pressure, motive steam D) Both mechanical and thermal energy

15) Air cycle refrigeration systems are most commonly used in
A) Domestic refrigerators B) Aircraft air conditioning systems
C) Cold storages D) Car air conditioning systems

16) In an air cycle refrigeration system, low temperatures are produced due to
A) Evaporation of liquid air B) Throttling of air
C) Expansion of air in turbine D) None of the above

17) During sensible heating, DBT
A) increases B) decreases
C) remains constant D) none of the above

18) In psychrometric chart, the vertical lines are of
A) DBT B) WBT C) DPT D) none of above

19) In a refrigeration cycle, the subcooling _____ COP.
A) decreases B) increases C) neutral D) none of above

20) The Bell-Colemann refrigeration cycle uses _____as the working fluid.
A) water B) CO_2 C) air D) R11

_____

SLR-EP – 81

Seat No.	

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
REFRIGERATION AND AIR-CONDITIONING (Old)

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) Psychrometry chart, refrigerant tables and charts, steam table are ***allowed.***
3) ***Assume*** *suitable data* ***whenever*** *necessary, mention it* ***clearly****.*

SECTION – I

2. a) Explain in detail vapour compression cycle. **6**
   b) With schematic and T-s plot describe Boot-strap aircraft refrigeration cycle. **6**
   c) Enumerate methods of refrigeration and explain any one. **8**
3. a) Explain cascade refrigeration cycle. **6**
   b) What is ODP and GWP ? **6**
   c) A simple saturation cycle using R22 is designed for a load of 35 kW cooling and works between 5°C evaporator and 40°C condenser temperature. **8**

   Calculate :

   i) mass flow of refrigerant in kg/min

   ii) power required.

Use the following table :

T_{sat}	P_{sat}	h_f	h_g	s_f	s_g
5	5.836	205.9	407.1	1.02115	1.7447
40	15.331	249.53	416.4	1.16659	1.6995

Take Cp of superheated vapour refrigerant at condenser pressure = 0.9 kJ/kgK.

4. Write a short note : **(5×4=20)**
   a) ASHRAE classification of refrigerants.
   b) DART (Dry Air Rated Temperature)
   c) Electrolux absorption refrigeration system.
   d) Subcooling vapour refrigeration system.

SECTION – II

5. a) Give types and uses of outlet diffusers, dampers used in air-conditioning system. **6**
   b) Draw and explain comfort chart. **6**
   c) A sample of air has DBT and WBT 35°C and 25°C respectively. The barometric pressure is 760 mm of Hg. Determine : **8**
      i) water vapour pressure ii) specific humidity
      iii) DPT iv) enthalphy

6. a) What is the economics of an air transmission system ? State the general rules which should be followed in the design of ducts. **6**
   b) Explain the terms : **6**
      i) Aspect ratio
      ii) Equivalent diameter
      iii) Throw
   c) Classify air-conditioning methods. Explain any one. **8**

7. Write a note on following : **(5×4=20)**
   a) Thermal exchange between human body and environment.
   b) Ventilation-its objective and requirement
   c) Summer air-conditioning
   d) Thermodynamic wet bulb temperature.

SLR-EP – 81

Seat No.	

Set Q

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
REFRIGERATION AND AIR-CONDITIONING (Old)

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
*2) Psychrometry chart, refrigerant tables and charts, steam table are **allowed.***
*3) **Assume** suitable data **whenever** necessary, mention it **clearly**.*
*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 : 20

1. Choose the correct answer : **(1×20=20)**

1) In an air cycle refrigeration system, low temperatures are produced due to
A) Evaporation of liquid air B) Throttling of air
C) Expansion of air in turbine D) None of the above

2) During sensible heating, DBT
A) increases B) decreases
C) remains constant D) none of the above

3) In psychrometric chart, the vertical lines are of
A) DBT B) WBT C) DPT D) none of above

4) In a refrigeration cycle, the subcooling _____ COP.
A) decreases B) increases C) neutral D) none of above

5) The Bell-Colemann refrigeration cycle uses _____as the working fluid.
A) water B) CO_2 C) air D) R11

6) In evaporative condenser, the condensation of refrigerant takes place by
A) evaporation of water B) fusion of water
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7) Electrolux vapour absorption system is
A) single fluid B) two fluid
C) three fluid D) none of the above

8) Generally brine is used as
A) primary refrigerant B) secondary refrigerant
C) third refrigerant D) none of the above

9) Cascade refrigeration system uses
A) one refrigerant B) two refrigerant
C) three refrigerants D) four refrigerants

10) Which is the following comfort condition ?
A) 0°C DBT and 0% RH B) 100°C DBT and 100% RH
C) 10°C DBT and 10% RH D) 22°C DBT and 60% RH

11) The saturated air has
A) DBT < WBT B) DBT > WBT
C) DBT = WBT D) None of the above

12) ERSH is equal to
A) RSH/RTH B) RLH/RTH C) RTH/RSH D) RTH/RLH

13) One ron of refrigeration is equal to
A) 3.5 kW B) 3 kW C) 2.5 kW D) 1.5 kW

14) Bypass of the cooling coil should be
A) low B) high
C) depends on application D) none of the above

15) In aqua-ammonia vapour absorption system, which is used as refrigerant
A) Aqua B) R22 C) water D) ammonia

16) In vapour refrigeration system, the capillary tube is placed between
A) compressor and condenser B) condenser and evaporator
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17) Thermostatic Expansion Valve (TEV) is preferred for
A) low capacity B) high capacity
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18) Joule Thomson coefficient for refrigeration is
A) = 0 B) > 0 C) < 0 D) none of the above

19) The required input to the steam jet refrigeration systems is in the form of
A) Mechanical energy B) Thermal energy
C) High pressure, motive steam D) Both mechanical and thermal energy

20) Air cycle refrigeration systems are most commonly used in
A) Domestic refrigerators B) Aircraft air conditioning systems
C) Cold storages D) Car air conditioning systems

SLR-EP – 81

Seat No.	

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
REFRIGERATION AND AIR-CONDITIONING (Old)

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) Psychrometry chart, refrigerant tables and charts, steam table are ***allowed.***
3) ***Assume*** *suitable data* ***whenever*** *necessary, mention it* ***clearly****.*

SECTION – I

2. a) Explain in detail vapour compression cycle. **6**
   b) With schematic and T-s plot describe Boot-strap aircraft refrigeration cycle. **6**
   c) Enumerate methods of refrigeration and explain any one. **8**
3. a) Explain cascade refrigeration cycle. **6**
   b) What is ODP and GWP ? **6**
   c) A simple saturation cycle using R22 is designed for a load of 35 kW cooling and works between 5°C evaporator and 40°C condenser temperature. **8**

   Calculate :

   i) mass flow of refrigerant in kg/min

   ii) power required.

Use the following table :

T_{sat}	P_{sat}	h_f	h_g	s_f	s_g
5	5.836	205.9	407.1	1.02115	1.7447
40	15.331	249.53	416.4	1.16659	1.6995

Take Cp of superheated vapour refrigerant at condenser pressure = 0.9 kJ/kgK.

4. Write a short note : **(5×4=20)**
   a) ASHRAE classification of refrigerants.
   b) DART (Dry Air Rated Temperature)
   c) Electrolux absorption refrigeration system.
   d) Subcooling vapour refrigeration system.

SECTION – II

5. a) Give types and uses of outlet diffusers, dampers used in air-conditioning system. **6**
   b) Draw and explain comfort chart. **6**
   c) A sample of air has DBT and WBT 35°C and 25°C respectively. The barometric pressure is 760 mm of Hg. Determine : **8**
      i) water vapour pressure ii) specific humidity
      iii) DPT iv) enthalphy

6. a) What is the economics of an air transmission system ? State the general rules which should be followed in the design of ducts. **6**
   b) Explain the terms : **6**
      i) Aspect ratio
      ii) Equivalent diameter
      iii) Throw
   c) Classify air-conditioning methods. Explain any one. **8**

7. Write a note on following : **(5×4=20)**
   a) Thermal exchange between human body and environment.
   b) Ventilation-its objective and requirement
   c) Summer air-conditioning
   d) Thermodynamic wet bulb temperature.

SLR-EP – 81

Seat No.	

Set R

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
REFRIGERATION AND AIR-CONDITIONING (Old)

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
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*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 : 20

1. Choose the correct answer : **(1×20=20)**

1) In vapour refrigeration system, the capillary tube is placed between
A) compressor and condenser B) condenser and evaporator
C) evaporator and compressor D) none of the above

2) Thermostatic Expansion Valve (TEV) is preferred for
A) low capacity B) high capacity
C) never used D) none of the above

3) Joule Thomson coefficient for refrigeration is
A) = 0 B) > 0 C) < 0 D) none of the above

4) The required input to the steam jet refrigeration systems is in the form of
A) Mechanical energy B) Thermal energy
C) High pressure, motive steam D) Both mechanical and thermal energy

5) Air cycle refrigeration systems are most commonly used in
A) Domestic refrigerators B) Aircraft air conditioning systems
C) Cold storages D) Car air conditioning systems

6) In an air cycle refrigeration system, low temperatures are produced due to
A) Evaporation of liquid air B) Throttling of air
C) Expansion of air in turbine D) None of the above

7) During sensible heating, DBT
   A) increases B) decreases
   C) remains constant D) none of the above

8) In psychrometric chart, the vertical lines are of
   A) DBT B) WBT C) DPT D) none of above

9) In a refrigeration cycle, the subcooling _____ COP.
   A) decreases B) increases C) neutral D) none of above

10) The Bell-Colemann refrigeration cycle uses _____as the working fluid.
   A) water B) CO_2 C) air D) R11

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   A) RSH/RTH B) RLH/RTH C) RTH/RSH D) RTH/RLH

18) One ron of refrigeration is equal to
   A) 3.5 kW B) 3 kW C) 2.5 kW D) 1.5 kW

19) Bypass of the cooling coil should be
   A) low B) high
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20) In aqua-ammonia vapour absorption system, which is used as refrigerant
   A) Aqua B) R22 C) water D) ammonia

_____

SLR-EP – 81

Seat No.	

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
REFRIGERATION AND AIR-CONDITIONING (Old)

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) Psychrometry chart, refrigerant tables and charts, steam table are ***allowed.***
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SECTION – I

2. a) Explain in detail vapour compression cycle. **6**
   b) With schematic and T-s plot describe Boot-strap aircraft refrigeration cycle. **6**
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   b) What is ODP and GWP ? **6**
   c) A simple saturation cycle using R22 is designed for a load of 35 kW cooling and works between 5°C evaporator and 40°C condenser temperature. **8**

   Calculate :

   i) mass flow of refrigerant in kg/min

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Use the following table :

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Take Cp of superheated vapour refrigerant at condenser pressure = 0.9 kJ/kgK.

4. Write a short note : **(5×4=20)**
   a) ASHRAE classification of refrigerants.
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SECTION – II

5. a) Give types and uses of outlet diffusers, dampers used in air-conditioning system. **6**
   b) Draw and explain comfort chart. **6**
   c) A sample of air has DBT and WBT 35°C and 25°C respectively. The barometric pressure is 760 mm of Hg. Determine : **8**
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      iii) DPT iv) enthalphy

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   b) Explain the terms : **6**
      i) Aspect ratio
      ii) Equivalent diameter
      iii) Throw
   c) Classify air-conditioning methods. Explain any one. **8**

7. Write a note on following : **(5×4=20)**
   a) Thermal exchange between human body and environment.
   b) Ventilation-its objective and requirement
   c) Summer air-conditioning
   d) Thermodynamic wet bulb temperature.

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SLR-EP – 81

Seat No.	

Set S

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
REFRIGERATION AND AIR-CONDITIONING (Old)

Day and Date : Monday, 21-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
*2) Psychrometry chart, refrigerant tables and charts, steam table are **allowed.***
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*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 : 20

1. Choose the correct answer : **(1×20=20)**

1) The saturated air has
A) DBT < WBT B) DBT > WBT
C) DBT = WBT D) None of the above

2) ERSH is equal to
A) RSH/RTH B) RLH/RTH C) RTH/RSH D) RTH/RLH

3) One ron of refrigeration is equal to
A) 3.5 kW B) 3 kW C) 2.5 kW D) 1.5 kW

4) Bypass of the cooling coil should be
A) low B) high
C) depends on application D) none of the above

5) In aqua-ammonia vapour absorption system, which is used as refrigerant
A) Aqua B) R22 C) water D) ammonia

6) In vapour refrigeration system, the capillary tube is placed between
A) compressor and condenser B) condenser and evaporator
C) evaporator and compressor D) none of the above

7) Thermostatic Expansion Valve (TEV) is preferred for
A) low capacity B) high capacity
C) never used D) none of the above

P.T.O.

8) Joule Thomson coefficient for refrigeration is
A) = 0 B) > 0 C) < 0 D) none of the above

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A) Mechanical energy B) Thermal energy
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A) Evaporation of liquid air B) Throttling of air
C) Expansion of air in turbine D) None of the above

12) During sensible heating, DBT
A) increases B) decreases
C) remains constant D) none of the above

13) In psychrometric chart, the vertical lines are of
A) DBT B) WBT C) DPT D) none of above

14) In a refrigeration cycle, the subcooling _____ COP.
A) decreases B) increases C) neutral D) none of above

15) The Bell-Colemann refrigeration cycle uses _____as the working fluid.
A) water B) CO_2 C) air D) R11

16) In evaporative condenser, the condensation of refrigerant takes place by
A) evaporation of water B) fusion of water
C) solidification of water D) none of the above

17) Electrolux vapour absorption system is
A) single fluid B) two fluid
C) three fluid D) none of the above

18) Generally brine is used as
A) primary refrigerant B) secondary refrigerant
C) third refrigerant D) none of the above

19) Cascade refrigeration system uses
A) one refrigerant B) two refrigerant
C) three refrigerants D) four refrigerants

20) Which is the following comfort condition ?
A) 0°C DBT and 0% RH B) 100°C DBT and 100% RH
C) 10°C DBT and 10% RH D) 22°C DBT and 60% RH

_____

SLR-EP – 81

Seat No.	

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
REFRIGERATION AND AIR-CONDITIONING (Old)

Day and Date : Monday, 21-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) Psychrometry chart, refrigerant tables and charts, steam table are ***allowed.***
3) ***Assume*** *suitable data* ***whenever*** *necessary, mention it* ***clearly****.*

SECTION – I

2. a) Explain in detail vapour compression cycle. **6**
   b) With schematic and T-s plot describe Boot-strap aircraft refrigeration cycle. **6**
   c) Enumerate methods of refrigeration and explain any one. **8**
3. a) Explain cascade refrigeration cycle. **6**
   b) What is ODP and GWP ? **6**
   c) A simple saturation cycle using R22 is designed for a load of 35 kW cooling and works between 5°C evaporator and 40°C condenser temperature. **8**

   Calculate :

   i) mass flow of refrigerant in kg/min

   ii) power required.

Use the following table :

T_{sat}	P_{sat}	h_f	h_g	s_f	s_g
5	5.836	205.9	407.1	1.02115	1.7447
40	15.331	249.53	416.4	1.16659	1.6995

Take Cp of superheated vapour refrigerant at condenser pressure = 0.9 kJ/kgK.

4. Write a short note : **(5×4=20)**
   a) ASHRAE classification of refrigerants.
   b) DART (Dry Air Rated Temperature)
   c) Electrolux absorption refrigeration system.
   d) Subcooling vapour refrigeration system.

SECTION – II

5. a) Give types and uses of outlet diffusers, dampers used in air-conditioning system. **6**
   b) Draw and explain comfort chart. **6**
   c) A sample of air has DBT and WBT 35°C and 25°C respectively. The barometric pressure is 760 mm of Hg. Determine : **8**
      i) water vapour pressure ii) specific humidity
      iii) DPT iv) enthalphy

6. a) What is the economics of an air transmission system ? State the general rules which should be followed in the design of ducts. **6**
   b) Explain the terms : **6**
      i) Aspect ratio
      ii) Equivalent diameter
      iii) Throw
   c) Classify air-conditioning methods. Explain any one. **8**

7. Write a note on following : **(5×4=20)**
   a) Thermal exchange between human body and environment.
   b) Ventilation-its objective and requirement
   c) Summer air-conditioning
   d) Thermodynamic wet bulb temperature.

SLR-EP – 82

Seat No.	

Set **P**

B.E. (Mech.) (Part – II) (Old) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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 : 20

1. Choose the correct answer : **(20×1=20)**

1) Entrepreneurial role, disturbance-handler role are _____ managerial roles.
A) Interpersonal B) Informational C) Decision D) Leading

2) _____ means the intentional structure of roles in a formally organized enterprise.
A) Informal organisation B) Policy
C) Formal organisation D) Code of conduct

3) _____ are distinct little businesses set up as units in a larger company to ensure that a certain product.
A) Business Small Units B) Strategic Business Units
C) Small Business Units D) Business Branches Units

4) Self-esteem, status affiliation with others, affection these comes under _____ needs.
A) Basic B) Primary C) Third level D) Secondary

5) _____Maslow regards this as the highest needs in his hierarchy.
A) Pysiological needs B) Safety needs
C) Need for self actualisation D) Acceptance needs

6) In _____ concept product enjoys the supreme importance.
A) selling B) marketing C) manufacturing D) business

7) _____ is the routes taken by the product/goods as they move from the organization/producer to the ultimate consumer or user.
A) Routing B) Channel of distribution
C) Path D) Delivery

8) The amount of working capital varies _____ with the use of credit.
A) Can't say B) Inversely C) 1 as to 2 D) Directly

9) _____ managers are the real "team manager" in grid type.
A) 1.9 B) 5.5 C) 9.1 D) 9.9

10) _____ funds are required to meet the working capital needs like investment in the inventories, debtors, bank balance, cash on hand, marketable security etc.
A) Long term B) Short term C) Middle term D) Fixed

11) In our country, _____ is the 'National Standards Body'.
A) NSB B) BIS C) NBS D) ISB

12) The costs associated with measuring, evaluating or auditing the product come under
A) Cost of appraisal B) Cost of prevention
C) Cost of internal failure D) Cost of external failure

13) The maximum number of allowable defective in a lot is called as
A) Acceptance number B) OK number
C) Rejection number D) Lot number

14) In a double sampling plan if the 1st sample is neither good enough nor bad enough then the decision on acceptance or rejection is based on the evidence of
A) Last two combined
B) First and last combined
C) First and second sample combined
D) First three combined

15) AOQ is given by the relation
A) P'.Pa (N – n/N) B) Pa.P' (n – N/N)
C) Pa.P' (n – N/n) D) Pa.P' (N – n/N)

16) LTPD stands for
A) Lot Tolerance Perfect Defective B) Lot Tolerance Percent Defective
C) Lot Tolerable Percent Defective D) Lot Tolerance Piece Defective

17) The probability of rejecting a good lot which otherwise would have been accepted is called as
A) Rework B) Consumer's risk
C) Producer's risk D) OK goods

18) The number of items in a lot is called as
A) Test quantity B) Sample size C) Batch size D) Lot size

19) Sampling inspection exerts more effective pressure on
A) Quality maintenance B) Production method
C) Quality improvement D) Quality systems

20) _____ is the process of evaluating a portion of the products in a lot for the purpose of accepting or rejecting the lot on the basis of conforming or nonconforming to the quality specifications.
A) Acceptance sampling B) Batch sampling
C) Quality checking D) Lot sampling

_____

SLR-EP – 82

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 22-11-2016 Marks : 80
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.*

SECTION – I

2. A) Write a note on industrial safety. **6**

   B) What are functions of marketing department ? Explain distribution and selling for domestic and industrial goods. **7**

3. A) What is planning ? Explain the steps in planning. **7**

   B) Explain various types of communications. **6**

4. A) Explain Maslow's theory and McGregor's theory. **8**

   B) What are the responsibilities of material manager ? What are objectives of material management department ? **6**

5. A) Explain decision making process with types of decision. **6**

   B) Explain the elements for performance appraisal. What are various methods of training managers ? **7**

SECTION – II

6. A) Name any four quality gurus and their contribution in quality. **7**

   B) Write a note on X – R chart. **6**

7. A) Explain cause and effect diagram, scatter diagram and pareto analysis. **7**

   B) Write note on continuous improvement process. **6**

Set P

8. A) Explain actual and ideal OC curve for a sampling plan. Also explain all concepts such as producer's risk, consumer's risk. AQL, LTPD, AOQL etc. **7**

   B) What are different clauses under ISO 9000 ? **6**

9. A) A manufacturer purchases small bolts in cartons that usually contains several thousands of bolts. Each shipment consist of a number of cartons. As a part of acceptance procedure for these bolts, 400 bolts are selected at random from each carton and are subjected to visual inspection for certain defect. In shipment of 10 cartons the respective percentage of defectives in the samples from each carton are 0, 0, 0.5, 0.75, 0, 2.0, 0.25, 0, 0.25 and 1.25. Does this shipment of bolts appear to exhibit statistical control with respect to the quality characteristics examined in the inspection ? **8**

   B) Write note on ISO 14000. **6**

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SLR-EP – 82

Seat No.	

Set **Q**

B.E. (Mech.) (Part – II) (Old) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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 : 20

1. Choose the correct answer : **(20×1=20)**

1) LTPD stands for
A) Lot Tolerance Perfect Defective B) Lot Tolerance Percent Defective
C) Lot Tolerable Percent Defective D) Lot Tolerance Piece Defective

2) The probability of rejecting a good lot which otherwise would have been accepted is called as
A) Rework B) Consumer's risk
C) Producer's risk D) OK goods

3) The number of items in a lot is called as
A) Test quantity B) Sample size C) Batch size D) Lot size

4) Sampling inspection exerts more effective pressure on
A) Quality maintenance B) Production method
C) Quality improvement D) Quality systems

5) _____ is the process of evaluating a portion of the products in a lot for the purpose of accepting or rejecting the lot on the basis of conforming or nonconforming to the quality specifications.
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6) Entrepreneurial role, disturbance-handler role are _____ managerial roles.
A) Interpersonal B) Informational C) Decision D) Leading

7) _____ means the intentional structure of roles in a formally organized enterprise.
A) Informal organisation B) Policy
C) Formal organisation D) Code of conduct

8) _____ are distinct little businesses set up as units in a larger company to ensure that a certain product.
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9) Self-esteem, status affiliation with others, affection these comes under _____ needs.
   A) Basic B) Primary C) Third level D) Secondary

10) _____Maslow regards this as the highest needs in his hierarchy.
   A) Pysiological needs B) Safety needs
   C) Need for self actualisation D) Acceptance needs

11) In _____ concept product enjoys the supreme importance.
   A) selling B) marketing C) manufacturing D) business

12) _____ is the routes taken by the product/goods as they move from the organization/producer to the ultimate consumer or user.
   A) Routing B) Channel of distribution
   C) Path D) Delivery

13) The amount of working capital varies _____ with the use of credit.
   A) Can't say B) Inversely C) 1 as to 2 D) Directly

14) _____ managers are the real "team manager" in grid type.
   A) 1.9 B) 5.5 C) 9.1 D) 9.9

15) _____ funds are required to meet the working capital needs like investment in the inventories, debtors, bank balance, cash on hand, marketable security etc.
   A) Long term B) Short term C) Middle term D) Fixed

16) In our country, _____ is the 'National Standards Body'.
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   A) Cost of appraisal B) Cost of prevention
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   A) Acceptance number B) OK number
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19) In a double sampling plan if the 1st sample is neither good enough nor bad enough then the decision on acceptance or rejection is based on the evidence of
   A) Last two combined
   B) First and last combined
   C) First and second sample combined
   D) First three combined

20) AOQ is given by the relation
   A) P'.Pa (N – n/N) B) Pa.P' (n – N/N)
   C) Pa.P' (n – N/n) D) Pa.P' (N – n/N)

Set Q

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SLR-EP – 82

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 22-11-2016 Marks : 80
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.*

SECTION – I

2. A) Write a note on industrial safety. **6**

   B) What are functions of marketing department ? Explain distribution and selling for domestic and industrial goods. **7**

3. A) What is planning ? Explain the steps in planning. **7**

   B) Explain various types of communications. **6**

4. A) Explain Maslow's theory and McGregor's theory. **8**

   B) What are the responsibilities of material manager ? What are objectives of material management department ? **6**

5. A) Explain decision making process with types of decision. **6**

   B) Explain the elements for performance appraisal. What are various methods of training managers ? **7**

SECTION – II

6. A) Name any four quality gurus and their contribution in quality. **7**

   B) Write a note on X – R chart. **6**

7. A) Explain cause and effect diagram, scatter diagram and pareto analysis. **7**

   B) Write note on continuous improvement process. **6**

Set Q

8. A) Explain actual and ideal OC curve for a sampling plan. Also explain all concepts such as producer's risk, consumer's risk. AQL, LTPD, AOQL etc. **7**

   B) What are different clauses under ISO 9000 ? **6**

9. A) A manufacturer purchases small bolts in cartons that usually contains several thousands of bolts. Each shipment consist of a number of cartons. As a part of acceptance procedure for these bolts, 400 bolts are selected at random from each carton and are subjected to visual inspection for certain defect. In shipment of 10 cartons the respective percentage of defectives in the samples from each carton are 0, 0, 0.5, 0.75, 0, 2.0, 0.25, 0, 0.25 and 1.25. Does this shipment of bolts appear to exhibit statistical control with respect to the quality characteristics examined in the inspection ? **8**

   B) Write note on ISO 14000. **6**

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SLR-EP – 82

Seat No.	

Set **R**

B.E. (Mech.) (Part – II) (Old) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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 : 20

1. Choose the correct answer : **(20×1=20)**

1) In our country, _____ is the 'National Standards Body'.
A) NSB B) BIS C) NBS D) ISB

2) The costs associated with measuring, evaluating or auditing the product come under
A) Cost of appraisal B) Cost of prevention
C) Cost of internal failure D) Cost of external failure

3) The maximum number of allowable defective in a lot is called as
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C) Rejection number D) Lot number

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A) Last two combined
B) First and last combined
C) First and second sample combined
D) First three combined

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A) P'.Pa (N – n/N) B) Pa.P' (n – N/N)
C) Pa.P' (n – N/n) D) Pa.P' (N – n/N)

6) LTPD stands for
A) Lot Tolerance Perfect Defective B) Lot Tolerance Percent Defective
C) Lot Tolerable Percent Defective D) Lot Tolerance Piece Defective

7) The probability of rejecting a good lot which otherwise would have been accepted is called as
A) Rework B) Consumer's risk
C) Producer's risk D) OK goods

P.T.O.

8) The number of items in a lot is called as
A) Test quantity B) Sample size C) Batch size D) Lot size

9) Sampling inspection exerts more effective pressure on
A) Quality maintenance B) Production method
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10) _____ is the process of evaluating a portion of the products in a lot for the purpose of accepting or rejecting the lot on the basis of conforming or nonconforming to the quality specifications.
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12) _____ means the intentional structure of roles in a formally organized enterprise.
A) Informal organisation B) Policy
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13) _____ are distinct little businesses set up as units in a larger company to ensure that a certain product.
A) Business Small Units B) Strategic Business Units
C) Small Business Units D) Business Branches Units

14) Self-esteem, status affiliation with others, affection these comes under _____ needs.
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15) _____Maslow regards this as the highest needs in his hierarchy.
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16) In _____ concept product enjoys the supreme importance.
A) selling B) marketing C) manufacturing D) business

17) _____ is the routes taken by the product/goods as they move from the organization/producer to the ultimate consumer or user.
A) Routing B) Channel of distribution
C) Path D) Delivery

18) The amount of working capital varies _____ with the use of credit.
A) Can't say B) Inversely C) 1 as to 2 D) Directly

19) _____ managers are the real "team manager" in grid type.
A) 1.9 B) 5.5 C) 9.1 D) 9.9

20) _____ funds are required to meet the working capital needs like investment in the inventories, debtors, bank balance, cash on hand, marketable security etc.
A) Long term B) Short term C) Middle term D) Fixed

SLR-EP – 82

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 22-11-2016 Marks : 80
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.*

SECTION – I

2. A) Write a note on industrial safety. **6**

   B) What are functions of marketing department ? Explain distribution and selling for domestic and industrial goods. **7**

3. A) What is planning ? Explain the steps in planning. **7**

   B) Explain various types of communications. **6**

4. A) Explain Maslow's theory and McGregor's theory. **8**

   B) What are the responsibilities of material manager ? What are objectives of material management department ? **6**

5. A) Explain decision making process with types of decision. **6**

   B) Explain the elements for performance appraisal. What are various methods of training managers ? **7**

SECTION – II

6. A) Name any four quality gurus and their contribution in quality. **7**

   B) Write a note on X – R chart. **6**

7. A) Explain cause and effect diagram, scatter diagram and pareto analysis. **7**

   B) Write note on continuous improvement process. **6**

Set R

8. A) Explain actual and ideal OC curve for a sampling plan. Also explain all concepts such as producer's risk, consumer's risk. AQL, LTPD, AOQL etc. **7**

   B) What are different clauses under ISO 9000 ? **6**

9. A) A manufacturer purchases small bolts in cartons that usually contains several thousands of bolts. Each shipment consist of a number of cartons. As a part of acceptance procedure for these bolts, 400 bolts are selected at random from each carton and are subjected to visual inspection for certain defect. In shipment of 10 cartons the respective percentage of defectives in the samples from each carton are 0, 0, 0.5, 0.75, 0, 2.0, 0.25, 0, 0.25 and 1.25. Does this shipment of bolts appear to exhibit statistical control with respect to the quality characteristics examined in the inspection ? **8**

   B) Write note on ISO 14000. **6**

———————

SLR-EP – 82

Seat No.	

Set **S**

B.E. (Mech.) (Part – II) (Old) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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 : 20

1. Choose the correct answer : **(20×1=20)**

1) In _____ concept product enjoys the supreme importance.
A) selling B) marketing C) manufacturing D) business

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A) Cost of appraisal B) Cost of prevention
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A) Acceptance number B) OK number
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   C) Lot Tolerable Percent Defective D) Lot Tolerance Piece Defective

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   A) Pysiological needs B) Safety needs
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_____

SLR-EP – 82

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 22-11-2016 Marks : 80
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.*

SECTION – I

2. A) Write a note on industrial safety. **6**

   B) What are functions of marketing department ? Explain distribution and selling for domestic and industrial goods. **7**

3. A) What is planning ? Explain the steps in planning. **7**

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SECTION – II

6. A) Name any four quality gurus and their contribution in quality. **7**

   B) Write a note on X – R chart. **6**

7. A) Explain cause and effect diagram, scatter diagram and pareto analysis. **7**

   B) Write note on continuous improvement process. **6**

Set S

8. A) Explain actual and ideal OC curve for a sampling plan. Also explain all concepts such as producer's risk, consumer's risk. AQL, LTPD, AOQL etc. **7**

   B) What are different clauses under ISO 9000 ? **6**

9. A) A manufacturer purchases small bolts in cartons that usually contains several thousands of bolts. Each shipment consist of a number of cartons. As a part of acceptance procedure for these bolts, 400 bolts are selected at random from each carton and are subjected to visual inspection for certain defect. In shipment of 10 cartons the respective percentage of defectives in the samples from each carton are 0, 0, 0.5, 0.75, 0, 2.0, 0.25, 0, 0.25 and 1.25. Does this shipment of bolts appear to exhibit statistical control with respect to the quality characteristics examined in the inspection ? **8**

   B) Write note on ISO 14000. **6**

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Seat No.	

Set P

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
MECHATRONICS

Day and Date : Wednesday, 23-11-2016 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.***
*3) Q. **1** contains multiple choice type questions. Select the most appropriate answer.*
*4) Answer **any two** questions from **each** Section.*
*5) Use of Scientific calculator is **allowed**.*
*6) Assume **suitable** data if necessary and state it **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**
   1) In signal conditioning signal processor performs the function
      a) Controlling b) Regulation c) Amplification d) Recording
   2) In this proximity sensor, as target approaches the face of the sensor, oscillator amplitude
      a) Decreases b) Increases c) Remains same d) None of these
   3) The properties of an ideal Op Amp are
      a) It should have zero input impedance
      b) It should have high input impedance
      c) It should have zero open loop gain
      d) It should have very low gain
   4) In NC machine for positioning of work table following motor is used
      a) AC motor b) DC motor c) Stepper motor d) AC and DC
   5) The most commonly used crystal frequency for 8051 microcontroller
      a) 12 MHz b) 9 MHz c) 7 MHz d) 15 MHz
   6) Decimal equivalent of the binary number $(11111)_2$ is
      a) $(30)_{10}$ b) $(31)_{10}$ c) $(40)_{10}$ d) $(42)_{10}$
   7) This network topology is used in telephone system
      a) Tree b) Star c) Ring d) Bus
   8) A relay consist of
      a) Inverter b) Coil and iron core
      c) Feed back analyser d) None of the above

P.T.O.

9) In PLC, internal relays are used for
   a) Sequencing of output
   b) Latching of output
   c) Preparation of ladder diagram
   d) Programs with multiple input conditions
10) In microcontroller the function of the ALE pin
   a) Read signal pin external memory
   b) Provide output pulse for latching lower order of the address during access to external memory
   c) Reset the microcontroller
   d) All the above
11) EEPROM memory data can be erased by
   a) Using ultraviolet rays
   b) Applying relatively high voltage
   c) Using PSEN pin
   d) None of the above
12) Interfacing is required for
   a) Code conversion
   b) Data acquisition
   c) Fault finding
   d) (b) and (c)
13) PLC program is written in
   a) PLC diagram
   b) Multiplexure diagram
   c) Ladder diagram
   d) None of the above
14) Protocol governs
   a) Memory of data
   b) Sinking of output
   c) Inversion of data
   d) Data format
15) Wheatstone bridge can be used
   a) To convert voltage change to resistance change
   b) To convert current change to temperature change
   c) To convert electrical resistance change to voltage change
   d) None of the above
16) Squirrel cage induction motor is
   a) DC motor b) AC motor c) Stepper motor d) AC and DC
17) Octal equilvalent of decimal number $(0.6875)_{10}$ is
   a) $(0.55)_8$ b) $(0.53)_8$ c) $(0.54)_8$ d) $(0.56)_8$
18) In distributed communication system
   a) Hierarchy of computer according to the task they are carried out
   b) Each computer system carries out similar task to all other computer system
   c) Central computer control the entire plant
   d) None of the above
19) Karnaugh map is used
   a) To obtain the truth table
   b) To convert code
   c) To produce simplified Boolean expression
   d) To obtain various graphs
20) In LVDT, output voltage is proportional to
   a) Linear voltage
   b) Torque
   c) Linear displacement
   d) Temperature

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Seat No.	

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
MECHATRONICS

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two full*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate marks.*
3) Assume ***suitable*** *data if necessary and state it* ***clearly****.*
4) Use of Scientific calculator is ***allowed****.*

SECTION – I

2. a) Define mechatronics. Explain microprocessor based engine management system with a neat sketch. **8**
   b) Discuss the general classification of sensors. **6**
   c) Why signal conditioning is required ? Explain different types of filters. **6**

3. a) Discuss the construction and working of AC motors. List its advantages, limitations and applications. **8**
   b) Discuss the architecture of 8085 microprocessor with a neat sketch. **6**
   c) Explain the working of relay with a neat sketch. Also briefly explain about gear train types. **6**

4. Write short notes on **any four** : **(4×5=20)**
   a) ADCs and DACs
   b) Registers
   c) Karnaugh maps
   d) Hydraulic actuators
   e) Data acquisition system.

SECTION – II

5. a) Explain with correct schematic 8051 based washing machine controller. **8**
   b) Discuss with neat sketch, architecture of programmable logic controller. **6**
   c) Discuss the OSI model for intercommunication. **6**

6. a) Explain mechatronic control in automated manufacturing. **8**

   b) Draw a ladder diagram for a circuit that could be used with conveyor belt which is used to move an item to a work station. The presence of item at the work station is detected by means of a breaking contact activated by means of a beam of light to a photo sensor. There are items stops for 100 s for an operation to be carried out before moving on and off conveyor. The motor for the belt is started by a normally open start switch and stopped by a normally closed switch. **6**

   c) Discuss various network topologies. **6**

7. Write short notes on (**any four**) : **(4×5=20)**

   a) Sensor based condition monitoring

   b) PLC input and output

   c) Micro sensors in mechatronics

   d) Fuzzy logic

   e) Communication protocols.

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SLR-EP – 83

Seat No.	

Set Q

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
MECHATRONICS

Day and Date : Wednesday, 23-11-2016 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.***
*3) Q. **1** contains multiple choice type questions. Select the most appropriate answer.*
*4) Answer **any two** questions from **each** Section.*
*5) Use of Scientific calculator is **allowed**.*
*6) Assume **suitable** data if necessary and state it **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**
   1) Squirrel cage induction motor is
      a) DC motor b) AC motor c) Stepper motor d) AC and DC
   2) Octal equilvalent of decimal number $(0.6875)_{10}$ is
      a) $(0.55)_8$ b) $(0.53)_8$ c) $(0.54)_8$ d) $(0.56)_8$
   3) In distributed communication system
      a) Hierarchy of computer according to the task they are carried out
      b) Each computer system carries out similar task to all other computer system
      c) Central computer control the entire plant
      d) None of the above
   4) Karnaugh map is used
      a) To obtain the truth table
      b) To convert code
      c) To produce simplified Boolean expression
      d) To obtain various graphs
   5) In LVDT, output voltage is proportional to
      a) Linear voltage b) Torque
      c) Linear displacement d) Temperature
   6) In signal conditioning signal processor performs the function
      a) Controlling b) Regulation c) Amplification d) Recording

P.T.O.

7) In this proximity sensor, as target approaches the face of the sensor, oscillator amplitude
   a) Decreases b) Increases c) Remains same d) None of these
8) The properties of an ideal Op Amp are
   a) It should have zero input impedance
   b) It should have high input impedance
   c) It should have zero open loop gain
   d) It should have very low gain
9) In NC machine for positioning of work table following motor is used
   a) AC motor b) DC motor c) Stepper motor d) AC and DC
10) The most commonly used crystal frequency for 8051 microcontroller
   a) 12 MHz b) 9 MHz c) 7 MHz d) 15 MHz
11) Decimal equivalent of the binary number $(11111)_2$ is
   a) $(30)_{10}$ b) $(31)_{10}$ c) $(40)_{10}$ d) $(42)_{10}$
12) This network topology is used in telephone system
   a) Tree b) Star c) Ring d) Bus
13) A relay consist of
   a) Inverter b) Coil and iron core
   c) Feed back analyser d) None of the above
14) In PLC, internal relays are used for
   a) Sequencing of output b) Latching of output
   c) Preparation of ladder diagram d) Programs with multiple input conditions
15) In microcontroller the function of the ALE pin
   a) Read signal pin external memory
   b) Provide output pulse for latching lower order of the address during access to external memory
   c) Reset the microcontroller
   d) All the above
16) EEPROM memory data can be erased by
   a) Using ultraviolet rays b) Applying relatively high voltage
   c) Using PSEN pin d) None of the above
17) Interfacing is required for
   a) Code conversion b) Data acquisition
   c) Fault finding d) (b) and (c)
18) PLC program is written in
   a) PLC diagram b) Multiplexure diagram
   c) Ladder diagram d) None of the above
19) Protocol governs
   a) Memory of data b) Sinking of output
   c) Inversion of data d) Data format
20) Wheatstone bridge can be used
   a) To convert voltage change to resistance change
   b) To convert current change to temperature change
   c) To convert electrical resistance change to voltage change
   d) None of the above

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Seat No.	

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
MECHATRONICS

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two full*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate marks.*
3) Assume ***suitable*** *data if necessary and state it* ***clearly****.*
4) Use of Scientific calculator is ***allowed****.*

SECTION – I

2. a) Define mechatronics. Explain microprocessor based engine management system with a neat sketch. **8**
   b) Discuss the general classification of sensors. **6**
   c) Why signal conditioning is required ? Explain different types of filters. **6**

3. a) Discuss the construction and working of AC motors. List its advantages, limitations and applications. **8**
   b) Discuss the architecture of 8085 microprocessor with a neat sketch. **6**
   c) Explain the working of relay with a neat sketch. Also briefly explain about gear train types. **6**

4. Write short notes on **any four** : **(4×5=20)**
   a) ADCs and DACs
   b) Registers
   c) Karnaugh maps
   d) Hydraulic actuators
   e) Data acquisition system.

SECTION – II

5. a) Explain with correct schematic 8051 based washing machine controller. **8**
   b) Discuss with neat sketch, architecture of programmable logic controller. **6**
   c) Discuss the OSI model for intercommunication. **6**

6. a) Explain mechatronic control in automated manufacturing. **8**

   b) Draw a ladder diagram for a circuit that could be used with conveyor belt which is used to move an item to a work station. The presence of item at the work station is detected by means of a breaking contact activated by means of a beam of light to a photo sensor. There are items stops for 100 s for an operation to be carried out before moving on and off conveyor. The motor for the belt is started by a normally open start switch and stopped by a normally closed switch. **6**

   c) Discuss various network topologies. **6**

7. Write short notes on (**any four**) : **(4×5=20)**

   a) Sensor based condition monitoring

   b) PLC input and output

   c) Micro sensors in mechatronics

   d) Fuzzy logic

   e) Communication protocols.

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Seat No.	

SLR-EP – 83

Set **R**

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
MECHATRONICS

Day and Date : Wednesday, 23-11-2016 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.***
*3) Q. **1** contains multiple choice type questions. Select the most appropriate answer.*
*4) Answer **any two** questions from **each** Section.*
*5) Use of Scientific calculator is **allowed**.*
*6) Assume **suitable** data if necessary and state it **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**
   1) EEPROM memory data can be erased by
      a) Using ultraviolet rays b) Applying relatively high voltage
      c) Using PSEN pin d) None of the above
   2) Interfacing is required for
      a) Code conversion b) Data acquisition
      c) Fault finding d) (b) and (c)
   3) PLC program is written in
      a) PLC diagram b) Multiplexure diagram
      c) Ladder diagram d) None of the above
   4) Protocol governs
      a) Memory of data b) Sinking of output
      c) Inversion of data d) Data format
   5) Wheatstone bridge can be used
      a) To convert voltage change to resistance change
      b) To convert current change to temperature change
      c) To convert electrical resistance change to voltage change
      d) None of the above
   6) Squirrel cage induction motor is
      a) DC motor b) AC motor c) Stepper motor d) AC and DC
   7) Octal equilvalent of decimal number $(0.6875)_{10}$ is
      a) $(0.55)_8$ b) $(0.53)_8$ c) $(0.54)_8$ d) $(0.56)_8$

P.T.O.

8) In distributed communication system
   a) Hierarchy of computer according to the task they are carried out
   b) Each computer system carries out similar task to all other computer system
   c) Central computer control the entire plant
   d) None of the above
9) Karnaugh map is used
   a) To obtain the truth table
   b) To convert code
   c) To produce simplified Boolean expression
   d) To obtain various graphs
10) In LVDT, output voltage is proportional to
   a) Linear voltage b) Torque
   c) Linear displacement d) Temperature
11) In signal conditioning signal processor performs the function
   a) Controlling b) Regulation c) Amplification d) Recording
12) In this proximity sensor, as target approaches the face of the sensor, oscillator amplitude
   a) Decreases b) Increases c) Remains same d) None of these
13) The properties of an ideal Op Amp are
   a) It should have zero input impedance
   b) It should have high input impedance
   c) It should have zero open loop gain
   d) It should have very low gain
14) In NC machine for positioning of work table following motor is used
   a) AC motor b) DC motor c) Stepper motor d) AC and DC
15) The most commonly used crystal frequency for 8051 microcontroller
   a) 12 MHz b) 9 MHz c) 7 MHz d) 15 MHz
16) Decimal equivalent of the binary number $(11111)_2$ is
   a) $(30)_{10}$ b) $(31)_{10}$ c) $(40)_{10}$ d) $(42)_{10}$
17) This network topology is used in telephone system
   a) Tree b) Star c) Ring d) Bus
18) A relay consist of
   a) Inverter b) Coil and iron core
   c) Feed back analyser d) None of the above
19) In PLC, internal relays are used for
   a) Sequencing of output b) Latching of output
   c) Preparation of ladder diagram d) Programs with multiple input conditions
20) In microcontroller the function of the ALE pin
   a) Read signal pin external memory
   b) Provide output pulse for latching lower order of the address during access to external memory
   c) Reset the microcontroller
   d) All the above

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Seat No.	

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
MECHATRONICS

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two full*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate marks.*
3) Assume ***suitable*** *data if necessary and state it* ***clearly****.*
4) Use of Scientific calculator is ***allowed****.*

SECTION – I

2. a) Define mechatronics. Explain microprocessor based engine management system with a neat sketch. **8**
   b) Discuss the general classification of sensors. **6**
   c) Why signal conditioning is required ? Explain different types of filters. **6**

3. a) Discuss the construction and working of AC motors. List its advantages, limitations and applications. **8**
   b) Discuss the architecture of 8085 microprocessor with a neat sketch. **6**
   c) Explain the working of relay with a neat sketch. Also briefly explain about gear train types. **6**

4. Write short notes on **any four** : **(4×5=20)**
   a) ADCs and DACs
   b) Registers
   c) Karnaugh maps
   d) Hydraulic actuators
   e) Data acquisition system.

SECTION – II

5. a) Explain with correct schematic 8051 based washing machine controller. **8**
   b) Discuss with neat sketch, architecture of programmable logic controller. **6**
   c) Discuss the OSI model for intercommunication. **6**

Set R

6. a) Explain mechatronic control in automated manufacturing. **8**

   b) Draw a ladder diagram for a circuit that could be used with conveyor belt which is used to move an item to a work station. The presence of item at the work station is detected by means of a breaking contact activated by means of a beam of light to a photo sensor. There are items stops for 100 s for an operation to be carried out before moving on and off conveyor. The motor for the belt is started by a normally open start switch and stopped by a normally closed switch. **6**

   c) Discuss various network topologies. **6**

7. Write short notes on (**any four**) : **(4×5=20)**

   a) Sensor based condition monitoring

   b) PLC input and output

   c) Micro sensors in mechatronics

   d) Fuzzy logic

   e) Communication protocols.

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SLR-EP – 83

Seat No.	

Set S

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
MECHATRONICS

Day and Date : Wednesday, 23-11-2016 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.***
*3) Q. **1** contains multiple choice type questions. Select the most appropriate answer.*
*4) Answer **any two** questions from **each** Section.*
*5) Use of Scientific calculator is **allowed**.*
*6) Assume **suitable** data if necessary and state it **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**
   1) Decimal equivalent of the binary number $(11111)_2$ is
      a) $(30)_{10}$ b) $(31)_{10}$ c) $(40)_{10}$ d) $(42)_{10}$
   2) This network topology is used in telephone system
      a) Tree b) Star c) Ring d) Bus
   3) A relay consist of
      a) Inverter b) Coil and iron core
      c) Feed back analyser d) None of the above
   4) In PLC, internal relays are used for
      a) Sequencing of output b) Latching of output
      c) Preparation of ladder diagram d) Programs with multiple input conditions
   5) In microcontroller the function of the ALE pin
      a) Read signal pin external memory
      b) Provide output pulse for latching lower order of the address during access to external memory
      c) Reset the microcontroller
      d) All the above
   6) EEPROM memory data can be erased by
      a) Using ultraviolet rays b) Applying relatively high voltage
      c) Using PSEN pin d) None of the above
   7) Interfacing is required for
      a) Code conversion b) Data acquisition
      c) Fault finding d) (b) and (c)

P.T.O.

8) PLC program is written in
   a) PLC diagram b) Multiplexure diagram
   c) Ladder diagram d) None of the above
9) Protocol governs
   a) Memory of data b) Sinking of output
   c) Inversion of data d) Data format
10) Wheatstone bridge can be used
   a) To convert voltage change to resistance change
   b) To convert current change to temperature change
   c) To convert electrical resistance change to voltage change
   d) None of the above
11) Squirrel cage induction motor is
   a) DC motor b) AC motor c) Stepper motor d) AC and DC
12) Octal equilvalent of decimal number $(0.6875)_{10}$ is
   a) $(0.55)_8$ b) $(0.53)_8$ c) $(0.54)_8$ d) $(0.56)_8$
13) In distributed communication system
   a) Hierarchy of computer according to the task they are carried out
   b) Each computer system carries out similar task to all other computer system
   c) Central computer control the entire plant
   d) None of the above
14) Karnaugh map is used
   a) To obtain the truth table
   b) To convert code
   c) To produce simplified Boolean expression
   d) To obtain various graphs
15) In LVDT, output voltage is proportional to
   a) Linear voltage b) Torque
   c) Linear displacement d) Temperature
16) In signal conditioning signal processor performs the function
   a) Controlling b) Regulation c) Amplification d) Recording
17) In this proximity sensor, as target approaches the face of the sensor, oscillator amplitude
   a) Decreases b) Increases c) Remains same d) None of these
18) The properties of an ideal Op Amp are
   a) It should have zero input impedance
   b) It should have high input impedance
   c) It should have zero open loop gain
   d) It should have very low gain
19) In NC machine for positioning of work table following motor is used
   a) AC motor b) DC motor c) Stepper motor d) AC and DC
20) The most commonly used crystal frequency for 8051 microcontroller
   a) 12 MHz b) 9 MHz c) 7 MHz d) 15 MHz

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Seat No.	

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
MECHATRONICS

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two full*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate marks.*
3) Assume ***suitable*** *data if necessary and state it* ***clearly****.*
4) Use of Scientific calculator is ***allowed****.*

SECTION – I

2. a) Define mechatronics. Explain microprocessor based engine management system with a neat sketch. **8**
   b) Discuss the general classification of sensors. **6**
   c) Why signal conditioning is required ? Explain different types of filters. **6**

3. a) Discuss the construction and working of AC motors. List its advantages, limitations and applications. **8**
   b) Discuss the architecture of 8085 microprocessor with a neat sketch. **6**
   c) Explain the working of relay with a neat sketch. Also briefly explain about gear train types. **6**

4. Write short notes on **any four** : **(4×5=20)**
   a) ADCs and DACs
   b) Registers
   c) Karnaugh maps
   d) Hydraulic actuators
   e) Data acquisition system.

SECTION – II

5. a) Explain with correct schematic 8051 based washing machine controller. **8**
   b) Discuss with neat sketch, architecture of programmable logic controller. **6**
   c) Discuss the OSI model for intercommunication. **6**

Set S

6. a) Explain mechatronic control in automated manufacturing. **8**

   b) Draw a ladder diagram for a circuit that could be used with conveyor belt which is used to move an item to a work station. The presence of item at the work station is detected by means of a breaking contact activated by means of a beam of light to a photo sensor. There are items stops for 100 s for an operation to be carried out before moving on and off conveyor. The motor for the belt is started by a normally open start switch and stopped by a normally closed switch. **6**

   c) Discuss various network topologies. **6**

7. Write short notes on (**any four**) : **(4×5=20)**

   a) Sensor based condition monitoring

   b) PLC input and output

   c) Micro sensors in mechatronics

   d) Fuzzy logic

   e) Communication protocols.

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SLR-EP – 85

Seat No.	

Set **P**

B.E. (Mech.) (Part – II) (New) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Monday, 21-11-2016 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.***
3) Figures to the ***right*** *indicate* ***full*** *marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) _____ involves selecting missions and objectives and the actions to achieve them.
A) Planning B) Mission C) Strategy D) Goals

2) _____ is defined as "the discipline dealing with what is good and bad and with moral duty and obligation".
A) Rule B) Organisation culture
C) Protocol D) Ethics

3) In the _____ interview, the manager follows an interview guide but may also ask other questions.
A) Structured B) Standard C) Directional D) Semi structured

4) _____ attempts to make a job more varied by removing the dullness associated with performing repetitive operations.
A) Job enlargement B) Job enrichment
C) Continuous improvement D) Job rotation

5) Figurehead role, leader role, liaison role are _____ managerial roles.
A) Interpersonal B) Informational C) Decision D) Leading

6) Theory _____ is pessimistic, static and rigid.
A) Y B) X C) Maslow's D) Z

7) _____ refers to an individual's subjective judgement about the fairness of rewards she or he got, relative to the inputs, in comparison with reward of other.
A) All theories B) Maslow's theory
C) X and Y theory D) Equity theory

8) If _____, then this could results in frustration of subordinates.
A) Authority > Responsibility B) Authority < Responsibility
C) Power = Responsibility D) Power > Authority

9) Machinery, material handling equipment, Tools, jigs, fixtures comes under
   A) Working capital B) Machinery capital
   C) Fixed capital D) Variable capital

10) _____ funds are required to meet the working capital needs like investment in the inventories, debtors, bank balance, cash on hand, marketable security etc.
   A) Long term B) Middle term C) Short term D) Fixed

11) _____ is the process of evaluating a portion of the products in a lot for the purpose of accepting or rejecting the lot on the basis of conforming or nonconforming to the quality specifications.
   A) Acceptance sampling B) Batch sampling
   C) Quality checking D) Lot sampling

12) In a sampling plan $N = 500$, $n_1 = 10$, $n_2 = 8$, $c_1 = 1$, $c_2 = 4$, if the number of defectives in the 1^{st} sample are 3, then the decision will be
   A) No rejection B) Take a second sample and inspect
   C) Go with production D) Lot ok

13) The producer can decrease his risk by submitting the lots of
   A) Same as AQL B) Better than AQL
   C) Less than AQL D) Only AQL

14) The producers risk is denoted by
   A) ρ B) β C) α D) δ

15) The quality of design is concerned with the _____ for the manufacture of the product.
   A) Exactness of specification B) Fitness of specification
   C) Correctness of specification D) Tightness of specification

16) The larger the sample size and acceptance number _____ is the slope of OC curve.
   A) Straight B) Curve C) Steeper D) Horizontal

17) The success of sampling inspection depends upon
   A) Lot size B) Sample size
   C) Acceptance number D) All

18) The maximum number of allowable defective in a lot is called as
   A) Acceptance number B) OK number
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19) LTPD stands for
   A) Lot Tolerance Perfect Defective B) Lot Tolerable Percent Defective
   C) Lot Tolerance Percent Defective D) Lot Tolerance Piece Defective

20) AOQ stands for
   A) Average Outgoing Quality B) Additional Outgoing Quality
   C) Average Outward Quality D) Advanced Outgoing Quality

_____

SLR-EP – 85

Seat No.	

B.E. (Mech.) (Part – II) (New) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Monday, 21-11-2016 Marks : 80
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.*

SECTION – I

2. A) Explain the functions of management. **6**
   B) Explain ethics in management. **7**

3. A) What is decision making ? Elaborate. **6**
   B) Explain selection process. **7**

4. A) Write a note on Maslow and X-Y theory of motivation. **8**
   B) What is communication and what are barriers in communications ? **6**

5. A) Explain material management. **6**
   B) Explain channels of distribution system for industrial and consumer good. **7**

SECTION – II

6. a) Name any three quality gurus and their contribution in quality. **6**
   b) Explain the following as applied to quality control : **7**
      1) Appraisal costs 2) Prevention costs
      3) Failure costs 4) Optimum costs.

7. a) How employee involvement affects organization performance ? What are various ways to improve employee involvement ? **6**

b) A double sampling plan is as follows : **8**

a) Select a sample of 2 from a lot of 20. If both articles inspected are good, accept the lot. If both are defective, reject the lot. If 1 is good and 1 defective, take a second sample of one article.

b) If the article in second sample is good, accept the lot. If it is defective, reject the lot. If a lot 25% defective is submitted, what is the probability of acceptance ?

Compute this by the method that is theoretically correct rather than an approximate method.

8. a) Write short note on Environmental Management System. **6**

b) Write procedure for control chart preparation. Explain it for X and R chart. **7**

9. a) What are 7 quality tools and Explain in detail any one ? **6**

b) Explain actual and ideal OC curve for a sampling plan. Also explain concepts such as producer's risk, consumer's risk AQL, LTPD, AOQL, related to OC Curve. **7**

SLR-EP – 85

Seat No.	

Set **Q**

B.E. (Mech.) (Part – II) (New) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Monday, 21-11-2016 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.***
3) Figures to the ***right*** *indicate* ***full*** *marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The larger the sample size and acceptance number _____ is the slope of OC curve.
A) Straight B) Curve C) Steeper D) Horizontal

2) The success of sampling inspection depends upon
A) Lot size B) Sample size
C) Acceptance number D) All

3) The maximum number of allowable defective in a lot is called as
A) Acceptance number B) OK number
C) Rejection number D) Lot number

4) LTPD stands for
A) Lot Tolerance Perfect Defective B) Lot Tolerable Percent Defective
C) Lot Tolerance Percent Defective D) Lot Tolerance Piece Defective

5) AOQ stands for
A) Average Outgoing Quality B) Additional Outgoing Quality
C) Average Outward Quality D) Advanced Outgoing Quality

6) _____ involves selecting missions and objectives and the actions to achieve them.
A) Planning B) Mission C) Strategy D) Goals

7) _____ is defined as "the discipline dealing with what is good and bad and with moral duty and obligation".
A) Rule B) Organisation culture
C) Protocol D) Ethics

8) In the _____ interview, the manager follows an interview guide but may also ask other questions.
A) Structured B) Standard C) Directional D) Semi structured

9) _____ attempts to make a job more varied by removing the dullness associated with performing repetitive operations.
A) Job enlargement B) Job enrichment
C) Continuous improvement D) Job rotation

10) Figurehead role, leader role, liaison role are _____ managerial roles.
A) Interpersonal B) Informational C) Decision D) Leading

11) Theory _____ is pessimistic, static and rigid.
A) Y B) X C) Maslow's D) Z

12) _____ refers to an individual's subjective judgement about the fairness of rewards she or he got, relative to the inputs, in comparison with reward of other.
A) All theories B) Maslow's theory
C) X and Y theory D) Equity theory

13) If _____, then this could results in frustration of subordinates.
A) Authority > Responsibility B) Authority < Responsibility
C) Power = Responsibility D) Power > Authority

14) Machinery, material handling equipment, Tools, jigs, fixtures comes under
A) Working capital B) Machinery capital
C) Fixed capital D) Variable capital

15) _____ funds are required to meet the working capital needs like investment in the inventories, debtors, bank balance, cash on hand, marketable security etc.
A) Long term B) Middle term C) Short term D) Fixed

16) _____ is the process of evaluating a portion of the products in a lot for the purpose of accepting or rejecting the lot on the basis of conforming or nonconforming to the quality specifications.
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A) Exactness of specification B) Fitness of specification
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_____

SLR-EP – 85

Seat No.	

B.E. (Mech.) (Part – II) (New) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Monday, 21-11-2016 Marks : 80
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.*

SECTION – I

2. A) Explain the functions of management. **6**
   B) Explain ethics in management. **7**

3. A) What is decision making ? Elaborate. **6**
   B) Explain selection process. **7**

4. A) Write a note on Maslow and X-Y theory of motivation. **8**
   B) What is communication and what are barriers in communications ? **6**

5. A) Explain material management. **6**
   B) Explain channels of distribution system for industrial and consumer good. **7**

SECTION – II

6. a) Name any three quality gurus and their contribution in quality. **6**
   b) Explain the following as applied to quality control : **7**
      1) Appraisal costs 2) Prevention costs
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7. a) How employee involvement affects organization performance ? What are various ways to improve employee involvement ? **6**

b) A double sampling plan is as follows : **8**

a) Select a sample of 2 from a lot of 20. If both articles inspected are good, accept the lot. If both are defective, reject the lot. If 1 is good and 1 defective, take a second sample of one article.

b) If the article in second sample is good, accept the lot. If it is defective, reject the lot. If a lot 25% defective is submitted, what is the probability of acceptance ?

Compute this by the method that is theoretically correct rather than an approximate method.

8. a) Write short note on Environmental Management System. **6**

b) Write procedure for control chart preparation. Explain it for X and R chart. **7**

9. a) What are 7 quality tools and Explain in detail any one ? **6**

b) Explain actual and ideal OC curve for a sampling plan. Also explain concepts such as producer's risk, consumer's risk AQL, LTPD, AOQL, related to OC Curve. **7**

SLR-EP – 85

Seat No.	

Set R

B.E. (Mech.) (Part – II) (New) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Monday, 21-11-2016 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.***
3) Figures to the ***right*** *indicate* ***full*** *marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) _____ is the process of evaluating a portion of the products in a lot for the purpose of accepting or rejecting the lot on the basis of conforming or nonconforming to the quality specifications.
A) Acceptance sampling B) Batch sampling
C) Quality checking D) Lot sampling

2) In a sampling plan N = 500, $n_1 = 10$, $n_2 = 8$, $c_1 = 1$, $c_2 = 4$, if the number of defectives in the 1st sample are 3, then the decision will be
A) No rejection B) Take a second sample and inspect
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A) Same as AQL B) Better than AQL
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4) The producers risk is denoted by
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5) The quality of design is concerned with the _____ for the manufacture of the product.
A) Exactness of specification B) Fitness of specification
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6) The larger the sample size and acceptance number _____ is the slope of OC curve.
A) Straight B) Curve C) Steeper D) Horizontal

7) The success of sampling inspection depends upon
A) Lot size B) Sample size
C) Acceptance number D) All

P.T.O.

8) The maximum number of allowable defective in a lot is called as
   A) Acceptance number B) OK number
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9) LTPD stands for
   A) Lot Tolerance Perfect Defective B) Lot Tolerable Percent Defective
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10) AOQ stands for
   A) Average Outgoing Quality B) Additional Outgoing Quality
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11) _____ involves selecting missions and objectives and the actions to achieve them.
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12) _____ is defined as "the discipline dealing with what is good and bad and with moral duty and obligation".
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13) In the _____ interview, the manager follows an interview guide but may also ask other questions.
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14) _____ attempts to make a job more varied by removing the dullness associated with performing repetitive operations.
   A) Job enlargement B) Job enrichment
   C) Continuous improvement D) Job rotation

15) Figurehead role, leader role, liaison role are _____ managerial roles.
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16) Theory _____ is pessimistic, static and rigid.
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17) _____ refers to an individual's subjective judgement about the fairness of rewards she or he got, relative to the inputs, in comparison with reward of other.
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19) Machinery, material handling equipment, Tools, jigs, fixtures comes under
   A) Working capital B) Machinery capital
   C) Fixed capital D) Variable capital

20) _____ funds are required to meet the working capital needs like investment in the inventories, debtors, bank balance, cash on hand, marketable security etc.
   A) Long term B) Middle term C) Short term D) Fixed

_____

SLR-EP – 85

Seat No.	

B.E. (Mech.) (Part – II) (New) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Monday, 21-11-2016 Marks : 80
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**.*
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SECTION – I

2. A) Explain the functions of management. **6**
   B) Explain ethics in management. **7**

3. A) What is decision making ? Elaborate. **6**
   B) Explain selection process. **7**

4. A) Write a note on Maslow and X-Y theory of motivation. **8**
   B) What is communication and what are barriers in communications ? **6**

5. A) Explain material management. **6**
   B) Explain channels of distribution system for industrial and consumer good. **7**

SECTION – II

6. a) Name any three quality gurus and their contribution in quality. **6**
   b) Explain the following as applied to quality control : **7**
      1) Appraisal costs 2) Prevention costs
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7. a) How employee involvement affects organization performance ? What are various ways to improve employee involvement ? **6**

b) A double sampling plan is as follows : **8**

a) Select a sample of 2 from a lot of 20. If both articles inspected are good, accept the lot. If both are defective, reject the lot. If 1 is good and 1 defective, take a second sample of one article.

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8. a) Write short note on Environmental Management System. **6**

b) Write procedure for control chart preparation. Explain it for X and R chart. **7**

9. a) What are 7 quality tools and Explain in detail any one ? **6**

b) Explain actual and ideal OC curve for a sampling plan. Also explain concepts such as producer's risk, consumer's risk AQL, LTPD, AOQL, related to OC Curve. **7**

SLR-EP – 85

Seat No.	

Set S

B.E. (Mech.) (Part – II) (New) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Monday, 21-11-2016 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.***
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Theory _____ is pessimistic, static and rigid.
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9) The producers risk is denoted by
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17) _____ is defined as “the discipline dealing with what is good and bad and with moral duty and obligation”.
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   A) Structured B) Standard C) Directional D) Semi structured

19) _____ attempts to make a job more varied by removing the dullness associated with performing repetitive operations.
   A) Job enlargement B) Job enrichment
   C) Continuous improvement D) Job rotation

20) Figurehead role, leader role, liaison role are _____ managerial roles.
   A) Interpersonal B) Informational C) Decision D) Leading

_____

SLR-EP – 85

Seat No.	

B.E. (Mech.) (Part – II) (New) Examination, 2016
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Monday, 21-11-2016 Marks : 80
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.*

SECTION – I

2. A) Explain the functions of management. **6**
   B) Explain ethics in management. **7**

3. A) What is decision making ? Elaborate. **6**
   B) Explain selection process. **7**

4. A) Write a note on Maslow and X-Y theory of motivation. **8**
   B) What is communication and what are barriers in communications ? **6**

5. A) Explain material management. **6**
   B) Explain channels of distribution system for industrial and consumer good. **7**

SECTION – II

6. a) Name any three quality gurus and their contribution in quality. **6**
   b) Explain the following as applied to quality control : **7**
      1) Appraisal costs 2) Prevention costs
      3) Failure costs 4) Optimum costs.

7. a) How employee involvement affects organization performance ? What are various ways to improve employee involvement ? **6**

b) A double sampling plan is as follows : **8**

a) Select a sample of 2 from a lot of 20. If both articles inspected are good, accept the lot. If both are defective, reject the lot. If 1 is good and 1 defective, take a second sample of one article.

b) If the article in second sample is good, accept the lot. If it is defective, reject the lot. If a lot 25% defective is submitted, what is the probability of acceptance ?

Compute this by the method that is theoretically correct rather than an approximate method.

8. a) Write short note on Environmental Management System. **6**

b) Write procedure for control chart preparation. Explain it for X and R chart. **7**

9. a) What are 7 quality tools and Explain in detail any one ? **6**

b) Explain actual and ideal OC curve for a sampling plan. Also explain concepts such as producer's risk, consumer's risk AQL, LTPD, AOQL, related to OC Curve. **7**

SLR-EP – 86

Seat No.	

Set **P**

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
INDUSTRIAL ENGINEERING (New)

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate marks.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*
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) Selection of material handling equipment is an important decision as it affects _____ of handling system. **1**
   a) Cost b) Efficiency
   c) Both cost and efficiency d) None of the above

2) Intangible factor for facility location are **1**
   a) Site cost b) Material cost
   c) Transportation utilities d) Community attitude

3) Tangible factor for facility location are **1**
   a) Environmental factors b) Recreational facilities
   c) Transportation utilities d) Community attitude

4) _____ describes clearly the requirement of jobs. **1**
   a) Job analysis b) Job description
   c) Job specification d) Job classification

5) _____ specify the attributes possessed by employee to complete the job satisfactorily. **1**
   a) Job analysis b) Job description
   c) Job specification d) Job classification

6) _____ is given to compensate for energy expended during working. **1**
   a) Allowance for basic fatigue b) Allowance for personal needs
   c) Interference allowance d) Contingency allowance

7) _____ is given to compensate the operator for the time necessary to leave, the workplace to attend to personal needs like drinking water, washing hands etc. **1**
   a) Allowance for basic fatigue b) Allowance for personal needs
   c) Interference allowance d) Contingency allowance

P.T.O.

8) Women require _____ allowance than men. **1**
   a) Smaller personal b) 5% less personal
   c) Longer personal d) None of the above

9) Match Pairs : **4**

Basic elements of work	**Symbol**
1) Operations	P) □
2) Inspection	Q) D
3) Temporary Storage	R) ○
4) Permanent Storage	S) △
	T) ▽

10) Gilberth contributed to **1**
   a) Time study b) Motion study c) Project study d) Value Engg.

11) Flow Process Chart is used in **1**
   a) Work sampling b) Micromotion study
   c) Merit rating d) Method study

12) _____ is required for drawing a cycle graph. **1**
   a) Light source b) Stop watch c) String d) Template

13) In method study critical examination is done through **1**
   a) Work sampling tech. b) Questioning tech.
   c) Stop watch tech. d) Flow process chart

14) Therblig, in Micro motion study is described by **1**
   a) An event b) An activity
   c) Standard symbol and colour d) None of the above

15) Productivity of an enterprise refers to which of the following ? **1**
   a) Rate of growth of capital
   b) The ratio of gross income to gross expenditure
   c) Yearly gross income
   d) Turnover in specified period

16) Contingency allowance should not exceed **1**
   a) 0% b) 5%
   c) 10% d) None of the above

17) _____ are not the genuine part of the time study and should be used with utmost care and only in clearly defined circumstances. **1**
   a) Relaxation allowances b) Interference allowances
   c) Contingency allowances d) Policy allowances

_____

SLR-EP – 86

Seat No.	

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
INDUSTRIAL ENGINEERING (New)

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate marks.*

SECTION – I

2. A) Explain the factors affecting productivity. **7**

   B) Discuss Indian Factory Act, 1948 – Safety Provisions. **7**

3. A) Define method study. Explain steps involved in method study. **7**

   B) Explain in detail "Critical Examination" in method study. **7**

   OR

   B) How environmental factors affect the man-machine system ? List types of displays. **7**

4. Write short note (**any three**) : **(4×3=12)**
   1) Multiple Activity Chart
   2) Travel Chart
   3) Anthropometry
   4) Work Simplification and work study.

SECTION – II

5. A) The element times (in minutes) for 4 cycle of an operation using a stop watch are presented below : **7**

Elements	Cycle times in minutes			
	1	**2**	**3**	**4**
1	1.5	1.5	1.3	1.4
2	2.6	2.7	2.4	2.6
3	3.3	3.2	3.4	3.4
4	1.2	1.2	1.1	1.2
5	0.51	0.51	0.52	0.49

Calculate standard time for the operation if
1) Element 2 and 4 are the machine element.
2) For the other elements, the operator is rated at 110%.
3) Total allowances are 15% of the normal time.

B) Define work sampling and procedure for conducting work sampling study. **7**

6. A) Explain process layout with suitable examples. What are the advantages and limitations of process layout ? **7**

B) What are objectives of job evaluation ? Explain procedure for Job evaluation. **7**

7. Write short note (**any three**) : **(4×3=12)**

1) Principles of Plant layout
2) PMTS (Predetermined Motion Time Analysis)
3) Merit rating Methods
4) Performance rating.

SLR-EP – 86

Seat No.	

Set **Q**

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
INDUSTRIAL ENGINEERING (New)

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate marks.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*
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) In method study critical examination is done through **1**
a) Work sampling tech. b) Questioning tech.
c) Stop watch tech. d) Flow process chart

2) Therblig, in Micro motion study is described by **1**
a) An event b) An activity
c) Standard symbol and colour d) None of the above

3) Productivity of an enterprise refers to which of the following ? **1**
a) Rate of growth of capital
b) The ratio of gross income to gross expenditure
c) Yearly gross income
d) Turnover in specified period

4) Contingency allowance should not exceed **1**
a) 0% b) 5% c) 10% d) None of the above

5) _____ are not the genuine part of the time study and should be used with utmost care and only in clearly defined circumstances. **1**
a) Relaxation allowances b) Interference allowances
c) Contingency allowances d) Policy allowances

6) Selection of material handling equipment is an important decision as it affects _____ of handling system. **1**
a) Cost b) Efficiency
c) Both cost and efficiency d) None of the above

7) Intangible factor for facility location are **1**
a) Site cost b) Material cost
c) Transportation utilities d) Community attitude

8) Tangible factor for facility location are **1**
   a) Environmental factors b) Recreational facilities
   c) Transportation utilities d) Community attitude

9) _____ describes clearly the requirement of jobs. **1**
   a) Job analysis b) Job description
   c) Job specification d) Job classification

10) _____ specify the attributes possessed by employee to complete the job satisfactorily. **1**
   a) Job analysis b) Job description
   c) Job specification d) Job classification

11) _____ is given to compensate for energy expended during working. **1**
   a) Allowance for basic fatigue b) Allowance for personal needs
   c) Interference allowance d) Contingency allowance

12) _____ is given to compensate the operator for the time necessary to leave, the workplace to attend to personal needs like drinking water, washing hands etc. **1**
   a) Allowance for basic fatigue b) Allowance for personal needs
   c) Interference allowance d) Contingency allowance

13) Women require _____ allowance than men. **1**
   a) Smaller personal b) 5% less personal
   c) Longer personal d) None of the above

14) Match Pairs : **4**

Basic elements of work	**Symbol**
1) Operations	P) □
2) Inspection	Q) D
3) Temporary Storage	R) ○
4) Permanent Storage	S) △
	T) ▽

15) Gilberth contributed to **1**
   a) Time study b) Motion study c) Project study d) Value Engg.

16) Flow Process Chart is used in **1**
   a) Work sampling b) Micromotion study
   c) Merit rating d) Method study

17) _____ is required for drawing a cycle graph. **1**
   a) Light source b) Stop watch c) String d) Template

_____

SLR-EP – 86

Seat No.	

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
INDUSTRIAL ENGINEERING (New)

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate marks.*

SECTION – I

2. A) Explain the factors affecting productivity. **7**

   B) Discuss Indian Factory Act, 1948 – Safety Provisions. **7**

3. A) Define method study. Explain steps involved in method study. **7**

   B) Explain in detail "Critical Examination" in method study. **7**

   OR

   B) How environmental factors affect the man-machine system ? List types of displays. **7**

4. Write short note (**any three**) : **(4×3=12)**
   1) Multiple Activity Chart
   2) Travel Chart
   3) Anthropometry
   4) Work Simplification and work study.

SECTION – II

5. A) The element times (in minutes) for 4 cycle of an operation using a stop watch are presented below : **7**

Elements	Cycle times in minutes			
	1	**2**	**3**	**4**
1	1.5	1.5	1.3	1.4
2	2.6	2.7	2.4	2.6
3	3.3	3.2	3.4	3.4
4	1.2	1.2	1.1	1.2
5	0.51	0.51	0.52	0.49

Calculate standard time for the operation if
1) Element 2 and 4 are the machine element.
2) For the other elements, the operator is rated at 110%.
3) Total allowances are 15% of the normal time.

B) Define work sampling and procedure for conducting work sampling study. **7**

6. A) Explain process layout with suitable examples. What are the advantages and limitations of process layout ? **7**

B) What are objectives of job evaluation ? Explain procedure for Job evaluation. **7**

7. Write short note (**any three**) : **(4×3=12)**

1) Principles of Plant layout
2) PMTS (Predetermined Motion Time Analysis)
3) Merit rating Methods
4) Performance rating.

SLR-EP – 86

Seat No.	

Set **R**

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
INDUSTRIAL ENGINEERING (New)

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate marks.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*
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) _____ is given to compensate the operator for the time necessary to leave, the workplace to attend to personal needs like drinking water, washing hands etc. **1**
   a) Allowance for basic fatigue b) Allowance for personal needs
   c) Interference allowance d) Contingency allowance

2) Women require _____ allowance than men. **1**
   a) Smaller personal b) 5% less personal
   c) Longer personal d) None of the above

3) Match Pairs : **4**

Basic elements of work	Symbol
1) Operations	P) □
2) Inspection	Q) ⊃
3) Temporary Storage	R) ○
4) Permanent Storage	S) △
	T) ▽

4) Gilberth contributed to **1**
   a) Time study b) Motion study c) Project study d) Value Engg.

5) Flow Process Chart is used in **1**
   a) Work sampling b) Micromotion study
   c) Merit rating d) Method study

6) _____ is required for drawing a cycle graph. **1**
   a) Light source b) Stop watch c) String d) Template

7) In method study critical examination is done through **1**
   a) Work sampling tech. b) Questioning tech.
   c) Stop watch tech. d) Flow process chart

P.T.O.

8) Therblig, in Micro motion study is described by **1**
   a) An event b) An activity
   c) Standard symbol and colour d) None of the above

9) Productivity of an enterprise refers to which of the following ? **1**
   a) Rate of growth of capital
   b) The ratio of gross income to gross expenditure
   c) Yearly gross income
   d) Turnover in specified period

10) Contingency allowance should not exceed **1**
   a) 0% b) 5%
   c) 10% d) None of the above

11) _____ are not the genuine part of the time study and should be used with utmost care and only in clearly defined circumstances. **1**
   a) Relaxation allowances b) Interference allowances
   c) Contingency allowances d) Policy allowances

12) Selection of material handling equipment is an important decision as it affects _____ of handling system. **1**
   a) Cost b) Efficiency
   c) Both cost and efficiency d) None of the above

13) Intangible factor for facility location are **1**
   a) Site cost b) Material cost
   c) Transportation utilities d) Community attitude

14) Tangible factor for facility location are **1**
   a) Environmental factors b) Recreational facilities
   c) Transportation utilities d) Community attitude

15) _____ describes clearly the requirement of jobs. **1**
   a) Job analysis b) Job description
   c) Job specification d) Job classification

16) _____ specify the attributes possessed by employee to complete the job satisfactorily. **1**
   a) Job analysis b) Job description
   c) Job specification d) Job classification

17) _____ is given to compensate for energy expended during working. **1**
   a) Allowance for basic fatigue b) Allowance for personal needs
   c) Interference allowance d) Contingency allowance

_____

SLR-EP – 86

Seat No.	

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
INDUSTRIAL ENGINEERING (New)

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate marks.*

SECTION – I

2. A) Explain the factors affecting productivity. **7**

   B) Discuss Indian Factory Act, 1948 – Safety Provisions. **7**

3. A) Define method study. Explain steps involved in method study. **7**

   B) Explain in detail "Critical Examination" in method study. **7**

   OR

   B) How environmental factors affect the man-machine system ? List types of displays. **7**

4. Write short note (**any three**) : **(4×3=12)**
   1) Multiple Activity Chart
   2) Travel Chart
   3) Anthropometry
   4) Work Simplification and work study.

SECTION – II

5. A) The element times (in minutes) for 4 cycle of an operation using a stop watch are presented below : **7**

Elements	Cycle times in minutes			
	1	**2**	**3**	**4**
1	1.5	1.5	1.3	1.4
2	2.6	2.7	2.4	2.6
3	3.3	3.2	3.4	3.4
4	1.2	1.2	1.1	1.2
5	0.51	0.51	0.52	0.49

Calculate standard time for the operation if
1) Element 2 and 4 are the machine element.
2) For the other elements, the operator is rated at 110%.
3) Total allowances are 15% of the normal time.

B) Define work sampling and procedure for conducting work sampling study. **7**

6. A) Explain process layout with suitable examples. What are the advantages and limitations of process layout ? **7**

B) What are objectives of job evaluation ? Explain procedure for Job evaluation. **7**

7. Write short note (**any three**) : **(4×3=12)**

1) Principles of Plant layout
2) PMTS (Predetermined Motion Time Analysis)
3) Merit rating Methods
4) Performance rating.

SLR-EP – 86

Seat No.	

Set **S**

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
INDUSTRIAL ENGINEERING (New)

Day and Date : Tuesday, 22-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate marks.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*
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) Contingency allowance should not exceed **1**
a) 0% b) 5%
c) 10% d) None of the above

2) _____ are not the genuine part of the time study and should be used with utmost care and only in clearly defined circumstances. **1**
a) Relaxation allowances b) Interference allowances
c) Contingency allowances d) Policy allowances

3) Selection of material handling equipment is an important decision as it affects _____ of handling system. **1**
a) Cost b) Efficiency
c) Both cost and efficiency d) None of the above

4) Intangible factor for facility location are **1**
a) Site cost b) Material cost
c) Transportation utilities d) Community attitude

5) Tangible factor for facility location are **1**
a) Environmental factors b) Recreational facilities
c) Transportation utilities d) Community attitude

6) _____ describes clearly the requirement of jobs. **1**
a) Job analysis b) Job description
c) Job specification d) Job classification

7) _____ specify the attributes possessed by employee to complete the job satisfactorily. **1**
a) Job analysis b) Job description
c) Job specification d) Job classification

P.T.O.

8) _____ is given to compensate for energy expended during working. **1**
   a) Allowance for basic fatigue b) Allowance for personal needs
   c) Interference allowance d) Contingency allowance

9) _____ is given to compensate the operator for the time necessary to leave, the workplace to attend to personal needs like drinking water, washing hands etc. **1**
   a) Allowance for basic fatigue b) Allowance for personal needs
   c) Interference allowance d) Contingency allowance

10) Women require _____ allowance than men. **1**
   a) Smaller personal b) 5% less personal
   c) Longer personal d) None of the above

11) Match Pairs : **4**

Basic elements of work	**Symbol**
1) Operations	P) □
2) Inspection	Q) D
3) Temporary Storage	R) ○
4) Permanent Storage	S) △
	T) ▽

12) Gilberth contributed to **1**
   a) Time study b) Motion study c) Project study d) Value Engg.

13) Flow Process Chart is used in **1**
   a) Work sampling b) Micromotion study
   c) Merit rating d) Method study

14) _____ is required for drawing a cycle graph. **1**
   a) Light source b) Stop watch c) String d) Template

15) In method study critical examination is done through **1**
   a) Work sampling tech. b) Questioning tech.
   c) Stop watch tech. d) Flow process chart

16) Therblig, in Micro motion study is described by **1**
   a) An event b) An activity
   c) Standard symbol and colour d) None of the above

17) Productivity of an enterprise refers to which of the following ? **1**
   a) Rate of growth of capital
   b) The ratio of gross income to gross expenditure
   c) Yearly gross income
   d) Turnover in specified period

_____

SLR-EP – 86

Seat No.	

B.E. (Mechanical Engg.) (Part – II) Examination, 2016
INDUSTRIAL ENGINEERING (New)

Day and Date : Tuesday, 22-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate marks.*

SECTION – I

2. A) Explain the factors affecting productivity. **7**

   B) Discuss Indian Factory Act, 1948 – Safety Provisions. **7**

3. A) Define method study. Explain steps involved in method study. **7**

   B) Explain in detail "Critical Examination" in method study. **7**

   OR

   B) How environmental factors affect the man-machine system ? List types of displays. **7**

4. Write short note (**any three**) : **(4×3=12)**
   1) Multiple Activity Chart
   2) Travel Chart
   3) Anthropometry
   4) Work Simplification and work study.

SECTION – II

5. A) The element times (in minutes) for 4 cycle of an operation using a stop watch are presented below : **7**

Elements	Cycle times in minutes			
	1	**2**	**3**	**4**
1	1.5	1.5	1.3	1.4
2	2.6	2.7	2.4	2.6
3	3.3	3.2	3.4	3.4
4	1.2	1.2	1.1	1.2
5	0.51	0.51	0.52	0.49

Calculate standard time for the operation if
1) Element 2 and 4 are the machine element.
2) For the other elements, the operator is rated at 110%.
3) Total allowances are 15% of the normal time.

B) Define work sampling and procedure for conducting work sampling study. **7**

6. A) Explain process layout with suitable examples. What are the advantages and limitations of process layout ? **7**

B) What are objectives of job evaluation ? Explain procedure for Job evaluation. **7**

7. Write short note (**any three**) : **(4×3=12)**

1) Principles of Plant layout
2) PMTS (Predetermined Motion Time Analysis)
3) Merit rating Methods
4) Performance rating.

SLR-EP – 89

Seat No.	

Set **P**

B.E. (Part – II) (Mechanical) (New) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Friday, 25-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions, ***if necessary*** *and mention them* ***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.***
6) ***Use*** *of non-programmable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Pyreheliometer is used to measure
A) Beam radiation B) Diffuse radiation
C) Global radiation D) All of the above

2) The function of solar collector is to convert
A) Solar energy into electricity B) Solar energy into radiation
C) Solar energy into thermal energy D) All of these

3) Zenith angle is complementary angle of
A) Latitude B) Surface Azimuth Angle
C) Hour Angle D) Sun Altitude Angle

4) _____ type of wind mill is of simple design.
A) Horizontal axis wind mill B) Vertical axis wind mill
C) Both D) None

5) Maximum wind energy available is proportional to
A) Square of the diameter of rotor B) Air density
C) Cube of the wind velocity D) All of the above

6) Flat plate collector absorbs
A) Direct Radiation B) Diffuse Radiation
C) Direct and Diffuse Both D) None of the above

7) Geothermal plant is suitable for
A) Base load power B) Peak load power
C) Both A) and B) D) None of the above

P.T.O.

8) A geothermal field may yield
   A) Hot water B) Wet steam C) Dry steam D) All of the above

9) Conservation of energy means using _____ energy for the same level of activity.
   A) More B) Less C) Partial D) Zero

10) The objective of energy Audit is to
   A) Spend energy B) Conduct formal survey
   C) Save energy D) Promote energy usage

11) The core of the transformer is made up of
   A) Laminations B) Single block
   C) Hollow casting D) Decomposable material

12) The highest point on the load curve represents
   A) Maximum time B) Maximum demand
   C) Maximum concrete load D) KVA rating of generators

13) For a power plant, the cost of labor is considered as _____ cost.
   A) Fixed B) Variable C) Progressive D) Major

14) The standard frequency for electric power supply in India is
   A) 60 Hz B) 50 Hz C) 440 Hz D) 220 Hz

15) Demand factor is defined as
   A) Average load / Maximum demand B) Maximum demand / connected load
   C) Connected load / maximum demand D) Maximum demand × connected load

16) In India largest thermal power station is located at
   A) Kota B) Sarni C) Chandrapur D) Neyveli

17) The functions performed by the switch gear are
   A) Faulty plant is automatically disconnected
   B) To break short circuit
   C) To facilitate redistribution of load
   D) All of these

18) In Hopkinson demand rate or two part tariff the demand rate or fixed charges are
   A) Depends upon the energy consumed
   B) Depends upon the maximum demand
   C) Both A) and B)
   D) None of the above

19) The average load factor of thermal power plants in India is
   A) 100% B) 80 to 95% C) 50 to 60% D) 20 to 30%

20) Diversity factor is always
   A) Equal to unity B) Less than unity
   C) More than unity D) More than twenty

_____

SLR-EP – 89

Seat No.	

B.E. (Part – II) (Mechanical) (New) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Friday, 25-11-2016 Marks : 80

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

***Instructions**: i) Answer **any two** questions from **each** Section.*
*ii) Figures to the **right** indicate **full** marks.*
*iii) **Make** suitable assumption if necessary and state **it clearly**.*

SECTION – I

2. a) Write a short note on electric energy growth in India. **7**

   b) What are the effect of variable load on power plant design and operation ? **6**

   c) From the following data calculate the cost of generation per unit delivered from the power plant : **7**

   Installed capacity of power plant = 200 MW

   Annual load factor= 0.4

   Capital cost of power plant = Rs. 280 lacs

   Annual cost of fuel, oil, salaries, taxation = Rs. 60 lacs

   Interest and depreciation = 13%.

3. a) State the principle of generator and explain in detail. **7**

   b) A 60 MW power station has an annual peak load of 50 MW. The power station supplies load having maximum demands of 20 MW, 17 MW, 10 MW and 9 MW.

   The annual load factor is 0.45. Find :

   i) Average load
   ii) Energy supplied per year
   iii) Diversity factor
   iv) Demand factor. **7**

   c) Explain different methods of tariff. **6**

4. a) Explain in detail compressed air storage plant. **6**

   b) Discuss different load curve. **7**

   c) Describe with neat sketch various types of relay used in power plant. **7**

SECTION – II

5. a) Explain with neat sketch Pyreheliometer. **7**

   b) Define altitude angle, surface azimuth angle and declination angle with neat sketch. **6**

   c) Write a note on wave energy conservation. **7**

6. a) Discuss the basic component of wind energy conversion system with neat block diagram. **7**

   b) Describe with neat sketch the working of liquid flat plate collector. **7**

   c) Give classification of wind energy and state its advantages and disadvantages. **6**

7. a) Write short note on OTEC. **7**

   b) Discuss energy conservation in sugar industry. **7**

   c) Describe various steps in energy audit. **6**

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SLR-EP – 89

Seat No.	

Set Q

B.E. (Part – II) (Mechanical) (New) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Friday, 25-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* *1)* ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions, ***if necessary*** *and mention them* ***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.***
6) ***Use*** *of non-programmable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) In India largest thermal power station is located at
A) Kota B) Sarni C) Chandrapur D) Neyveli

2) The functions performed by the switch gear are
A) Faulty plant is automatically disconnected
B) To break short circuit
C) To facilitate redistribution of load
D) All of these

3) In Hopkinson demand rate or two part tariff the demand rate or fixed charges are
A) Depends upon the energy consumed
B) Depends upon the maximum demand
C) Both A) and B)
D) None of the above

4) The average load factor of thermal power plants in India is
A) 100% B) 80 to 95% C) 50 to 60% D) 20 to 30%

5) Diversity factor is always
A) Equal to unity B) Less than unity
C) More than unity D) More than twenty

6) Pyreheliometer is used to measure
A) Beam radiation B) Diffuse radiation
C) Global radiation D) All of the above

P.T.O.

7) The function of solar collector is to convert
   A) Solar energy into electricity B) Solar energy into radiation
   C) Solar energy into thermal energy D) All of these

8) Zenith angle is complementary angle of
   A) Latitude B) Surface Azimuth Angle
   C) Hour Angle D) Sun Altitude Angle

9) _____ type of wind mill is of simple design.
   A) Horizontal axis wind mill B) Vertical axis wind mill
   C) Both D) None

10) Maximum wind energy available is proportional to
   A) Square of the diameter of rotor B) Air density
   C) Cube of the wind velocity D) All of the above

11) Flat plate collector absorbs
   A) Direct Radiation B) Diffuse Radiation
   C) Direct and Diffuse Both D) None of the above

12) Geothermal plant is suitable for
   A) Base load power B) Peak load power
   C) Both A) and B) D) None of the above

13) A geothermal field may yield
   A) Hot water B) Wet steam C) Dry steam D) All of the above

14) Conservation of energy means using _____ energy for the same level of activity.
   A) More B) Less C) Partial D) Zero

15) The objective of energy Audit is to
   A) Spend energy B) Conduct formal survey
   C) Save energy D) Promote energy usage

16) The core of the transformer is made up of
   A) Laminations B) Single block
   C) Hollow casting D) Decomposable material

17) The highest point on the load curve represents
   A) Maximum time B) Maximum demand
   C) Maximum concrete load D) KVA rating of generators

18) For a power plant, the cost of labor is considered as _____ cost.
   A) Fixed B) Variable C) Progressive D) Major

19) The standard frequency for electric power supply in India is
   A) 60 Hz B) 50 Hz C) 440 Hz D) 220 Hz

20) Demand factor is defined as
   A) Average load / Maximum demand B) Maximum demand / connected load
   C) Connected load / maximum demand D) Maximum demand × connected load

_____

SLR-EP – 89

Seat No.	

B.E. (Part – II) (Mechanical) (New) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Friday, 25-11-2016 Marks : 80

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

***Instructions**: i) Answer **any two** questions from **each** Section.*
*ii) Figures to the **right** indicate **full** marks.*
*iii) **Make** suitable assumption if necessary and state **it clearly**.*

SECTION – I

2. a) Write a short note on electric energy growth in India. **7**

   b) What are the effect of variable load on power plant design and operation ? **6**

   c) From the following data calculate the cost of generation per unit delivered from the power plant : **7**

   Installed capacity of power plant = 200 MW

   Annual load factor= 0.4

   Capital cost of power plant = Rs. 280 lacs

   Annual cost of fuel, oil, salaries, taxation = Rs. 60 lacs

   Interest and depreciation = 13%.

3. a) State the principle of generator and explain in detail. **7**

   b) A 60 MW power station has an annual peak load of 50 MW. The power station supplies load having maximum demands of 20 MW, 17 MW, 10 MW and 9 MW.

   The annual load factor is 0.45. Find :

   i) Average load
   ii) Energy supplied per year
   iii) Diversity factor
   iv) Demand factor. **7**

   c) Explain different methods of tariff. **6**

4. a) Explain in detail compressed air storage plant. **6**

   b) Discuss different load curve. **7**

   c) Describe with neat sketch various types of relay used in power plant. **7**

SECTION – II

5. a) Explain with neat sketch Pyreheliometer. **7**

   b) Define altitude angle, surface azimuth angle and declination angle with neat sketch. **6**

   c) Write a note on wave energy conservation. **7**

6. a) Discuss the basic component of wind energy conversion system with neat block diagram. **7**

   b) Describe with neat sketch the working of liquid flat plate collector. **7**

   c) Give classification of wind energy and state its advantages and disadvantages. **6**

7. a) Write short note on OTEC. **7**

   b) Discuss energy conservation in sugar industry. **7**

   c) Describe various steps in energy audit. **6**

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SLR-EP – 89

Seat No.	

Set R

B.E. (Part – II) (Mechanical) (New) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Friday, 25-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* *1)* ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions, ***if necessary*** *and mention them* ***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.***
6) ***Use*** *of non-programmable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The core of the transformer is made up of
A) Laminations B) Single block
C) Hollow casting D) Decomposable material

2) The highest point on the load curve represents
A) Maximum time B) Maximum demand
C) Maximum concrete load D) KVA rating of generators

3) For a power plant, the cost of labor is considered as _____ cost.
A) Fixed B) Variable C) Progressive D) Major

4) The standard frequency for electric power supply in India is
A) 60 Hz B) 50 Hz C) 440 Hz D) 220 Hz

5) Demand factor is defined as
A) Average load / Maximum demand B) Maximum demand / connected load
C) Connected load / maximum demand D) Maximum demand × connected load

6) In India largest thermal power station is located at
A) Kota B) Sarni C) Chandrapur D) Neyveli

7) The functions performed by the switch gear are
A) Faulty plant is automatically disconnected
B) To break short circuit
C) To facilitate redistribution of load
D) All of these

P.T.O.

8) In Hopkinson demand rate or two part tariff the demand rate or fixed charges are
   A) Depends upon the energy consumed
   B) Depends upon the maximum demand
   C) Both A) and B)
   D) None of the above

9) The average load factor of thermal power plants in India is
   A) 100% B) 80 to 95% C) 50 to 60% D) 20 to 30%

10) Diversity factor is always
   A) Equal to unity B) Less than unity
   C) More than unity D) More than twenty

11) Pyreheliometer is used to measure
   A) Beam radiation B) Diffuse radiation
   C) Global radiation D) All of the above

12) The function of solar collector is to convert
   A) Solar energy into electricity B) Solar energy into radiation
   C) Solar energy into thermal energy D) All of these

13) Zenith angle is complementary angle of
   A) Latitude B) Surface Azimuth Angle
   C) Hour Angle D) Sun Altitude Angle

14) _____ type of wind mill is of simple design.
   A) Horizontal axis wind mill B) Vertical axis wind mill
   C) Both D) None

15) Maximum wind energy available is proportional to
   A) Square of the diameter of rotor B) Air density
   C) Cube of the wind velocity D) All of the above

16) Flat plate collector absorbs
   A) Direct Radiation B) Diffuse Radiation
   C) Direct and Diffuse Both D) None of the above

17) Geothermal plant is suitable for
   A) Base load power B) Peak load power
   C) Both A) and B) D) None of the above

18) A geothermal field may yield
   A) Hot water B) Wet steam C) Dry steam D) All of the above

19) Conservation of energy means using _____ energy for the same level of activity.
   A) More B) Less C) Partial D) Zero

20) The objective of energy Audit is to
   A) Spend energy B) Conduct formal survey
   C) Save energy D) Promote energy usage

_____

SLR-EP – 89

Seat No.	

B.E. (Part – II) (Mechanical) (New) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Friday, 25-11-2016 Marks : 80

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

***Instructions**: i) Answer **any two** questions from **each** Section.*
*ii) Figures to the **right** indicate **full** marks.*
*iii) **Make** suitable assumption if necessary and state **it clearly**.*

SECTION – I

2. a) Write a short note on electric energy growth in India. **7**

   b) What are the effect of variable load on power plant design and operation ? **6**

   c) From the following data calculate the cost of generation per unit delivered from the power plant : **7**

   Installed capacity of power plant = 200 MW

   Annual load factor= 0.4

   Capital cost of power plant = Rs. 280 lacs

   Annual cost of fuel, oil, salaries, taxation = Rs. 60 lacs

   Interest and depreciation = 13%.

3. a) State the principle of generator and explain in detail. **7**

   b) A 60 MW power station has an annual peak load of 50 MW. The power station supplies load having maximum demands of 20 MW, 17 MW, 10 MW and 9 MW.

   The annual load factor is 0.45. Find :

   i) Average load
   ii) Energy supplied per year
   iii) Diversity factor
   iv) Demand factor. **7**

   c) Explain different methods of tariff. **6**

Set R

4. a) Explain in detail compressed air storage plant. **6**

   b) Discuss different load curve. **7**

   c) Describe with neat sketch various types of relay used in power plant. **7**

SECTION – II

5. a) Explain with neat sketch Pyreheliometer. **7**

   b) Define altitude angle, surface azimuth angle and declination angle with neat sketch. **6**

   c) Write a note on wave energy conservation. **7**

6. a) Discuss the basic component of wind energy conversion system with neat block diagram. **7**

   b) Describe with neat sketch the working of liquid flat plate collector. **7**

   c) Give classification of wind energy and state its advantages and disadvantages. **6**

7. a) Write short note on OTEC. **7**

   b) Discuss energy conservation in sugar industry. **7**

   c) Describe various steps in energy audit. **6**

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SLR-EP – 89

Seat No.	

Set S

B.E. (Part – II) (Mechanical) (New) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Friday, 25-11-2016 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions, ***if necessary*** *and mention them* ***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.***
6) ***Use*** *of non-programmable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Flat plate collector absorbs
A) Direct Radiation B) Diffuse Radiation
C) Direct and Diffuse Both D) None of the above

2) Geothermal plant is suitable for
A) Base load power B) Peak load power
C) Both A) and B) D) None of the above

3) A geothermal field may yield
A) Hot water B) Wet steam C) Dry steam D) All of the above

4) Conservation of energy means using _____ energy for the same level of activity.
A) More B) Less C) Partial D) Zero

5) The objective of energy Audit is to
A) Spend energy B) Conduct formal survey
C) Save energy D) Promote energy usage

6) The core of the transformer is made up of
A) Laminations B) Single block
C) Hollow casting D) Decomposable material

7) The highest point on the load curve represents
A) Maximum time B) Maximum demand
C) Maximum concrete load D) KVA rating of generators

P.T.O.

8) For a power plant, the cost of labor is considered as _____ cost.
A) Fixed B) Variable C) Progressive D) Major

9) The standard frequency for electric power supply in India is
A) 60 Hz B) 50 Hz C) 440 Hz D) 220 Hz

10) Demand factor is defined as
A) Average load / Maximum demand B) Maximum demand / connected load
C) Connected load / maximum demand D) Maximum demand × connected load

11) In India largest thermal power station is located at
A) Kota B) Sarni C) Chandrapur D) Neyveli

12) The functions performed by the switch gear are
A) Faulty plant is automatically disconnected
B) To break short circuit
C) To facilitate redistribution of load
D) All of these

13) In Hopkinson demand rate or two part tariff the demand rate or fixed charges are
A) Depends upon the energy consumed
B) Depends upon the maximum demand
C) Both A) and B)
D) None of the above

14) The average load factor of thermal power plants in India is
A) 100% B) 80 to 95% C) 50 to 60% D) 20 to 30%

15) Diversity factor is always
A) Equal to unity B) Less than unity
C) More than unity D) More than twenty

16) Pyreheliometer is used to measure
A) Beam radiation B) Diffuse radiation
C) Global radiation D) All of the above

17) The function of solar collector is to convert
A) Solar energy into electricity B) Solar energy into radiation
C) Solar energy into thermal energy D) All of these

18) Zenith angle is complementary angle of
A) Latitude B) Surface Azimuth Angle
C) Hour Angle D) Sun Altitude Angle

19) _____ type of wind mill is of simple design.
A) Horizontal axis wind mill B) Vertical axis wind mill
C) Both D) None

20) Maximum wind energy available is proportional to
A) Square of the diameter of rotor B) Air density
C) Cube of the wind velocity D) All of the above

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SLR-EP – 89

Seat No.	

B.E. (Part – II) (Mechanical) (New) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Friday, 25-11-2016 Marks : 80

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

***Instructions**: i) Answer **any two** questions from **each** Section.*
*ii) Figures to the **right** indicate **full** marks.*
*iii) **Make** suitable assumption if necessary and state **it clearly**.*

SECTION – I

2. a) Write a short note on electric energy growth in India. **7**

   b) What are the effect of variable load on power plant design and operation ? **6**

   c) From the following data calculate the cost of generation per unit delivered from the power plant : **7**

   Installed capacity of power plant = 200 MW

   Annual load factor= 0.4

   Capital cost of power plant = Rs. 280 lacs

   Annual cost of fuel, oil, salaries, taxation = Rs. 60 lacs

   Interest and depreciation = 13%.

3. a) State the principle of generator and explain in detail. **7**

   b) A 60 MW power station has an annual peak load of 50 MW. The power station supplies load having maximum demands of 20 MW, 17 MW, 10 MW and 9 MW.

   The annual load factor is 0.45. Find :

   i) Average load
   ii) Energy supplied per year
   iii) Diversity factor
   iv) Demand factor. **7**

   c) Explain different methods of tariff. **6**

4. a) Explain in detail compressed air storage plant. **6**

   b) Discuss different load curve. **7**

   c) Describe with neat sketch various types of relay used in power plant. **7**

SECTION – II

5. a) Explain with neat sketch Pyreheliometer. **7**

   b) Define altitude angle, surface azimuth angle and declination angle with neat sketch. **6**

   c) Write a note on wave energy conservation. **7**

6. a) Discuss the basic component of wind energy conversion system with neat block diagram. **7**

   b) Describe with neat sketch the working of liquid flat plate collector. **7**

   c) Give classification of wind energy and state its advantages and disadvantages. **6**

7. a) Write short note on OTEC. **7**

   b) Discuss energy conservation in sugar industry. **7**

   c) Describe various steps in energy audit. **6**

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SLR-EP – 365

Seat No.	

Set **P**

B.E. (Mech.) (Part – I) (Old) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Tuesday, 13-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) *Make suitable assumptions if* ***necessary*** *and mention them* ***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.***
6) *Answer* ***any two*** *questions from* ***each*** *Section.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Initially in India steam power plant was constructed at
a) Kolkata b) Goa c) Mumbai d) Darjeeling

2) Per capita consumption in case of India is
a) In equivalence with developed countries
b) In excess of developed countries
c) Very severely behind developed countries
d) Average

3) Power plant having low utilization factor is the indication that
a) Plant is under maintenance
b) Plant is used as stand by unit
c) Plant is used for base load only
d) Plant is used for peak as well as base load

4) Peak point on the load curve signifies
a) Maximum time b) Maximum demand
c) Maximum concrete load d) kVA rating of generators

5) During the off-peak hours in case of an air storage plant.
a) The compressor works b) The turbine only works
c) Air is emptied from reservoir d) Respective grids are interconnected

6) The pumped storage plant essentially consists of a
a) Single basin b) Head and a tail reservoir pond
c) Bottom small reservoir d) Pressure amplifier

7) The capacity of transformer is generally measured in terms of
a) HP b) kVA c) kVAr d) kW

8) Low power factor results in
   a) Poor voltage regulation
   b) Large copper losses
   c) Large kVA ratings of transformers
   d) All of the above

9) The incremental rate vs. the output graph is in _____ proportion.
   a) Direct
   b) Inverse
   c) Cannot predict
   d) Uncertain

10) The tariff can be represented in general form
   a) bc + y
   b) by + c
   c) ax^2
   d) ax + by + c

11) In India the tariff for charging the consumers for the consumption of electricity is based on
   a) Straight meter rate
   b) Block meter rate
   c) Reverse block meter rate
   d) Two part tariff

12) At the center of the sun is hydrogen being converted into
   a) Helium
   b) Oxygen
   c) Nitrogen
   d) Hydrogen oxide

13) Altitude angle is corresponding to
   a) Zenith angle
   b) Azimuth angle
   c) Latitude angle
   d) Hour angle

14) Solar collector coverts solar energy into
   a) Electricity
   b) Radiation
   c) Thermal energy
   d) None of the above

15) The speed of the shaft to the generator has to be _____ in wind turbine.
   a) Decreased
   b) Increased
   c) Maintained constant
   d) Cyclically reversed in direction

16) The principle of ocean thermal energy conversion is based on
   a) Wave energy
   b) High tides
   c) Temperature difference between the top layer of the ocean and the cooler water at its depth
   d) High tides plus low tides

17) Tides are caused because of
   a) Sun
   b) Mars
   c) Both sun and mars
   d) Ocean depth

18) Geothermal energy is the energy from
   a) Radiation of the sun
   b) Forces of attraction of earth and sun
   c) Earth's crust
   d) Atmosphere

19) Energy management focuses on
   a) Controlling the supply and consumption of energy
   b) Maximizing productivity and comfort levels and minimize energy costs and pollution with effective use of energy
   c) Both a) and b)
   d) None of the above

20) Energy management aims
   a) Regulating the pollution levels
   b) Totally preventing pollution
   c) Both a) and b)
   d) None of the above

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SLR-EP – 365

Seat No.	

B.E. (Mech.) (Part – I) (Old) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Tuesday, 13-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) ***Draw*** *figures* ***where*** *necessary.*
3) ***Assume*** *suitable data if* ***required*** *and mention it.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) Describe the role of private sector in energy management. **6**

   b) Describe in brief circuit breakers and starters. **7**

   c) The maximum (peak) load on a thermal power plant of 60 MW capacity is 50 MW at an annual load factor of 50%. The loads having maximum demands of 25 MW, 20 MW, 8 MW and 5 MW are connected to the power station. Determine :
      a) Average load on power station
      b) Energy generated per year
      c) Demand factor
      d) Diversity factor. **7**

3. a) Describe in detail the effect of variable load on power plant design and operation. **7**

   b) Explain performance and operation characteristics of power plants. **6**

   c) Discuss effect of variable load on power plant. **7**

4. Write short note on the following **(any four)** : **(5×4=20)**
   a) Load sharing between base load and peak load power stations.
   b) Fixed and operating cost
   c) Tariff methods
   d) Power factor and its measurement
   e) Selection of generation equipment.

SECTION – II

5. a) Describe the solar radiation measurement in detail. **7**

   b) Calculate the angle made by beam radiation with the normal to a flat-plate collector on May 1 at 09.00h (local apparent time). The collector is located in New Delhi (28°35'N, 77°12'E). It is tilted at an angle of 360 with the horizontal and is pointing due south. Repeat the calculation for 12.00 h (local apparent time). **6**

   c) Describe in detail the performance of wind machines. **7**

6. a) Describe the components of single basin tidal power plant system, state also the advantages and disadvantages of tidal energy. **6**

   b) Describe with neat sketch vapour dominated geothermal system with its applications. **5**

   c) i) Describe in brief energy conservation Legislation. **4**

   ii) Definition, strategies and objective of energy audit. **5**

7. Write short note on the following **(any four)** : **(5×4=20)**

   a) Energy flow diagram

   b) Energy conservation in pulp and paper industries

   c) Types of geothermal resources

   d) Performance analysis of liquid flat plate collector

   e) Advantages, disadvantages and application of wind energy.

SLR-EP – 365

Seat No.	

Set **Q**

B.E. (Mech.) (Part – I) (Old) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Tuesday, 13-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) *Make suitable assumptions if* ***necessary*** *and mention them* ***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.***
6) *Answer* ***any two*** *questions from* ***each*** *Section.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The principle of ocean thermal energy conversion is based on
   a) Wave energy
   b) High tides
   c) Temperature difference between the top layer of the ocean and the cooler water at its depth
   d) High tides plus low tides

2) Tides are caused because of
   a) Sun b) Mars
   c) Both sun and mars d) Ocean depth

3) Geothermal energy is the energy from
   a) Radiation of the sun b) Forces of attraction of earth and sun
   c) Earth's crust d) Atmosphere

4) Energy management focuses on
   a) Controlling the supply and consumption of energy
   b) Maximizing productivity and comfort levels and minimize energy costs and pollution with effective use of energy
   c) Both a) and b)
   d) None of the above

5) Energy management aims
   a) Regulating the pollution levels b) Totally preventing pollution
   c) Both a) and b) d) None of the above

6) Initially in India steam power plant was constructed at
   a) Kolkata b) Goa c) Mumbai d) Darjeeling

7) Per capita consumption in case of India is
   a) In equivalence with developed countries
   b) In excess of developed countries
   c) Very severely behind developed countries
   d) Average

8) Power plant having low utilization factor is the indication that
   a) Plant is under maintenance
   b) Plant is used as stand by unit
   c) Plant is used for base load only
   d) Plant is used for peak as well as base load

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   a) Maximum time
   b) Maximum demand
   c) Maximum concrete load
   d) kVA rating of generators

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   b) The turbine only works
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   a) Single basin
   b) Head and a tail reservoir pond
   c) Bottom small reservoir
   d) Pressure amplifier

12) The capacity of transformer is generally measured in terms of
   a) HP b) kVA c) kVAr d) kW

13) Low power factor results in
   a) Poor voltage regulation
   b) Large copper losses
   c) Large kVA ratings of transformers
   d) All of the above

14) The incremental rate vs. the output graph is in _____ proportion.
   a) Direct b) Inverse c) Cannot predict d) Uncertain

15) The tariff can be represented in general form
   a) $bc + y$ b) $by + c$ c) ax^2 d) $ax + by + c$

16) In India the tariff for charging the consumers for the consumption of electricity is based on
   a) Straight meter rate
   b) Block meter rate
   c) Reverse block meter rate
   d) Two part tariff

17) At the center of the sun is hydrogen being converted into
   a) Helium b) Oxygen c) Nitrogen d) Hydrogen oxide

18) Altitude angle is corresponding to
   a) Zenith angle b) Azimuth angle c) Latitude angle d) Hour angle

19) Solar collector coverts solar energy into
   a) Electricity
   b) Radiation
   c) Thermal energy
   d) None of the above

20) The speed of the shaft to the generator has to be _____ in wind turbine.
   a) Decreased
   b) Increased
   c) Maintained constant
   d) Cyclically reversed in direction

_____

SLR-EP – 365

Seat No.	

B.E. (Mech.) (Part – I) (Old) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Tuesday, 13-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) ***Draw*** *figures* ***where*** *necessary.*
3) ***Assume*** *suitable data if* ***required*** *and mention it.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) Describe the role of private sector in energy management. **6**

   b) Describe in brief circuit breakers and starters. **7**

   c) The maximum (peak) load on a thermal power plant of 60 MW capacity is 50 MW at an annual load factor of 50%. The loads having maximum demands of 25 MW, 20 MW, 8 MW and 5 MW are connected to the power station. Determine :
      a) Average load on power station
      b) Energy generated per year
      c) Demand factor
      d) Diversity factor. **7**

3. a) Describe in detail the effect of variable load on power plant design and operation. **7**

   b) Explain performance and operation characteristics of power plants. **6**

   c) Discuss effect of variable load on power plant. **7**

4. Write short note on the following **(any four)** : **(5×4=20)**
   a) Load sharing between base load and peak load power stations.
   b) Fixed and operating cost
   c) Tariff methods
   d) Power factor and its measurement
   e) Selection of generation equipment.

Set Q

SECTION – II

5. a) Describe the solar radiation measurement in detail. **7**

   b) Calculate the angle made by beam radiation with the normal to a flat-plate collector on May 1 at 09.00h (local apparent time). The collector is located in New Delhi (28°35'N, 77°12'E). It is tilted at an angle of 360 with the horizontal and is pointing due south. Repeat the calculation for 12.00 h (local apparent time). **6**

   c) Describe in detail the performance of wind machines. **7**

6. a) Describe the components of single basin tidal power plant system, state also the advantages and disadvantages of tidal energy. **6**

   b) Describe with neat sketch vapour dominated geothermal system with its applications. **5**

   c) i) Describe in brief energy conservation Legislation. **4**

   ii) Definition, strategies and objective of energy audit. **5**

7. Write short note on the following **(any four)** : **(5×4=20)**

   a) Energy flow diagram

   b) Energy conservation in pulp and paper industries

   c) Types of geothermal resources

   d) Performance analysis of liquid flat plate collector

   e) Advantages, disadvantages and application of wind energy.

SLR-EP – 365

Seat No.	

Set R

B.E. (Mech.) (Part – I) (Old) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Tuesday, 13-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) **Neat** diagrams must be drawn **whenever** necessary.*
*2) Make suitable assumptions if **necessary** and mention them **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.***
*6) Answer **any two** questions from **each** Section.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) In India the tariff for charging the consumers for the consumption of electricity is based on
   a) Straight meter rate b) Block meter rate
   c) Reverse block meter rate d) Two part tariff

2) At the center of the sun is hydrogen being converted into
   a) Helium b) Oxygen c) Nitrogen d) Hydrogen oxide

3) Altitude angle is corresponding to
   a) Zenith angle b) Azimuth angle c) Latitude angle d) Hour angle

4) Solar collector coverts solar energy into
   a) Electricity b) Radiation
   c) Thermal energy d) None of the above

5) The speed of the shaft to the generator has to be _____ in wind turbine.
   a) Decreased b) Increased
   c) Maintained constant d) Cyclically reversed in direction

6) The principle of ocean thermal energy conversion is based on
   a) Wave energy
   b) High tides
   c) Temperature difference between the top layer of the ocean and the cooler water at its depth
   d) High tides plus low tides

7) Tides are caused because of
   a) Sun b) Mars
   c) Both sun and mars d) Ocean depth

P.T.O.

8) Geothermal energy is the energy from
   a) Radiation of the sun
   b) Forces of attraction of earth and sun
   c) Earth's crust
   d) Atmosphere

9) Energy management focuses on
   a) Controlling the supply and consumption of energy
   b) Maximizing productivity and comfort levels and minimize energy costs and pollution with effective use of energy
   c) Both a) and b)
   d) None of the above

10) Energy management aims
   a) Regulating the pollution levels
   b) Totally preventing pollution
   c) Both a) and b)
   d) None of the above

11) Initially in India steam power plant was constructed at
   a) Kolkata b) Goa c) Mumbai d) Darjeeling

12) Per capita consumption in case of India is
   a) In equivalence with developed countries
   b) In excess of developed countries
   c) Very severely behind developed countries
   d) Average

13) Power plant having low utilization factor is the indication that
   a) Plant is under maintenance
   b) Plant is used as stand by unit
   c) Plant is used for base load only
   d) Plant is used for peak as well as base load

14) Peak point on the load curve signifies
   a) Maximum time
   b) Maximum demand
   c) Maximum concrete load
   d) kVA rating of generators

15) During the off-peak hours in case of an air storage plant.
   a) The compressor works
   b) The turbine only works
   c) Air is emptied from reservoir
   d) Respective grids are interconnected

16) The pumped storage plant essentially consists of a
   a) Single basin
   b) Head and a tail reservoir pond
   c) Bottom small reservoir
   d) Pressure amplifier

17) The capacity of transformer is generally measured in terms of
   a) HP b) kVA c) kVAr d) kW

18) Low power factor results in
   a) Poor voltage regulation
   b) Large copper losses
   c) Large kVA ratings of transformers
   d) All of the above

19) The incremental rate vs. the output graph is in _____ proportion.
   a) Direct b) Inverse c) Cannot predict d) Uncertain

20) The tariff can be represented in general form
   a) $bc + y$ b) $by + c$ c) ax^2 d) $ax + by + c$

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SLR-EP – 365

Seat No.	

B.E. (Mech.) (Part – I) (Old) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Tuesday, 13-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) ***Draw*** *figures* ***where*** *necessary.*
3) ***Assume*** *suitable data if* ***required*** *and mention it.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) Describe the role of private sector in energy management. **6**

   b) Describe in brief circuit breakers and starters. **7**

   c) The maximum (peak) load on a thermal power plant of 60 MW capacity is 50 MW at an annual load factor of 50%. The loads having maximum demands of 25 MW, 20 MW, 8 MW and 5 MW are connected to the power station. Determine :
      a) Average load on power station
      b) Energy generated per year
      c) Demand factor
      d) Diversity factor. **7**

3. a) Describe in detail the effect of variable load on power plant design and operation. **7**

   b) Explain performance and operation characteristics of power plants. **6**

   c) Discuss effect of variable load on power plant. **7**

4. Write short note on the following **(any four)** : **(5×4=20)**
   a) Load sharing between base load and peak load power stations.
   b) Fixed and operating cost
   c) Tariff methods
   d) Power factor and its measurement
   e) Selection of generation equipment.

Set R

SECTION – II

5. a) Describe the solar radiation measurement in detail. **7**

   b) Calculate the angle made by beam radiation with the normal to a flat-plate collector on May 1 at 09.00h (local apparent time). The collector is located in New Delhi (28°35'N, 77°12'E). It is tilted at an angle of 360 with the horizontal and is pointing due south. Repeat the calculation for 12.00 h (local apparent time). **6**

   c) Describe in detail the performance of wind machines. **7**

6. a) Describe the components of single basin tidal power plant system, state also the advantages and disadvantages of tidal energy. **6**

   b) Describe with neat sketch vapour dominated geothermal system with its applications. **5**

   c) i) Describe in brief energy conservation Legislation. **4**

   ii) Definition, strategies and objective of energy audit. **5**

7. Write short note on the following **(any four)** : **(5×4=20)**

   a) Energy flow diagram

   b) Energy conservation in pulp and paper industries

   c) Types of geothermal resources

   d) Performance analysis of liquid flat plate collector

   e) Advantages, disadvantages and application of wind energy.

SLR-EP – 365

Seat No.	

Set S

B.E. (Mech.) (Part – I) (Old) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Tuesday, 13-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) **Neat** diagrams must be drawn **whenever** necessary.*
*2) Make suitable assumptions if **necessary** and mention them **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.***
*6) Answer **any two** questions from **each** Section.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The pumped storage plant essentially consists of a
   a) Single basin b) Head and a tail reservoir pond
   c) Bottom small reservoir d) Pressure amplifier

2) The capacity of transformer is generally measured in terms of
   a) HP b) kVA c) kVAr d) kW

3) Low power factor results in
   a) Poor voltage regulation b) Large copper losses
   c) Large kVA ratings of transformers d) All of the above

4) The incremental rate vs. the output graph is in _____ proportion.
   a) Direct b) Inverse c) Cannot predict d) Uncertain

5) The tariff can be represented in general form
   a) bc + y b) by + c c) ax^2 d) ax + by + c

6) In India the tariff for charging the consumers for the consumption of electricity is based on
   a) Straight meter rate b) Block meter rate
   c) Reverse block meter rate d) Two part tariff

7) At the center of the sun is hydrogen being converted into
   a) Helium b) Oxygen c) Nitrogen d) Hydrogen oxide

8) Altitude angle is corresponding to
   a) Zenith angle b) Azimuth angle c) Latitude angle d) Hour angle

9) Solar collector coverts solar energy into
   a) Electricity b) Radiation
   c) Thermal energy d) None of the above

P.T.O.

10) The speed of the shaft to the generator has to be _____ in wind turbine.
a) Decreased b) Increased
c) Maintained constant d) Cyclically reversed in direction

11) The principle of ocean thermal energy conversion is based on
a) Wave energy
b) High tides
c) Temperature difference between the top layer of the ocean and the cooler water at its depth
d) High tides plus low tides

12) Tides are caused because of
a) Sun b) Mars
c) Both sun and mars d) Ocean depth

13) Geothermal energy is the energy from
a) Radiation of the sun b) Forces of attraction of earth and sun
c) Earth's crust d) Atmosphere

14) Energy management focuses on
a) Controlling the supply and consumption of energy
b) Maximizing productivity and comfort levels and minimize energy costs and pollution with effective use of energy
c) Both a) and b)
d) None of the above

15) Energy management aims
a) Regulating the pollution levels b) Totally preventing pollution
c) Both a) and b) d) None of the above

16) Initially in India steam power plant was constructed at
a) Kolkata b) Goa c) Mumbai d) Darjeeling

17) Per capita consumption in case of India is
a) In equivalence with developed countries
b) In excess of developed countries
c) Very severely behind developed countries
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18) Power plant having low utilization factor is the indication that
a) Plant is under maintenance
b) Plant is used as stand by unit
c) Plant is used for base load only
d) Plant is used for peak as well as base load

19) Peak point on the load curve signifies
a) Maximum time b) Maximum demand
c) Maximum concrete load d) kVA rating of generators

20) During the off-peak hours in case of an air storage plant.
a) The compressor works b) The turbine only works
c) Air is emptied from reservoir d) Respective grids are interconnected

_____

SLR-EP – 365

Seat No.	

B.E. (Mech.) (Part – I) (Old) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Tuesday, 13-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) ***Draw*** *figures* ***where*** *necessary.*
3) ***Assume*** *suitable data if* ***required*** *and mention it.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) Describe the role of private sector in energy management. **6**

   b) Describe in brief circuit breakers and starters. **7**

   c) The maximum (peak) load on a thermal power plant of 60 MW capacity is 50 MW at an annual load factor of 50%. The loads having maximum demands of 25 MW, 20 MW, 8 MW and 5 MW are connected to the power station. Determine :
      a) Average load on power station
      b) Energy generated per year
      c) Demand factor
      d) Diversity factor. **7**

3. a) Describe in detail the effect of variable load on power plant design and operation. **7**

   b) Explain performance and operation characteristics of power plants. **6**

   c) Discuss effect of variable load on power plant. **7**

4. Write short note on the following **(any four)** : **(5×4=20)**
   a) Load sharing between base load and peak load power stations.
   b) Fixed and operating cost
   c) Tariff methods
   d) Power factor and its measurement
   e) Selection of generation equipment.

Set S

SECTION – II

5. a) Describe the solar radiation measurement in detail. **7**

   b) Calculate the angle made by beam radiation with the normal to a flat-plate collector on May 1 at 09.00h (local apparent time). The collector is located in New Delhi (28°35'N, 77°12'E). It is tilted at an angle of 360 with the horizontal and is pointing due south. Repeat the calculation for 12.00 h (local apparent time). **6**

   c) Describe in detail the performance of wind machines. **7**

6. a) Describe the components of single basin tidal power plant system, state also the advantages and disadvantages of tidal energy. **6**

   b) Describe with neat sketch vapour dominated geothermal system with its applications. **5**

   c) i) Describe in brief energy conservation Legislation. **4**

   ii) Definition, strategies and objective of energy audit. **5**

7. Write short note on the following **(any four)** : **(5×4=20)**

   a) Energy flow diagram

   b) Energy conservation in pulp and paper industries

   c) Types of geothermal resources

   d) Performance analysis of liquid flat plate collector

   e) Advantages, disadvantages and application of wind energy.

SLR-EP – 439

Seat No.	

Set P

T.E. (Mechanical) (Part – II) Examination, 2016
EXPERIMENTAL STRESS ANALYSIS (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Make necessary assumptions, if required and mention it clearly.*
2) Write the correct answer/answers for objective questions in the answer sheet for question 1.
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****.*
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 : 20

1. A) Match the most appropriate pairs : **(4×1=4)**

Column (1)	Column (2)
a) Zero order isochromatics	p. Stress difference is zero
b) Tardys method	q. Teledeltos paper
c) Foil strain gauges	r. Fractional fringe
d) Oblique incidence	s. Separation method
	t. Insensitive to cross-axis sensitivity

B) Match the most appropriate pairs : **(4×1=4)**

Column (1)	Column (2)
a) Pressure measurement	p. Laplace equation
b) Force measurement	q. Proving ring
c) Series or shunt balance	r. Fine balance
d) Differential balance (series or shunt)	s. Pressure cell
	t. Coarse balance

P.T.O.

C) Solve multiple correct answers : **(4×2=8)**

1) Strain gauge, as a transducer can measure
   a) Stress b) Strain c) Torque d) Pressure

2) Dummy strain gauge is not required for Wheatstone bridge having
   a) Four arm sensitive
   b) Two arm sensitive, strains equal in magnitude and opposite in nature
   c) Two arm sensitive, strains equal in magnitude and same in nature
   d) One arm sensitive

3) Material fringe value of photoelastic material can be obtained by the following specimen/s.
   a) Tensile specimen
   b) Beam under bending
   c) Disc under diametral compression
   d) Electrical analogy method

4) Which of the following is/are the temporary or permanent birefringent optical element/s ?
   a) Polariser b) Analyser c) Wave plate d) Model under test

D) Solve classical objectives : **(4×1=4)**

1) Threshold strain in brittle coating refers to following
   a) Maximum strain in coating b) Minimum strain in coating
   c) Shear modulus d) Electric effect

2) Rope analogy refers to
   a) Strain gauge b) Polarization of light
   c) Stress separation d) None of a), b), c)

3) Circular polariscope light field is used to get the
   a) Full order fringe b) Half order fringe
   c) Fractional fringe d) None of a), b), c)

4) Circular polariscope dark field is used to get the
   a) Full order fringe b) Half order fringe
   c) Fractional fringe d) None of a), b), c)

SLR-EP – 439

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
EXPERIMENTAL STRESS ANALYSIS (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Solve **any two** questions from **each** Section **I** and **II**.*
2) Make necessary assumptions, if required and mention it clearly.
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Differentiate between Plane and Circular Polariscope. **4**

   b) Derive the expression for the light intensity observed through analyzer when the stressed model is kept in plane polariscope. **10**

   c) Explain the Babinet Soleil Compensator method for determination of fractional fringe order. **6**

3. a) Explain the properties of photo elastic materials. **6**

   b) A loaded two dimensional photo elastic model of 10 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 3^{rd} and 4^{th} order fringe. On rotation of analyzer through 45°, the 3^{rd} order fringe passed through the point of interest. Calculate the fractional fringe order and maximum shear stress, if material fringe value is 13.5 N/mn. **8**

   c) Derive an expression for determination of material fringe value using specimen under pure bending. **6**

4. a) Discuss : **12**
      i) Oblique Incidence Method
      ii) Electrical Analogy Method.

   b) Discuss how the model results can be related to prototype. **8**

SECTION – II

5. a) The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows :

   €a = 235 micro-strain, €b = – 285 micro-strain and €c = 240 micro-strain.

   Determine the maximum principal strain direction, the principal stresses and the maximum shear stress. Take E = 210 GPa and μ = 0.3. **12**

   b) Explain bonding of strain gauges and moisture proofing. **8**

6. a) Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **8**

   b) Explain various ways of initial balance of Wheatstone's bridge. **8**

   c) Explain ideal properties of grid and backing material used in strain gauges. **4**

7. a) Explain Moiré fringe method. What are the merit and demerit ? **6**

   b) Explain the measurement of stresses at large number of location using strain gauges. **6**

   c) Explain different configuration of Wheatstone bridge circuit. **8**

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SLR-EP – 439

Seat No.	

Set Q

T.E. (Mechanical) (Part – II) Examination, 2016
EXPERIMENTAL STRESS ANALYSIS (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Make necessary assumptions, if required and mention it clearly.*
2) Write the correct answer/answers for objective questions in the answer sheet for question 1.
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****.*
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 : 20

1. A) Solve multiple correct answers : **(4×2=8)**

1) Strain gauge, as a transducer can measure
a) Stress b) Strain c) Torque d) Pressure

2) Dummy strain gauge is not required for Wheatstone bridge having
a) Four arm sensitive
b) Two arm sensitive, strains equal in magnitude and opposite in nature
c) Two arm sensitive, strains equal in magnitude and same in nature
d) One arm sensitive

3) Material fringe value of photoelastic material can be obtained by the following specimen/s.
a) Tensile specimen
b) Beam under bending
c) Disc under diametral compression
d) Electrical analogy method

4) Which of the following is/are the temporary or permanent birefringent optical element/s ?
a) Polariser b) Analyser c) Wave plate d) Model under test

B) Solve classical objectives : **(4×1=4)**

1) Threshold strain in brittle coating refers to following
   a) Maximum strain in coating
   b) Minimum strain in coating
   c) Shear modulus
   d) Electric effect

2) Rope analogy refers to
   a) Strain gauge
   b) Polarization of light
   c) Stress separation
   d) None of a), b), c)

3) Circular polariscope light field is used to get the
   a) Full order fringe
   b) Half order fringe
   c) Fractional fringe
   d) None of a), b), c)

4) Circular polariscope dark field is used to get the
   a) Full order fringe
   b) Half order fringe
   c) Fractional fringe
   d) None of a), b), c)

C) Match the most appropriate pairs : **(4×1=4)**

Column (1)	**Column (2)**
a) Zero order isochromatics	p. Stress difference is zero
b) Tardys method	q. Teledeltos paper
c) Foil strain gauges	r. Fractional fringe
d) Oblique incidence	s. Separation method
	t. Insensitive to cross-axis sensitivity

D) Match the most appropriate pairs : **(4×1=4)**

Column (1)	**Column (2)**
a) Pressure measurement	p. Laplace equation
b) Force measurement	q. Proving ring
c) Series or shunt balance	r. Fine balance
d) Differential balance (series or shunt)	s. Pressure cell
	t. Coarse balance

SLR-EP – 439

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
EXPERIMENTAL STRESS ANALYSIS (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Solve **any two** questions from **each** Section **I** and **II**.*
2) Make necessary assumptions, if required and mention it clearly.
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Differentiate between Plane and Circular Polariscope. **4**

   b) Derive the expression for the light intensity observed through analyzer when the stressed model is kept in plane polariscope. **10**

   c) Explain the Babinet Soleil Compensator method for determination of fractional fringe order. **6**

3. a) Explain the properties of photo elastic materials. **6**

   b) A loaded two dimensional photo elastic model of 10 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 3^{rd} and 4^{th} order fringe. On rotation of analyzer through 45°, the 3^{rd} order fringe passed through the point of interest. Calculate the fractional fringe order and maximum shear stress, if material fringe value is 13.5 N/mn. **8**

   c) Derive an expression for determination of material fringe value using specimen under pure bending. **6**

4. a) Discuss : **12**
      i) Oblique Incidence Method
      ii) Electrical Analogy Method.

   b) Discuss how the model results can be related to prototype. **8**

SECTION – II

5. a) The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows :

   €a = 235 micro-strain, €b = – 285 micro-strain and €c = 240 micro-strain.

   Determine the maximum principal strain direction, the principal stresses and the maximum shear stress. Take E = 210 GPa and μ = 0.3. **12**

   b) Explain bonding of strain gauges and moisture proofing. **8**

6. a) Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **8**

   b) Explain various ways of initial balance of Wheatstone's bridge. **8**

   c) Explain ideal properties of grid and backing material used in strain gauges. **4**

7. a) Explain Moiré fringe method. What are the merit and demerit ? **6**

   b) Explain the measurement of stresses at large number of location using strain gauges. **6**

   c) Explain different configuration of Wheatstone bridge circuit. **8**

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SLR-EP – 439

Seat No.	

Set R

T.E. (Mechanical) (Part – II) Examination, 2016
EXPERIMENTAL STRESS ANALYSIS (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Make necessary assumptions, if required and mention it clearly.*
2) Write the correct answer/answers for objective questions in the answer sheet for question 1.
*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**.*
*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 : 20

1. A) Match the most appropriate pairs : **(4×1=4)**

Column (1)	Column (2)
a) Pressure measurement	p. Laplace equation
b) Force measurement	q. Proving ring
c) Series or shunt balance	r. Fine balance
d) Differential balance (series or shunt)	s. Pressure cell
	t. Coarse balance

B) Match the most appropriate pairs : **(4×1=4)**

Column (1)	Column (2)
a) Zero order isochromatics	p. Stress difference is zero
b) Tardys method	q. Teledeltos paper
c) Foil strain gauges	r. Fractional fringe
d) Oblique incidence	s. Separation method
	t. Insensitive to cross-axis sensitivity

P.T.O.

C) Solve classical objectives : **(4×1=4)**

1) Threshold strain in brittle coating refers to following
   a) Maximum strain in coating b) Minimum strain in coating
   c) Shear modulus d) Electric effect

2) Rope analogy refers to
   a) Strain gauge b) Polarization of light
   c) Stress separation d) None of a), b), c)

3) Circular polariscope light field is used to get the
   a) Full order fringe b) Half order fringe
   c) Fractional fringe d) None of a), b), c)

4) Circular polariscope dark field is used to get the
   a) Full order fringe b) Half order fringe
   c) Fractional fringe d) None of a), b), c)

D) Solve multiple correct answers : **(4×2=8)**

1) Strain gauge, as a transducer can measure
   a) Stress b) Strain c) Torque d) Pressure

2) Dummy strain gauge is not required for Wheatstone bridge having
   a) Four arm sensitive
   b) Two arm sensitive, strains equal in magnitude and opposite in nature
   c) Two arm sensitive, strains equal in magnitude and same in nature
   d) One arm sensitive

3) Material fringe value of photoelastic material can be obtained by the following specimen/s.
   a) Tensile specimen
   b) Beam under bending
   c) Disc under diametral compression
   d) Electrical analogy method

4) Which of the following is/are the temporary or permanent birefringent optical element/s ?
   a) Polariser b) Analyser c) Wave plate d) Model under test

SLR-EP – 439

Seat No.	

T.E. (Mechanical) (Part – II) Examination, 2016
EXPERIMENTAL STRESS ANALYSIS (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Solve **any two** questions from **each** Section **I** and **II**.*
2) Make necessary assumptions, if required and mention it clearly.
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Differentiate between Plane and Circular Polariscope. **4**

   b) Derive the expression for the light intensity observed through analyzer when the stressed model is kept in plane polariscope. **10**

   c) Explain the Babinet Soleil Compensator method for determination of fractional fringe order. **6**

3. a) Explain the properties of photo elastic materials. **6**

   b) A loaded two dimensional photo elastic model of 10 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 3^{rd} and 4^{th} order fringe. On rotation of analyzer through 45°, the 3^{rd} order fringe passed through the point of interest. Calculate the fractional fringe order and maximum shear stress, if material fringe value is 13.5 N/mn. **8**

   c) Derive an expression for determination of material fringe value using specimen under pure bending. **6**

4. a) Discuss : **12**
      i) Oblique Incidence Method
      ii) Electrical Analogy Method.

   b) Discuss how the model results can be related to prototype. **8**

SECTION – II

5. a) The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows :

   €a = 235 micro-strain, €b = – 285 micro-strain and €c = 240 micro-strain.

   Determine the maximum principal strain direction, the principal stresses and the maximum shear stress. Take E = 210 GPa and μ = 0.3. **12**

   b) Explain bonding of strain gauges and moisture proofing. **8**

6. a) Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **8**

   b) Explain various ways of initial balance of Wheatstone's bridge. **8**

   c) Explain ideal properties of grid and backing material used in strain gauges. **4**

7. a) Explain Moiré fringe method. What are the merit and demerit ? **6**

   b) Explain the measurement of stresses at large number of location using strain gauges. **6**

   c) Explain different configuration of Wheatstone bridge circuit. **8**

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SLR-EP – 439

Seat No.	

Set S

T.E. (Mechanical) (Part – II) Examination, 2016
EXPERIMENTAL STRESS ANALYSIS (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Make necessary assumptions, if required and mention it clearly.*
2) Write the correct answer/answers for objective questions in the answer sheet for question 1.
*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**.*
*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 : 20

1. A) Solve classical objectives : **(4×1=4)**

1) Threshold strain in brittle coating refers to following
   a) Maximum strain in coating b) Minimum strain in coating
   c) Shear modulus d) Electric effect

2) Rope analogy refers to
   a) Strain gauge b) Polarization of light
   c) Stress separation d) None of a), b), c)

3) Circular polariscope light field is used to get the
   a) Full order fringe b) Half order fringe
   c) Fractional fringe d) None of a), b), c)

4) Circular polariscope dark field is used to get the
   a) Full order fringe b) Half order fringe
   c) Fractional fringe d) None of a), b), c)

P.T.O.

B) Solve multiple correct answers : **(4×2=8)**

1) Strain gauge, as a transducer can measure
   a) Stress b) Strain c) Torque d) Pressure

2) Dummy strain gauge is not required for Wheatstone bridge having
   a) Four arm sensitive
   b) Two arm sensitive, strains equal in magnitude and opposite in nature
   c) Two arm sensitive, strains equal in magnitude and same in nature
   d) One arm sensitive

3) Material fringe value of photoelastic material can be obtained by the following specimen/s.
   a) Tensile specimen
   b) Beam under bending
   c) Disc under diametral compression
   d) Electrical analogy method

4) Which of the following is/are the temporary or permanent birefringent optical element/s ?
   a) Polariser b) Analyser c) Wave plate d) Model under test

C) Match the most appropriate pairs : **(4×1=4)**

Column (1)	**Column (2)**
a) Pressure measurement	p. Laplace equation
b) Force measurement	q. Proving ring
c) Series or shunt balance	r. Fine balance
d) Differential balance (series or shunt)	s. Pressure cell
	t. Coarse balance

D) Match the most appropriate pairs : **(4×1=4)**

Column (1)	**Column (2)**
a) Zero order isochromatics	p. Stress difference is zero
b) Tardys method	q. Teledeltos paper
c) Foil strain gauges	r. Fractional fringe
d) Oblique incidence	s. Separation method
	t. Insensitive to cross-axis sensitivity

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T.E. (Mechanical) (Part – II) Examination, 2016
EXPERIMENTAL STRESS ANALYSIS (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Solve **any two** questions from **each** Section **I** and **II**.*
2) Make necessary assumptions, if required and mention it clearly.
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Differentiate between Plane and Circular Polariscope. **4**

   b) Derive the expression for the light intensity observed through analyzer when the stressed model is kept in plane polariscope. **10**

   c) Explain the Babinet Soleil Compensator method for determination of fractional fringe order. **6**

3. a) Explain the properties of photo elastic materials. **6**

   b) A loaded two dimensional photo elastic model of 10 mm thickness is observed in circular polariscope. The isochromatics fringe pattern revealed that the point of interest lies between 3^{rd} and 4^{th} order fringe. On rotation of analyzer through 45°, the 3^{rd} order fringe passed through the point of interest. Calculate the fractional fringe order and maximum shear stress, if material fringe value is 13.5 N/mn. **8**

   c) Derive an expression for determination of material fringe value using specimen under pure bending. **6**

4. a) Discuss : **12**
      i) Oblique Incidence Method
      ii) Electrical Analogy Method.

   b) Discuss how the model results can be related to prototype. **8**

SECTION – II

5. a) The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows :

   €a = 235 micro-strain, €b = – 285 micro-strain and €c = 240 micro-strain.

   Determine the maximum principal strain direction, the principal stresses and the maximum shear stress. Take E = 210 GPa and μ = 0.3. **12**

   b) Explain bonding of strain gauges and moisture proofing. **8**

6. a) Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **8**

   b) Explain various ways of initial balance of Wheatstone's bridge. **8**

   c) Explain ideal properties of grid and backing material used in strain gauges. **4**

7. a) Explain Moiré fringe method. What are the merit and demerit ? **6**

   b) Explain the measurement of stresses at large number of location using strain gauges. **6**

   c) Explain different configuration of Wheatstone bridge circuit. **8**

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Seat No.	

Set **P**

T.E. (Mechanical) (Part – II) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING PROFESSIONAL (Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 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) Answer **any two** questions from **each** Section.*
*4) Make suitable assumptions **if necessary** and state them **clearly**.*
*5) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Load curve shows variation in
   a) Demand w.r.t. supply b) Supply w.r.t. time
   c) Demand w.r.t. time d) Supply w.r.t. demand

2) India's first nuclear power plant was installed at
   a) Tarapur b) Kota c) Kalpakkam d) None of these

3) Load factor of power station is generally
   a) Equal to unity b) Less than unity c) More than unity d) None of these

4) The load factor of heavy industries may be taken as
   a) 10 to 20% b) 25 to 40% c) 50 to 70% d) 70 to 80%

5) Diversity factor is usually highest for
   a) Industrial consumers b) Commercial loads
   c) Residential consumers d) Municipal loads

6) Pumped storage hydroelectric power plant is more suitable use as
   a) Peak load plant b) Base load plant
   c) Intermediate load plant d) All of the above

7) The general type of tariff is
   a) bc + y b) by + c c) ax^2 d) ax + by + c

8) Insurance premium of power plant is considered as
   a) Variable cost b) Fixed variable cost
   c) Fixed cost d) None of the above

9) Annual depreciation cost is calculated by
   a) Sinking fund method b) Straight line method
   c) Both a) and b) d) Estimate value

P.T.O.

10) In Hopkinson demand rate the energy bill is dependant upon
   a) The energy consumed
   b) The maximum demand of the consumer
   c) Both a) and b)
   d) None of the above

11) Pyranometer is used to measure
   a) Beam radiation
   b) Diffuse radiation
   c) Global radiation
   d) All of the above

12) The ratio of beam radiation flux falling on a tilted surface to that falling on horizontal surface is
   a) Skew factor b) View factor c) Tilt factor d) Surface factor

13) The dispersion of solar energy is maximum at a wavelength of
   a) 1.0 μm b) 0.48 μm c) 1.4 μm d) 2.2 μm

14) Energy conservation involves
   a) Scrap rejection
   b) Surplus use of facilities
   c) Investment into energy efficient instrument
   d) Depreciation of funds

15) The geometric concentration ratio for parabolic collectors increases with increase in
   a) Aperture area
   b) Absorber area
   c) Reflector area
   d) All of the above

16) For drag type wind machines tip speed ratio is
   a) < 1 b) > 1 c) ≤ 0.59 d) $= 0.59$

17) The function of solar collector is to convert
   a) Solar energy into electricity
   b) Solar energy into radiation
   c) Solar energy into thermal energy
   d) All of the above

18) At the same wind speed wind turbine output power will increases with
   a) Altitude
   b) Solidity of rotor
   c) Diameter of rotor
   d) None of the above

19) The turbine which is used in tidal power plant for getting continuous power is
   a) Simple impulse turbine
   b) Reversible type
   c) Propeller type
   d) All of the above

20) Geothermal power plants as compared to fossil fuel plants have load factor
   a) Equal
   b) Lower
   c) Higher
   d) None of the above

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T.E. (Mechanical) (Part – II) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING PROFESSIONAL (Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) Make suitable assumptions **if necessary** and state them **clearly**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Describe in brief "Energy Policy of India". **6**

   b) Describe with neat sketches various types of loads on power plant and their variation. **7**

   c) A power plant supplies the loads having maximum demands of 40 MW, 50 MW and 30 MW respectively. The load factor of the plant on the basis of annual load curve is 60% and the diversity factor of the load is 1.2.

      Determine :

      a) The maximum load on the power plant

      b) The capacity of the power plant

      c) Annual energy supplied by the power plant. **7**

3. a) Describe various factors affecting efficiency of thermal power station used as base load power plant. **7**

   b) Draw a neat diagram of pump storage plant explaining its working as a peak load plant. **7**

   c) Differentiate between fixed and operating costs of power plants; enlist and explain the items which constitute the fixed and the operating cost. **6**

4. Write short note on **any four** : **(5×4=20)**

   a) Role of private sector in energy management

   b) Tariff methods

   c) Load sharing between base load and peak load power stations

   d) Selection of generation equipments

   e) Effect of variable load on power plant.

SECTION – II

5. a) Define Hour angle, Inclination angle, Zenith angle with neat sketches. **6**

   b) Explain with neat sketch pyranometer. **7**

   c) Discuss the classification of wind turbines. **7**

6. a) Explain with neat sketch horizontal axis wind machine. **6**

   b) Determine the diameter of the wind mill required to develop 500 kw power. The wind speed available at the site is 10 m/s and power coefficient is 0.45.

      a) Find the power produced by the wind mill per year if its effective use is 2500 hrs per year.

      b) Torque when rotor is rotating at 300 rpm.

      (Take ρ (Air) = 1.205 kg/m^3 at the site). **7**

   c) How can power be produced by using various tidal power plants ? **7**

7. Write short note on **any four** : **(5×4=20)**

   a) Ocean thermal energy

   b) Dolphin type wave machine

   c) Energy audit

   d) Energy conservation

   e) Energy flow diagram.

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Set **Q**

T.E. (Mechanical) (Part – II) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING PROFESSIONAL (Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 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) Answer **any two** questions from **each** Section.*
*4) Make suitable assumptions **if necessary** and state them **clearly**.*
*5) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) For drag type wind machines tip speed ratio is
a) < 1 b) > 1 c) $\leq$ 0.59 d) = 0.59

2) The function of solar collector is to convert
a) Solar energy into electricity b) Solar energy into radiation
c) Solar energy into thermal energy d) All of the above

3) At the same wind speed wind turbine output power will increases with
a) Altitude b) Solidity of rotor
c) Diameter of rotor d) None of the above

4) The turbine which is used in tidal power plant for getting continuous power is
a) Simple impulse turbine b) Reversible type
c) Propeller type d) All of the above

5) Geothermal power plants as compared to fossil fuel plants have load factor
a) Equal b) Lower
c) Higher d) None of the above

6) Load curve shows variation in
a) Demand w.r.t. supply b) Supply w.r.t. time
c) Demand w.r.t. time d) Supply w.r.t. demand

7) India's first nuclear power plant was installed at
a) Tarapur b) Kota c) Kalpakkam d) None of these

8) Load factor of power station is generally
a) Equal to unity b) Less than unity c) More than unity d) None of these

9) The load factor of heavy industries may be taken as
a) 10 to 20% b) 25 to 40% c) 50 to 70% d) 70 to 80%

P.T.O.

10) Diversity factor is usually highest for
   a) Industrial consumers b) Commercial loads
   c) Residential consumers d) Municipal loads

11) Pumped storage hydroelectric power plant is more suitable use as
   a) Peak load plant b) Base load plant
   c) Intermediate load plant d) All of the above

12) The general type of tariff is
   a) bc + y b) by + c c) ax^2 d) ax + by + c

13) Insurance premium of power plant is considered as
   a) Variable cost b) Fixed variable cost
   c) Fixed cost d) None of the above

14) Annual depreciation cost is calculated by
   a) Sinking fund method b) Straight line method
   c) Both a) and b) d) Estimate value

15) In Hopkinson demand rate the energy bill is dependant upon
   a) The energy consumed
   b) The maximum demand of the consumer
   c) Both a) and b)
   d) None of the above

16) Pyranometer is used to measure
   a) Beam radiation b) Diffuse radiation
   c) Global radiation d) All of the above

17) The ratio of beam radiation flux falling on a tilted surface to that falling on horizontal surface is
   a) Skew factor b) View factor c) Tilt factor d) Surface factor

18) The dispersion of solar energy is maximum at a wavelength of
   a) 1.0 μm b) 0.48 μm c) 1.4 μm d) 2.2 μm

19) Energy conservation involves
   a) Scrap rejection
   b) Surplus use of facilities
   c) Investment into energy efficient instrument
   d) Depreciation of funds

20) The geometric concentration ratio for parabolic collectors increases with increase in
   a) Aperture area b) Absorber area
   c) Reflector area d) All of the above

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T.E. (Mechanical) (Part – II) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING PROFESSIONAL (Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) Make suitable assumptions **if necessary** and state them **clearly**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Describe in brief "Energy Policy of India". **6**

   b) Describe with neat sketches various types of loads on power plant and their variation. **7**

   c) A power plant supplies the loads having maximum demands of 40 MW, 50 MW and 30 MW respectively. The load factor of the plant on the basis of annual load curve is 60% and the diversity factor of the load is 1.2.

      Determine :

      a) The maximum load on the power plant

      b) The capacity of the power plant

      c) Annual energy supplied by the power plant. **7**

3. a) Describe various factors affecting efficiency of thermal power station used as base load power plant. **7**

   b) Draw a neat diagram of pump storage plant explaining its working as a peak load plant. **7**

   c) Differentiate between fixed and operating costs of power plants; enlist and explain the items which constitute the fixed and the operating cost. **6**

4. Write short note on **any four** : **(5×4=20)**

   a) Role of private sector in energy management

   b) Tariff methods

   c) Load sharing between base load and peak load power stations

   d) Selection of generation equipments

   e) Effect of variable load on power plant.

Set Q

SECTION – II

5. a) Define Hour angle, Inclination angle, Zenith angle with neat sketches. **6**

   b) Explain with neat sketch pyranometer. **7**

   c) Discuss the classification of wind turbines. **7**

6. a) Explain with neat sketch horizontal axis wind machine. **6**

   b) Determine the diameter of the wind mill required to develop 500 kw power. The wind speed available at the site is 10 m/s and power coefficient is 0.45.

      a) Find the power produced by the wind mill per year if its effective use is 2500 hrs per year.

      b) Torque when rotor is rotating at 300 rpm.

      (Take ρ (Air) = 1.205 kg/m^3 at the site). **7**

   c) How can power be produced by using various tidal power plants ? **7**

7. Write short note on **any four** : **(5×4=20)**

   a) Ocean thermal energy

   b) Dolphin type wave machine

   c) Energy audit

   d) Energy conservation

   e) Energy flow diagram.

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Set **R**

T.E. (Mechanical) (Part – II) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING PROFESSIONAL (Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 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) Answer **any two** questions from **each** Section.*
*4) Make suitable assumptions **if necessary** and state them **clearly**.*
*5) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Pyranometer is used to measure
   a) Beam radiation b) Diffuse radiation
   c) Global radiation d) All of the above

2) The ratio of beam radiation flux falling on a tilted surface to that falling on horizontal surface is
   a) Skew factor b) View factor c) Tilt factor d) Surface factor

3) The dispersion of solar energy is maximum at a wavelength of
   a) 1.0 μm b) 0.48 μm c) 1.4 μm d) 2.2 μm

4) Energy conservation involves
   a) Scrap rejection
   b) Surplus use of facilities
   c) Investment into energy efficient instrument
   d) Depreciation of funds

5) The geometric concentration ratio for parabolic collectors increases with increase in
   a) Aperture area b) Absorber area
   c) Reflector area d) All of the above

6) For drag type wind machines tip speed ratio is
   a) < 1 b) > 1 c) ≤ 0.59 d) $= 0.59$

7) The function of solar collector is to convert
   a) Solar energy into electricity b) Solar energy into radiation
   c) Solar energy into thermal energy d) All of the above

8) At the same wind speed wind turbine output power will increases with
   a) Altitude b) Solidity of rotor
   c) Diameter of rotor d) None of the above

9) The turbine which is used in tidal power plant for getting continuous power is
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) All of the above

10) Geothermal power plants as compared to fossil fuel plants have load factor
   a) Equal b) Lower
   c) Higher d) None of the above

11) Load curve shows variation in
   a) Demand w.r.t. supply b) Supply w.r.t. time
   c) Demand w.r.t. time d) Supply w.r.t. demand

12) India's first nuclear power plant was installed at
   a) Tarapur b) Kota c) Kalpakkam d) None of these

13) Load factor of power station is generally
   a) Equal to unity b) Less than unity c) More than unity d) None of these

14) The load factor of heavy industries may be taken as
   a) 10 to 20% b) 25 to 40% c) 50 to 70% d) 70 to 80%

15) Diversity factor is usually highest for
   a) Industrial consumers b) Commercial loads
   c) Residential consumers d) Municipal loads

16) Pumped storage hydroelectric power plant is more suitable use as
   a) Peak load plant b) Base load plant
   c) Intermediate load plant d) All of the above

17) The general type of tariff is
   a) bc + y b) by + c c) ax^2 d) ax + by + c

18) Insurance premium of power plant is considered as
   a) Variable cost b) Fixed variable cost
   c) Fixed cost d) None of the above

19) Annual depreciation cost is calculated by
   a) Sinking fund method b) Straight line method
   c) Both a) and b) d) Estimate value

20) In Hopkinson demand rate the energy bill is dependant upon
   a) The energy consumed
   b) The maximum demand of the consumer
   c) Both a) and b)
   d) None of the above

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T.E. (Mechanical) (Part – II) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING PROFESSIONAL (Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) Make suitable assumptions **if necessary** and state them **clearly**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Describe in brief "Energy Policy of India". **6**

   b) Describe with neat sketches various types of loads on power plant and their variation. **7**

   c) A power plant supplies the loads having maximum demands of 40 MW, 50 MW and 30 MW respectively. The load factor of the plant on the basis of annual load curve is 60% and the diversity factor of the load is 1.2.

      Determine :

      a) The maximum load on the power plant

      b) The capacity of the power plant

      c) Annual energy supplied by the power plant. **7**

3. a) Describe various factors affecting efficiency of thermal power station used as base load power plant. **7**

   b) Draw a neat diagram of pump storage plant explaining its working as a peak load plant. **7**

   c) Differentiate between fixed and operating costs of power plants; enlist and explain the items which constitute the fixed and the operating cost. **6**

4. Write short note on **any four** : **(5×4=20)**

   a) Role of private sector in energy management

   b) Tariff methods

   c) Load sharing between base load and peak load power stations

   d) Selection of generation equipments

   e) Effect of variable load on power plant.

Set R

SECTION – II

5. a) Define Hour angle, Inclination angle, Zenith angle with neat sketches. **6**

   b) Explain with neat sketch pyranometer. **7**

   c) Discuss the classification of wind turbines. **7**

6. a) Explain with neat sketch horizontal axis wind machine. **6**

   b) Determine the diameter of the wind mill required to develop 500 kw power. The wind speed available at the site is 10 m/s and power coefficient is 0.45.

      a) Find the power produced by the wind mill per year if its effective use is 2500 hrs per year.

      b) Torque when rotor is rotating at 300 rpm.

      (Take ρ (Air) = 1.205 kg/m^3 at the site). **7**

   c) How can power be produced by using various tidal power plants ? **7**

7. Write short note on **any four** : **(5×4=20)**

   a) Ocean thermal energy

   b) Dolphin type wave machine

   c) Energy audit

   d) Energy conservation

   e) Energy flow diagram.

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Set **S**

T.E. (Mechanical) (Part – II) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING PROFESSIONAL (Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 1.00 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) Answer **any two** questions from **each** Section.*
*4) Make suitable assumptions **if necessary** and state them **clearly**.*
*5) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Pumped storage hydroelectric power plant is more suitable use as
   a) Peak load plant b) Base load plant
   c) Intermediate load plant d) All of the above

2) The general type of tariff is
   a) bc + y b) by + c c) ax^2 d) ax + by + c

3) Insurance premium of power plant is considered as
   a) Variable cost b) Fixed variable cost
   c) Fixed cost d) None of the above

4) Annual depreciation cost is calculated by
   a) Sinking fund method b) Straight line method
   c) Both a) and b) d) Estimate value

5) In Hopkinson demand rate the energy bill is dependant upon
   a) The energy consumed
   b) The maximum demand of the consumer
   c) Both a) and b)
   d) None of the above

6) Pyranometer is used to measure
   a) Beam radiation b) Diffuse radiation
   c) Global radiation d) All of the above

7) The ratio of beam radiation flux falling on a tilted surface to that falling on horizontal surface is
   a) Skew factor b) View factor c) Tilt factor d) Surface factor

P.T.O.

8) The dispersion of solar energy is maximum at a wavelength of
   a) 1.0 μm b) 0.48 μm c) 1.4 μm d) 2.2 μm

9) Energy conservation involves
   a) Scrap rejection
   b) Surplus use of facilities
   c) Investment into energy efficient instrument
   d) Depreciation of funds

10) The geometric concentration ratio for parabolic collectors increases with increase in
   a) Aperture area b) Absorber area
   c) Reflector area d) All of the above

11) For drag type wind machines tip speed ratio is
   a) < 1 b) > 1 c) ≤ 0.59 d) $= 0.59$

12) The function of solar collector is to convert
   a) Solar energy into electricity b) Solar energy into radiation
   c) Solar energy into thermal energy d) All of the above

13) At the same wind speed wind turbine output power will increases with
   a) Altitude b) Solidity of rotor
   c) Diameter of rotor d) None of the above

14) The turbine which is used in tidal power plant for getting continuous power is
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) All of the above

15) Geothermal power plants as compared to fossil fuel plants have load factor
   a) Equal b) Lower
   c) Higher d) None of the above

16) Load curve shows variation in
   a) Demand w.r.t. supply b) Supply w.r.t. time
   c) Demand w.r.t. time d) Supply w.r.t. demand

17) India's first nuclear power plant was installed at
   a) Tarapur b) Kota c) Kalpakkam d) None of these

18) Load factor of power station is generally
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19) The load factor of heavy industries may be taken as
   a) 10 to 20% b) 25 to 40% c) 50 to 70% d) 70 to 80%

20) Diversity factor is usually highest for
   a) Industrial consumers b) Commercial loads
   c) Residential consumers d) Municipal loads

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T.E. (Mechanical) (Part – II) Examination, 2016
POWER PLANT AND ENERGY ENGINEERING PROFESSIONAL (Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) Make suitable assumptions **if necessary** and state them **clearly**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Describe in brief "Energy Policy of India". **6**

   b) Describe with neat sketches various types of loads on power plant and their variation. **7**

   c) A power plant supplies the loads having maximum demands of 40 MW, 50 MW and 30 MW respectively. The load factor of the plant on the basis of annual load curve is 60% and the diversity factor of the load is 1.2.

      Determine :

      a) The maximum load on the power plant

      b) The capacity of the power plant

      c) Annual energy supplied by the power plant. **7**

3. a) Describe various factors affecting efficiency of thermal power station used as base load power plant. **7**

   b) Draw a neat diagram of pump storage plant explaining its working as a peak load plant. **7**

   c) Differentiate between fixed and operating costs of power plants; enlist and explain the items which constitute the fixed and the operating cost. **6**

4. Write short note on **any four** : **(5×4=20)**

   a) Role of private sector in energy management

   b) Tariff methods

   c) Load sharing between base load and peak load power stations

   d) Selection of generation equipments

   e) Effect of variable load on power plant.

Set S

SECTION – II

5. a) Define Hour angle, Inclination angle, Zenith angle with neat sketches. **6**

   b) Explain with neat sketch pyranometer. **7**

   c) Discuss the classification of wind turbines. **7**

6. a) Explain with neat sketch horizontal axis wind machine. **6**

   b) Determine the diameter of the wind mill required to develop 500 kw power. The wind speed available at the site is 10 m/s and power coefficient is 0.45.

      a) Find the power produced by the wind mill per year if its effective use is 2500 hrs per year.

      b) Torque when rotor is rotating at 300 rpm.

      (Take ρ (Air) = 1.205 kg/m^3 at the site). **7**

   c) How can power be produced by using various tidal power plants ? **7**

7. Write short note on **any four** : **(5×4=20)**

   a) Ocean thermal energy

   b) Dolphin type wave machine

   c) Energy audit

   d) Energy conservation

   e) Energy flow diagram.

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Professional Elective – II
MECHANICAL VIBRATION

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) If mass of body increases 9 times
   a) Frequency decreases 3 times b) Frequency increases 3 times
   c) Frequency does not change d) Zero

2) In energy method for finding frequency of system
   a) The sum of kinetic and potential energy is zero
   b) The sum of kinetic and potential energy is constant
   c) System is assumed to be non-conservative
   d) Frequency cannot be determined

3) A system is said to be critically damped if damping factor for the system is
   a) more than one b) equal to one c) less than one d) equal to zero

4) During Resonance
   a) high amplitude of vibration occurs b) low amplitude of vibration occurs
   c) no vibration occurs d) vibration remain unaffected

5) Dynamic vibration absorber is suitable for
   a) constant speed machine b) varying speed machines
   c) zero speed range machines d) none of above

6) Resultant stiffness of two springs in series as compared to individual stiffness of any of two springs
   a) is more b) is less c) is equal d) none of above

7) In a spring mass system if mass of system is doubled with spring stiffness halved, the natural frequency of vibration
   a) remain unchanged b) is doubled
   c) is halved d) is quadrupled

P.T.O.

8) In a spring mass system the mass 'm' and spring stiffness 'k' is taken very high altitude, the natural frequency of longitudinal vibrations
   a) increases
   b) remain unchanged
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   d) may increase or decrease depends on value spring mass

9) The energy dissipated per cycle depends upon of coefficient of friction in case of
   a) viscous damping b) coulomb damping
   c) structural damping d) slip damping

10) The characteristics of under damped system of motion are
   a) amplitude increases with time b) amplitude decreases with time
   c) amplitude is constant with time d) none

11) A harmonic motion is
   a) necessarily periodic motion b) non-periodic motion
   c) a motion described in a circle d) a random motion

12) In a dynamic vibration absorber system, under tuned conditions which of following relation hold ?
   a) K1K2 = M1M2 b) K1M2 = M1K2
   c) K1M1 = M2K2 d) none

13) The equivalent stiffness of spring connected in series having stiffness k1 & k2 can be written as
   a) (1/k1) + (1/k2) b) k1 + k2 c) (1/k1) – (1/k2) d) none

14) Main properties of vibrating system
   a) Mass and Stiffness b) Mass, stiffness and damping
   c) Stiffness and damping d) Damping and Stiffness

15) If spring of stiffness K units is cut into 2 equal pieces, then stiffness of each spring
   a) K/3 b) 2K c) 3K d) 5K

16) Accelerometer is designed with
   a) low frequency b) high frequency c) zero frequency d) none

17) Vibrometers have natural frequency of order
   a) 4Hz b) 100Hz c) 1000Hz d) above 10kHz

18) The material normally used for vibration isolation is
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SECTION – I

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   ii) Cycle
   iii) Resonance
   iv) Stiffness
   v) Forced vibration.

   b) State types of damping and explain any one type of damping system. **5**

3. a) Derive governing equation single degree spring mass damped system under harmonic excitation. **8**

   b) Explain logarithmic decrement of spring mass undamped system. **5**

4. a) For spring mass system as shown in figure (01), determine (i) equation of motion (ii) Natural frequency (iii) normal mode of system. **10**

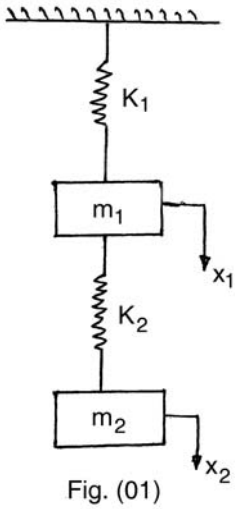

Fig. (01)

   b) Distinguish between Periodic & non-periodic motion. **4**

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5. a) For the system as shown in figure (02) find equation of motion and also find its natural frequency. **8**

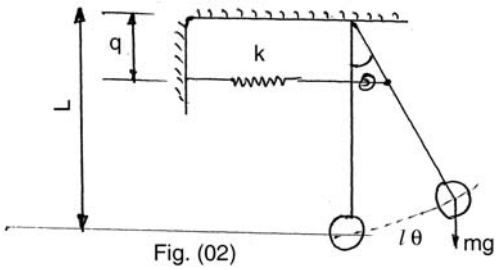

Fig. (02)

b) Explain steps involved in vibration analysis. **5**

SECTION – II

6. a) Distinguish between linear and nonlinear vibrations. **5**

b) Explain Principal of accelerometer with sketch and frequency curve. **3**

c) Explain FFT analyzer in brief. **5**

7. a) Explain principal of superposition in Nonlinear vibration and brief about nature of nonlinearity for simple pendulum. **8**

b) Write a short note on Vibration Exciter. **5**

8. a) Determine the natural frequency of torsional vibration of shaft with two circular discs of uniform thickness at the ends as shown in figure (03). The masses of discs are M1 = 500 kg and M2 = 1000 kg and their outer diameters are D1 = 125 cm and D2 = 190 cm. The length of shaft is L = 300 cm and its diameter d = 10 cm. Take G = 0.83×10^{11} N/m^2. **8**

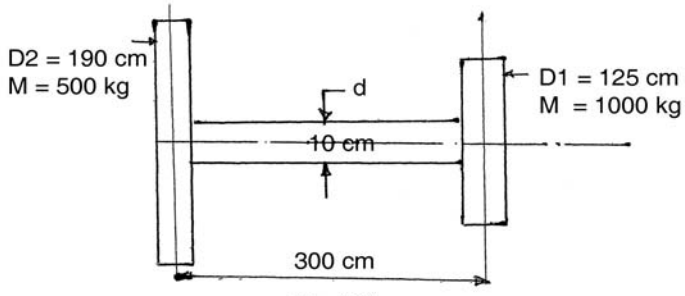

Fig. (03)

b) Write as short note on Random vibration analysis. **5**

9. Write a short note on (attempt **any two**). **14**

a) Torsional Vibration of shaft

b) Force Transmissibility

c) Time and Frequency domain analysis.

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a) low frequency b) high frequency c) zero frequency d) none

2) Vibrometers have natural frequency of order
a) 4Hz b) 100Hz c) 1000Hz d) above 10kHz

3) The material normally used for vibration isolation is
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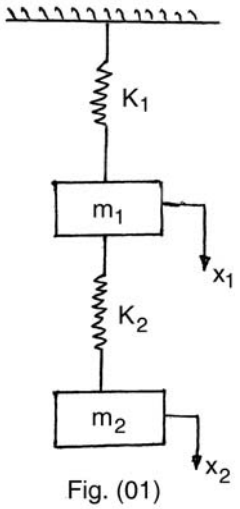

Fig. (01)

   b) Distinguish between Periodic & non-periodic motion. **4**

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5. a) For the system as shown in figure (02) find equation of motion and also find its natural frequency. **8**

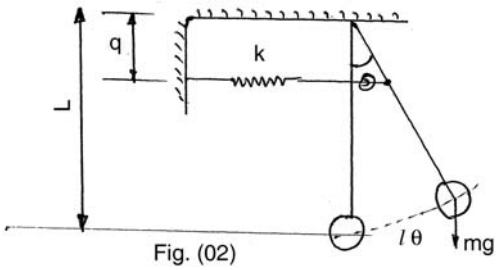

Fig. (02)

b) Explain steps involved in vibration analysis. **5**

SECTION – II

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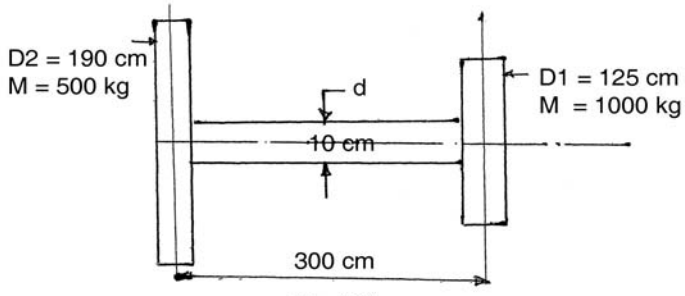

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Set Q

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Set R

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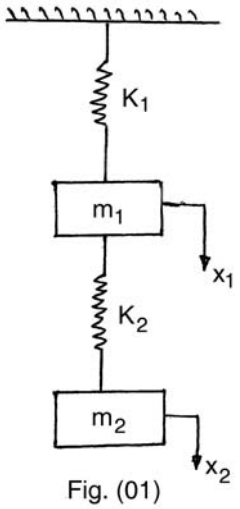

Fig. (01)

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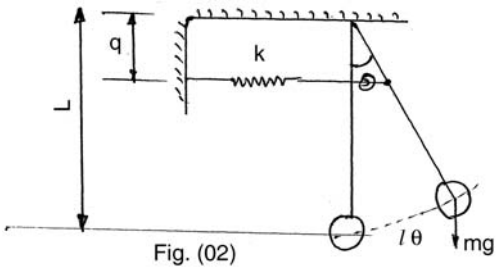

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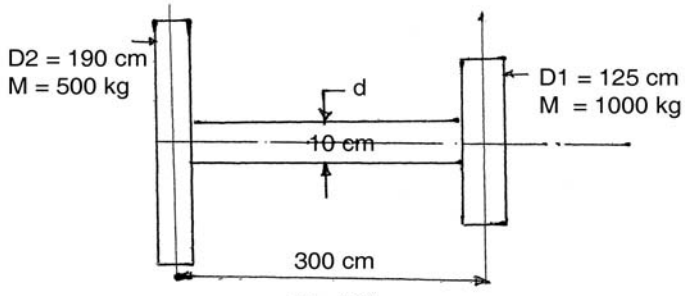

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   c) Stiffness and damping d) Damping and Stiffness

10) If spring of stiffness K units is cut into 2 equal pieces, then stiffness of each spring
   a) K/3 b) 2K c) 3K d) 5K

11) Accelerometer is designed with
   a) low frequency b) high frequency c) zero frequency d) none

12) Vibrometers have natural frequency of order
   a) 4Hz b) 100Hz c) 1000Hz d) above 10kHz

13) The material normally used for vibration isolation is
   a) rubber b) metallic spring c) both a & b d) glass

14) In case of nonlinear vibration frequency of system
   a) is constant b) is not constant
   c) cannot be predicted d) none

15) Each outcome of an experiment for random variable
   a) a sample point b) a random point
   c) an observed value d) all of above

16) If mass of body increases 9 times
   a) Frequency decreases 3 times b) Frequency increases 3 times
   c) Frequency does not change d) Zero

17) In energy method for finding frequency of system
   a) The sum of kinetic and potential energy is zero
   b) The sum of kinetic and potential energy is constant
   c) System is assumed to be non-conservative
   d) Frequency cannot be determined

18) A system is said to be critically damped if damping factor for the system is
   a) more than one b) equal to one c) less than one d) equal to zero

19) During Resonance
   a) high amplitude of vibration occurs b) low amplitude of vibration occurs
   c) no vibration occurs d) vibration remain unaffected

20) Dynamic vibration absorber is suitable for
   a) constant speed machine b) varying speed machines
   c) zero speed range machines d) none of above

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Seat No.	

T.E. (Mech.) (Part – II) Examination, 2016
Professional Elective – II
MECHANICAL VIBRATION

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Solve **any three** questions from **each** Section-**I** & Section-**II**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make suitable assumptions if **necessary** and state them **clearly**.*

SECTION – I

2. a) Define following terms (**any four**). **8**
   i) Simple Harmonic Motion
   ii) Cycle
   iii) Resonance
   iv) Stiffness
   v) Forced vibration.

   b) State types of damping and explain any one type of damping system. **5**

3. a) Derive governing equation single degree spring mass damped system under harmonic excitation. **8**

   b) Explain logarithmic decrement of spring mass undamped system. **5**

4. a) For spring mass system as shown in figure (01), determine (i) equation of motion (ii) Natural frequency (iii) normal mode of system. **10**

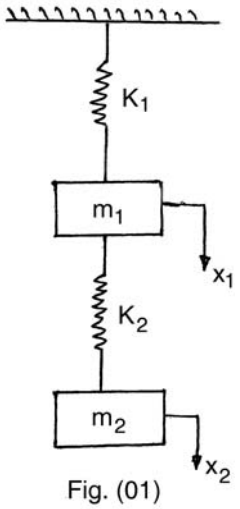

Fig. (01)

   b) Distinguish between Periodic & non-periodic motion. **4**

Set S

5. a) For the system as shown in figure (02) find equation of motion and also find its natural frequency. **8**

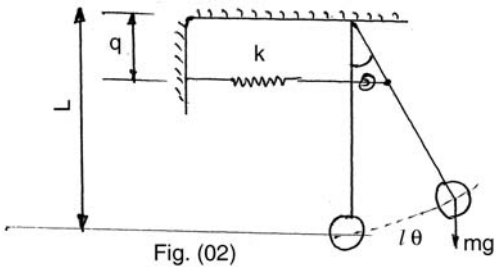

Fig. (02)

b) Explain steps involved in vibration analysis. **5**

SECTION – II

6. a) Distinguish between linear and nonlinear vibrations. **5**

b) Explain Principal of accelerometer with sketch and frequency curve. **3**

c) Explain FFT analyzer in brief. **5**

7. a) Explain principal of superposition in Nonlinear vibration and brief about nature of nonlinearity for simple pendulum. **8**

b) Write a short note on Vibration Exciter. **5**

8. a) Determine the natural frequency of torsional vibration of shaft with two circular discs of uniform thickness at the ends as shown in figure (03). The masses of discs are M1 = 500 kg and M2 = 1000 kg and their outer diameters are D1 = 125 cm and D2 = 190 cm. The length of shaft is L = 300 cm and its diameter d = 10 cm. Take G = 0.83×10^{11} N/m^2. **8**

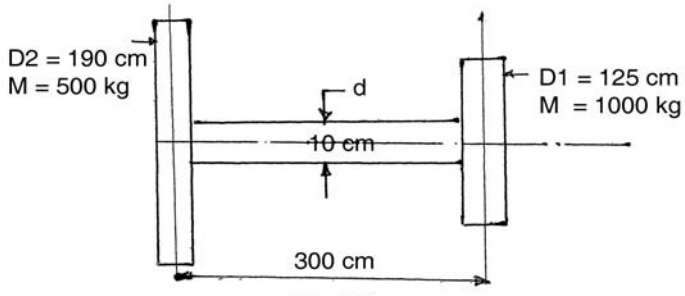

Fig. (03)

b) Write as short note on Random vibration analysis. **5**

9. Write a short note on (attempt **any two**). **14**

a) Torsional Vibration of shaft

b) Force Transmissibility

c) Time and Frequency domain analysis.

Set S

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Seat No.	

Set **P**

T.E. (Mechanical) Part – II Examination, 2016
TOOL ENGINEERING (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 2.00 p.m.

Instructions:
1) *Question number **1, 2** and **6** are **compulsory**.*
2) *Answer **any two full** questions from the remaining in **each** Section.*
3) *Figures to **right** indicate **full** marks.*
4) *Make suitable assumptions, if required and state them **clearly**.*
5) *Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
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 : **(1×10=10)**

A) 1) In bending allowance the value of K is dependent on
   a) Inner radius b) Length of bend
   c) Bend angle d) All above

2) For carrying out boring operation on lathe machine of a component on mass basis
   a) Jig is used b) Fixture is used
   c) Both jig and fixture are used d) Neither jig nor fixture is used

3) Tool life is largely affected by
   a) Depth of cut b) Cutting speed
   c) Feed d) All above

4) Spring back phenomenon is associated with
   a) Drawing b) Bending
   c) Cutting d) Forming

5) In sheet metal work, the cutting force on the tool can be reduced by
   a) Grinding the cutting edges sharp
   b) Increasing hardness of tool
   c) Providing shear angle on tool
   d) Increasing hardness of die

6) In ASA system, if tool signature is 8 - 14 - 5 - 5 - 10 - 15 - 2 mm then side rake angle
   a) 5° b) 8°
   c) 14° d) 10°

7) The process by which multiple holes which are very small and close together are cut in a flat work material is
   a) Shaving b) Trimming
   c) Bending d) Perforating

P.T.O.

8) The male component of the die assembly which is fastened to press ram is
   a) Bolster plate b) Punch
   c) Die d) Stripper

9) Dynamometer is used to measure
   a) Cutting force b) Power
   c) Cutting speed d) None of these

10) The most common material for multiple point cutting tool is
   a) Mild steel b) Stainless steel
   c) HSS d) None of these

B) 11) Which of the following elements belong to fixture ? **(5×2=10)**
   a) Guide post b) Tennon
   c) Finger stop d) Setting block

12) Jigs are machine shop devices which consist of
   a) Location b) Clamping
   c) Means of tool guiding d) Setting block

13) Which can be treated as assets ?
   a) Buildings b) Manpower
   c) Equipments d) Equity

14) Which of the following is chip removal process ?
   a) Die casting b) Broaching
   c) Forging d) Grinding

15) Breakeven point is used to analyze
   a) Capacity of machine
   b) Min. Qty. to be produced for No. loss
   c) Profit or loss
   d) None of the above

SLR-EP – 442

Seat No.	

T.E. (Mechanical) Part – II Examination, 2016
TOOL ENGINEERING (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 2.00 p.m.

Instructions: *1) Question number **2** and **6** are **compulsory**.*
*2) Answer **any two full** questions from the remaining in **each** Section.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, if required and state them **clearly**.*

SECTION – I

2. Design a progressive die for a component shown in Fig 1. **20**

Calculate the following :
1) Strip layout
2) Punch and die size
3) Cutting force
4) Die block dimensions
5) Clearance

D = 30 mm, t = 5, d = 10 mm, T_s = 415 N/mm^2.

OR

Design a drawing tool for production of a cup with diameter of 50 mm and height of 60 mm and having inner radius of 1.6 mm, t = 1 mm, yield stress = 45 Kg/mm^2. Draw two view of drawing tool out of one should be sectional view.

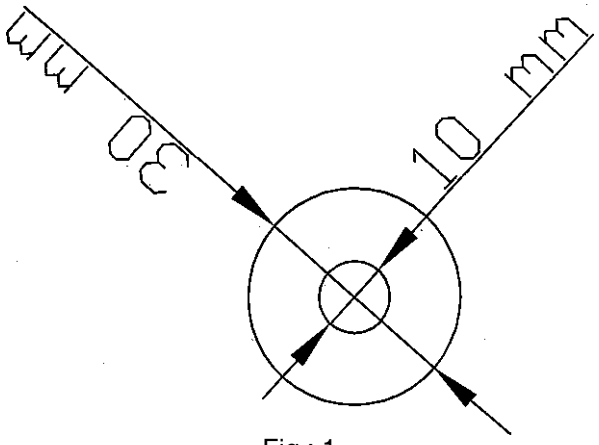

Fig : 1

3. a) The following data relates to an orthogonal cutting process. **5**

Chip thickness = 0.4 mm, feed = 0.2 mm/rev, rake angle = 10°, cutting force = 120 kg, feed force = 30 kg, width of cut = 2.3 mm

Calculate :

1) Shear angle 2) Shear stress

b) While machining with steel by HSS tool at a feed rate of 0.2 mm/rev and 2 mm depth of cut, following observations are made,

Cutting speed (m/min)	25	35
Tool life (min)	90	20

Assuming Taylor's tool life equation, recommend the speed for tool life of 1 hr. **5**

4. a) What is chip ? Discuss types of chip. **5**
   b) Discuss orthogonal and oblique cutting. **5**

5. Write notes on the following (**Any 2**) : **(5×2=10)**
   a) How to reduce cutting force in press working ?
   b) Blanking and piercing.
   c) Tool materials.
   d) Bending dies.

SECTION – II

6. Design a drill jig for 4 holes as shown in fig. 2. Draw one sectional view and top view. **20**

OR

Design a milling fixture for a slot of 30 × 10 × 2 as shown figure 2. Draw two views out of one should be sectional view.

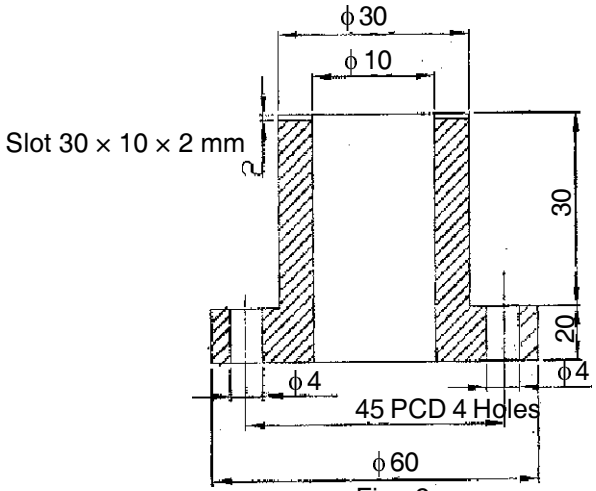

Fig : 2

7. a) Discuss 3-2-1 principle. **5**
   b) What is redundancy and how to avoid it ? **5**

8. a) Discuss types of clamping with a neat sketch. **5**
   b) Discuss types of bushes with a neat sketch. **5**

9. Write short notes on (**any 2**) : **(5×2=10)**
   a) Elements of cost and cost estimation.
   b) Nomenclature and angle of a twist drill.
   c) Diamond pin locator.
   d) Depreciation.

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Set P

SLR-EP – 442

Seat No.	

Set **Q**

T.E. (Mechanical) Part – II Examination, 2016
TOOL ENGINEERING (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 2.00 p.m.

Instructions:
1) *Question number **1, 2** and **6** are **compulsory**.*
2) *Answer **any two full** questions from the remaining in **each** Section.*
3) *Figures to **right** indicate **full** marks.*
4) *Make suitable assumptions, if required and state them **clearly**.*
5) *Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
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 : **(1×10=10)**

A) 1) In ASA system, if tool signature is 8 - 14 - 5 - 5 - 10 - 15 - 2 mm then side rake angle
a) 5° b) 8°
c) 14° d) 10°

2) The process by which multiple holes which are very small and close together are cut in a flat work material is
a) Shaving b) Trimming
c) Bending d) Perforating

3) The male component of the die assembly which is fastened to press ram is
a) Bolster plate b) Punch
c) Die d) Stripper

4) Dynamometer is used to measure
a) Cutting force b) Power
c) Cutting speed d) None of these

5) The most common material for multiple point cutting tool is
a) Mild steel b) Stainless steel
c) HSS d) None of these

6) In bending allowance the value of K is dependent on
a) Inner radius b) Length of bend
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7) For carrying out boring operation on lathe machine of a component on mass basis
a) Jig is used b) Fixture is used
c) Both jig and fixture are used d) Neither jig nor fixture is used

P.T.O.

8) Tool life is largely affected by
   a) Depth of cut
   b) Cutting speed
   c) Feed
   d) All above

9) Spring back phenomenon is associated with
   a) Drawing
   b) Bending
   c) Cutting
   d) Forming

10) In sheet metal work, the cutting force on the tool can be reduced by
   a) Grinding the cutting edges sharp
   b) Increasing hardness of tool
   c) Providing shear angle on tool
   d) Increasing hardness of die

B) 11) Jigs are machine shop devices which consist of **(5×2=10)**
   a) Location
   b) Clamping
   c) Means of tool guiding
   d) Setting block

12) Which can be treated as assets ?
   a) Buildings
   b) Manpower
   c) Equipments
   d) Equity

13) Which of the following is chip removal process ?
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   c) Forging
   d) Grinding

14) Breakeven point is used to analyze
   a) Capacity of machine
   b) Min. Qty. to be produced for No. loss
   c) Profit or loss
   d) None of the above

15) Which of the following elements belong to fixture ?
   a) Guide post
   b) Tennon
   c) Finger stop
   d) Setting block

SLR-EP – 442

Seat No.	

T.E. (Mechanical) Part – II Examination, 2016
TOOL ENGINEERING (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 2.00 p.m.

Instructions: *1) Question number **2** and **6** are **compulsory**.*
*2) Answer **any two full** questions from the remaining in **each** Section.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, if required and state them **clearly**.*

SECTION – I

2. Design a progressive die for a component shown in Fig 1. **20**

Calculate the following :
1) Strip layout
2) Punch and die size
3) Cutting force
4) Die block dimensions
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D = 30 mm, t = 5, d = 10 mm, T_s = 415 N/mm^2.

OR

Design a drawing tool for production of a cup with diameter of 50 mm and height of 60 mm and having inner radius of 1.6 mm, t = 1 mm, yield stress = 45 Kg/mm^2. Draw two view of drawing tool out of one should be sectional view.

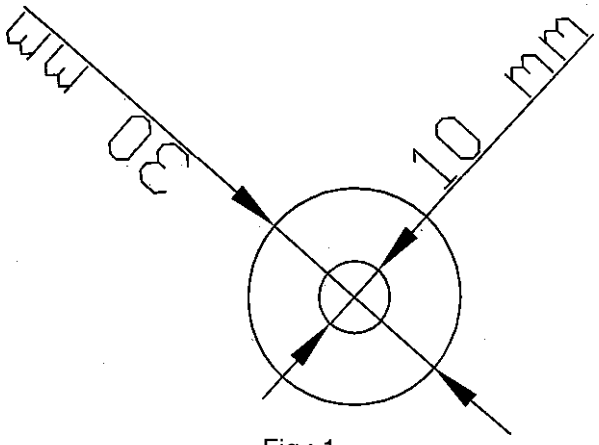

Fig : 1

3. a) The following data relates to an orthogonal cutting process. **5**

Chip thickness = 0.4 mm, feed = 0.2 mm/rev, rake angle = 10°, cutting force = 120 kg, feed force = 30 kg, width of cut = 2.3 mm

Calculate :

1) Shear angle 2) Shear stress

b) While machining with steel by HSS tool at a feed rate of 0.2 mm/rev and 2 mm depth of cut, following observations are made,

Cutting speed (m/min)	25	35
Tool life (min)	90	20

Assuming Taylor's tool life equation, recommend the speed for tool life of 1 hr. **5**

4. a) What is chip ? Discuss types of chip. **5**
   b) Discuss orthogonal and oblique cutting. **5**

5. Write notes on the following (**Any 2**) : **(5×2=10)**
   a) How to reduce cutting force in press working ?
   b) Blanking and piercing.
   c) Tool materials.
   d) Bending dies.

SECTION – II

6. Design a drill jig for 4 holes as shown in fig. 2. Draw one sectional view and top view. **20**

OR

Design a milling fixture for a slot of 30 × 10 × 2 as shown figure 2. Draw two views out of one should be sectional view.

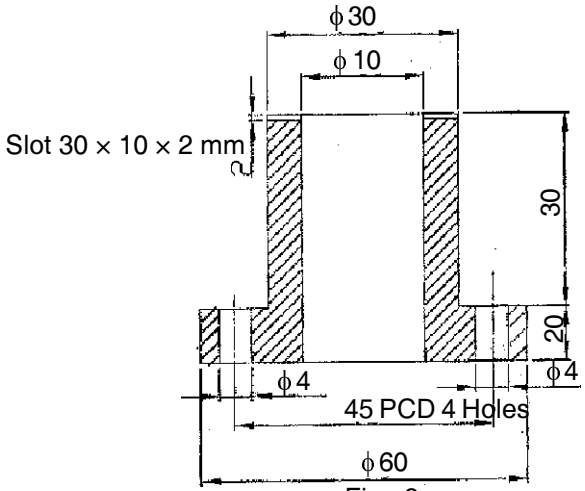

Fig : 2

7. a) Discuss 3-2-1 principle. **5**
   b) What is redundancy and how to avoid it ? **5**

8. a) Discuss types of clamping with a neat sketch. **5**
   b) Discuss types of bushes with a neat sketch. **5**

9. Write short notes on (**any 2**) : **(5×2=10)**
   a) Elements of cost and cost estimation.
   b) Nomenclature and angle of a twist drill.
   c) Diamond pin locator.
   d) Depreciation.

———————————

Set Q

SLR-EP – 442

Seat No.	

Set **R**

T.E. (Mechanical) Part – II Examination, 2016
TOOL ENGINEERING (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 2.00 p.m.

Instructions:
1) *Question number **1, 2** and **6** are **compulsory**.*
2) *Answer **any two full** questions from the remaining in **each** Section.*
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4) *Make suitable assumptions, if required and state them **clearly**.*
5) *Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
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 : **(1×10=10)**

A) 1) Spring back phenomenon is associated with
   a) Drawing b) Bending
   c) Cutting d) Forming

2) In sheet metal work, the cutting force on the tool can be reduced by
   a) Grinding the cutting edges sharp
   b) Increasing hardness of tool
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3) In ASA system, if tool signature is 8 - 14 - 5 - 5 - 10 - 15 - 2 mm then side rake angle
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P.T.O.

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   b) Clamping
   c) Means of tool guiding
   d) Setting block

SLR-EP – 442

Seat No.	

T.E. (Mechanical) Part – II Examination, 2016
TOOL ENGINEERING (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 2.00 p.m.

Instructions: *1) Question number **2** and **6** are **compulsory**.*
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SECTION – I

2. Design a progressive die for a component shown in Fig 1. **20**

Calculate the following :
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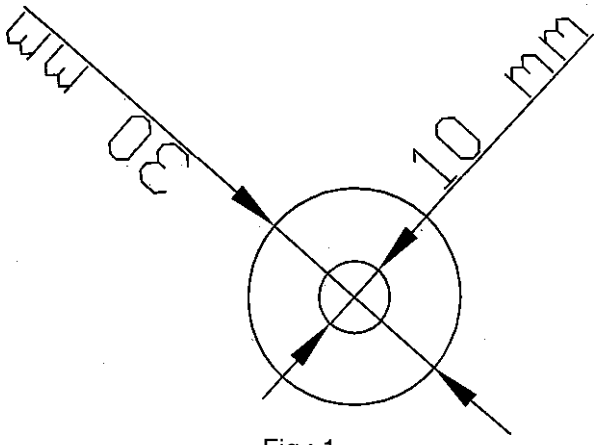

Fig : 1

3. a) The following data relates to an orthogonal cutting process. **5**

Chip thickness = 0.4 mm, feed = 0.2 mm/rev, rake angle = 10°, cutting force = 120 kg, feed force = 30 kg, width of cut = 2.3 mm

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Assuming Taylor's tool life equation, recommend the speed for tool life of 1 hr. **5**

4. a) What is chip ? Discuss types of chip. **5**
   b) Discuss orthogonal and oblique cutting. **5**

5. Write notes on the following (**Any 2**) : **(5×2=10)**
   a) How to reduce cutting force in press working ?
   b) Blanking and piercing.
   c) Tool materials.
   d) Bending dies.

SECTION – II

6. Design a drill jig for 4 holes as shown in fig. 2. Draw one sectional view and top view. **20**

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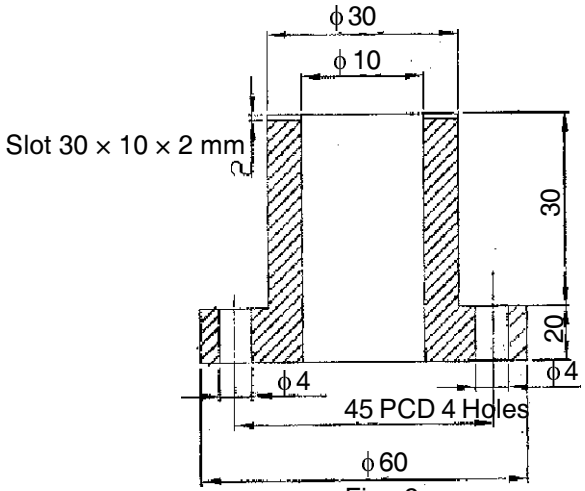

Fig : 2

7. a) Discuss 3-2-1 principle. **5**
   b) What is redundancy and how to avoid it ? **5**

8. a) Discuss types of clamping with a neat sketch. **5**
   b) Discuss types of bushes with a neat sketch. **5**

9. Write short notes on (**any 2**) : **(5×2=10)**
   a) Elements of cost and cost estimation.
   b) Nomenclature and angle of a twist drill.
   c) Diamond pin locator.
   d) Depreciation.

———————

Set R

SLR-EP – 442

Seat No.	

Set **S**

T.E. (Mechanical) Part – II Examination, 2016
TOOL ENGINEERING (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Max. Marks : 100
Time : 10.00 a.m. to 2.00 p.m.

***Instructions**:*
1) *Question number **1, 2** and **6** are **compulsory**.*
2) *Answer **any two full** questions from the remaining in **each** Section.*
3) *Figures to **right** indicate **full** marks.*
4) *Make suitable assumptions, if required and state them **clearly**.*
5) *Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
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 : **(1×10=10)**

A) 1) The most common material for multiple point cutting tool is
   a) Mild steel b) Stainless steel
   c) HSS d) None of these

2) In bending allowance the value of K is dependent on
   a) Inner radius b) Length of bend
   c) Bend angle d) All above

3) For carrying out boring operation on lathe machine of a component on mass basis
   a) Jig is used b) Fixture is used
   c) Both jig and fixture are used d) Neither jig nor fixture is used

4) Tool life is largely affected by
   a) Depth of cut b) Cutting speed
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5) Spring back phenomenon is associated with
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   a) Grinding the cutting edges sharp
   b) Increasing hardness of tool
   c) Providing shear angle on tool
   d) Increasing hardness of die

7) In ASA system, if tool signature is 8 - 14 - 5 - 5 - 10 - 15 - 2 mm then side rake angle
   a) 5° b) 8°
   c) 14° d) 10°

P.T.O.

8) The process by which multiple holes which are very small and close together are cut in a flat work material is
   a) Shaving
   b) Trimming
   c) Bending
   d) Perforating

9) The male component of the die assembly which is fastened to press ram is
   a) Bolster plate
   b) Punch
   c) Die
   d) Stripper

10) Dynamometer is used to measure
   a) Cutting force
   b) Power
   c) Cutting speed
   d) None of these

B) 11) Which of the following is chip removal process ? **(5×2=10)**
   a) Die casting
   b) Broaching
   c) Forging
   d) Grinding

12) Breakeven point is used to analyze
   a) Capacity of machine
   b) Min. Qty. to be produced for No. loss
   c) Profit or loss
   d) None of the above

13) Which of the following elements belong to fixture ?
   a) Guide post
   b) Tennon
   c) Finger stop
   d) Setting block

14) Jigs are machine shop devices which consist of
   a) Location
   b) Clamping
   c) Means of tool guiding
   d) Setting block

15) Which can be treated as assets ?
   a) Buildings
   b) Manpower
   c) Equipments
   d) Equity

SLR-EP – 442

Seat No.	

T.E. (Mechanical) Part – II Examination, 2016
TOOL ENGINEERING (Professional Elective – II)

Day and Date : Friday, 25-11-2016 Marks : 80
Time : 10.00 a.m. to 2.00 p.m.

Instructions: *1) Question number **2** and **6** are **compulsory**.*
*2) Answer **any two full** questions from the remaining in **each** Section.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, if required and state them **clearly**.*

SECTION – I

2. Design a progressive die for a component shown in Fig 1. **20**

Calculate the following :
1) Strip layout
2) Punch and die size
3) Cutting force
4) Die block dimensions
5) Clearance

D = 30 mm, t = 5, d = 10 mm, T_s = 415 N/mm^2.

OR

Design a drawing tool for production of a cup with diameter of 50 mm and height of 60 mm and having inner radius of 1.6 mm, t = 1 mm, yield stress = 45 Kg/mm^2. Draw two view of drawing tool out of one should be sectional view.

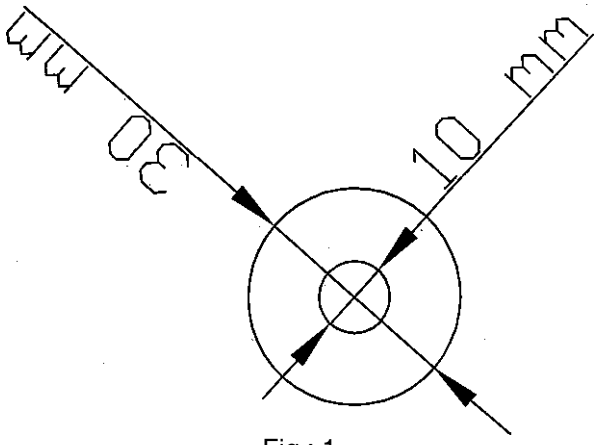

Fig : 1

3. a) The following data relates to an orthogonal cutting process. **5**

Chip thickness = 0.4 mm, feed = 0.2 mm/rev, rake angle = 10°, cutting force = 120 kg, feed force = 30 kg, width of cut = 2.3 mm

Calculate :

1) Shear angle 2) Shear stress

b) While machining with steel by HSS tool at a feed rate of 0.2 mm/rev and 2 mm depth of cut, following observations are made,

Cutting speed (m/min)	25	35
Tool life (min)	90	20

Assuming Taylor's tool life equation, recommend the speed for tool life of 1 hr. **5**

4. a) What is chip ? Discuss types of chip. **5**
   b) Discuss orthogonal and oblique cutting. **5**

5. Write notes on the following (**Any 2**) : **(5×2=10)**
   a) How to reduce cutting force in press working ?
   b) Blanking and piercing.
   c) Tool materials.
   d) Bending dies.

SECTION – II

6. Design a drill jig for 4 holes as shown in fig. 2. Draw one sectional view and top view. **20**

OR

Design a milling fixture for a slot of 30 × 10 × 2 as shown figure 2. Draw two views out of one should be sectional view.

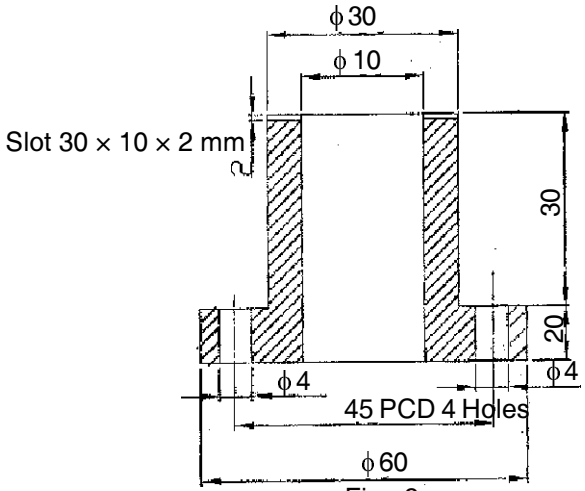

Fig : 2

7. a) Discuss 3-2-1 principle. **5**
   b) What is redundancy and how to avoid it ? **5**

8. a) Discuss types of clamping with a neat sketch. **5**
   b) Discuss types of bushes with a neat sketch. **5**

9. Write short notes on (**any 2**) : **(5×2=10)**
   a) Elements of cost and cost estimation.
   b) Nomenclature and angle of a twist drill.
   c) Diamond pin locator.
   d) Depreciation.

———————————

Set S

SLR-EP – 443

Seat No.	

Set **P**

B.E. (Mechanical Engineering) (Part – I) Examination, 2016
Professional (Elective – III)
FINITE ELEMENT METHOD

Day and Date : Tuesday, 6-12-2016 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.***
3) Answer ***any two*** *questions from* ***each*** *Section.*
4) Figures to the ***right*** *indicate* ***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 : **(20×1=20)**

1) The matrix showing relation between strain vector and displacement vector or temperature vector and temperature gradient is
A) [D] B) [K] C) [C] D) [B]

2) The material property matrix is represented as
A) [D] B) [K] C) [C] D) [B]

3) Which of the following is a Weighted Residual method ?
A) Galerkin's method B) Variational formulations
C) Potential energy method D) None of the above

4) Shock spectrum analysis is
A) Steady state problem B) Eigen value problem
C) Transient problem D) Static analysis

5) Tetrahedron with four corner nodes relates
A) 3D simplex element B) Complex element
C) Multiplex element D) None

6) A piston is fastened to the connecting rod using a gudgeon pin. What element must be used to define the connecting between the piston and gudgeon pin and gudgeon pin and connecting rod ?
A) Isoparametric element B) Mass element
C) Gap or contact element D) Axisymmetric shell

7) The function which dictate the nodal contribution of field variable is
A) Stress function B) Displacement function
C) Force function D) Shape function

8) For analysis of fluid problems the appropriate commercial software package is
A) Catia B) Pro-E C) FLUENT D) Hypermesh

P.T.O.

9) A measure of distortion of a element is
A) bandwidth B) damping ratio C) aspect ratio D) shape function

10) In Computer Integrated Manufacturing (CIM) FEM is the following phase of a manufacturing
A) CAD B) CAM C) CAE D) CAD/CAM

11) NAFEMS is a national agency which publishes guidelines on commercial software packages for following
A) Finite Element Analysis B) CAM
C) CAD D) None of the above

12) A problem which is not a function of a time
A) Eigen value problem B) Steady state problem
C) Transient problem D) Propogation problem

13) If the physical formulation of the problem is described as a differential equation, then the most popular solution method is the
A) *Method of Weighted Residuals* B) *Variational Formulation*
C) *Direct stiffness matrix* D) *None of the above*

14) Consider a differential equation $Dy''(x) + Q = 0$ Suppose that $y = h(x)$ is an approximate solution to it. Substitution then gives $Dh''(x) + Q = R$, where R is a
A) Nonzero residual B) Zero residual
C) Resultant D) None of the above

15) The MWR (Method of Weighted Residual) requires that $\int W_i(x)R(x) = 0$ where $W_i(x)$ are
A) The weighting functions B) Weighted residual
C) Error term D) None of the above

16) The equations defining approximate distribution are known as interpolation functions and can take any mathematical form in practice they are usually
A) Polynomials B) Trigonometric functions
C) Exponential function D) Hermetic function

17) The coordinate system that are local to each element but are dimensionless and have a maximum absolute magnitude of unity.
A) Global coordinate system B) Cartisian coordinate system
C) Natural coordinate system D) Polar coordinate system

18) The element with quadratic interpolation function is called as
A) Quadratic element B) Cubic element
C) Linear D) None of the above

19) The bandwidth of a matrix after node numbering where 'D' is largest difference between nodes in a single element and 'f' is the number of degrees of freedom at each node is
A) $D \times f$ B) $D + f$ C) $(D + 1) f$ D) $(D - 1) f$

20) Accuracy and reliability in modeling is achieved by
A) Higher order element B) 1 D Element
C) Both A and B D) None of above

SLR-EP – 443

Seat No.	

B.E. (Mechanical Engineering) (Part – I) Examination, 2016
Professional (Elective – III)
FINITE ELEMENT METHOD

Day and Date : Tuesday, 6-12-2016 Marks : 80

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

Instructions : *1) Answer **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data if **necessary** and mention it **clearly**.*

SECTION – I

2. a) Explain Weighted Residual Method. Classify its weak and nonweak forms. **7**

   b) Applications of FEM in different domains. **6**

   c) Solve by Galerkin method and compare u(0.8) with exact solution. **7**

$$\frac{d^2u}{dx^2} - 4u - x^2 = 0 \quad \text{BCS} : u(0) = 0 \; \frac{du}{dx}(1) = 1 \text{ find } u(0.8)$$

3. a) Discuss the various matrices stated in the following equation. **7**

$$[K] = \oint [B]^T [D][B]\, dv$$

   b) Derive **6**

$$\frac{\partial \pi}{\partial \{U\}} = \left(\sum_{C=1}^{E} \left[K^{(e)} \right] \right) \{U\} - \{F\} = 0 \cdot$$

   c) Discuss one dimensional, two dimensional and three dimensional elements and their properties. **7**

4. Write short notes on **any five** : **(4×5=20)**

   a) Advantage and disadvantage of FEM

   b) Galerkin method

   c) Properties of Global stiffness matrix

   d) Element connectivity

   e) Truss Element

   f) Numerical methods.

Set P

SECTION – II

5. a) Derive 1D Quadratic element shape function in natural coordinates. **7**

   b) Explain valid and invalid mesh designs with neat sketch. **7**

   c) Explain shock spectrum analysis. **6**

6. a) Explain General FEM procedure. **7**

   b) Explain model validity and accuracy using approximation of geometry and material property. **7**

   c) Differentiate static and dynamic analysis. **6**

7. Write short notes on **any five**. **(4×5=20)**

   a) Commercial FEM software packages with their field applications

   b) Isoparametric element

   c) Jacobian

   d) Element distortion and check

   e) Modal analysis

   f) h and p Refinements.

SLR-EP – 443

Seat No.	

Set **Q**

B.E. (Mechanical Engineering) (Part – I) Examination, 2016
Professional (Elective – III)
FINITE ELEMENT METHOD

Day and Date : Tuesday, 6-12-2016 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.***
3) Answer ***any two*** *questions from* ***each*** *Section.*
4) Figures to the ***right*** *indicate* ***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 : **(20×1=20)**

1) The equations defining approximate distribution are known as interpolation functions and can take any mathematical form in practice they are usually
   A) Polynomials B) Trigonometric functions
   C) Exponential function D) Hermetic function

2) The coordinate system that are local to each element but are dimensionless and have a maximum absolute magnitude of unity.
   A) Global coordinate system B) Cartisian coordinate system
   C) Natural coordinate system D) Polar coordinate system

3) The element with quadratic interpolation function is called as
   A) Quadratic element B) Cubic element
   C) Linear D) None of the above

4) The bandwidth of a matrix after node numbering where 'D' is largest difference between nodes in a single element and 'f' is the number of degrees of freedom at each node is
   A) D × f B) D + f C) (D + 1) f D) (D – 1) f

5) Accuracy and reliability in modeling is achieved by
   A) Higher order element B) 1 D Element
   C) Both A and B D) None of above

6) The matrix showing relation between strain vector and displacement vector or temperature vector and temperature gradient is
   A) [D] B) [K] C) [C] D) [B]

7) The material property matrix is represented as
   A) [D] B) [K] C) [C] D) [B]

P.T.O.

8) Which of the following is a Weighted Residual method ?
   A) Galerkin's method
   B) Variational formulations
   C) Potential energy method
   D) None of the above

9) Shock spectrum analysis is
   A) Steady state problem
   B) Eigen value problem
   C) Transient problem
   D) Static analysis

10) Tetrahedron with four corner nodes relates
   A) 3D simplex element
   B) Complex element
   C) Multiplex element
   D) None

11) A piston is fastened to the connecting rod using a gudgeon pin. What element must be used to define the connecting between the piston and gudgeon pin and gudgeon pin and connecting rod ?
   A) Isoparametric element
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   C) Gap or contact element
   D) Axisymmetric shell

12) The function which dictate the nodal contribution of field variable is
   A) Stress function
   B) Displacement function
   C) Force function
   D) Shape function

13) For analysis of fluid problems the appropriate commercial software package is
   A) Catia B) Pro-E C) FLUENT D) Hypermesh

14) A measure of distortion of a element is
   A) bandwidth B) damping ratio C) aspect ratio D) shape function

15) In Computer Integrated Manufacturing (CIM) FEM is the following phase of a manufacturing
   A) CAD B) CAM C) CAE D) CAD/CAM

16) NAFEMS is a national agency which publishes guidelines on commercial software packages for following
   A) Finite Element Analysis
   B) CAM
   C) CAD
   D) None of the above

17) A problem which is not a function of a time
   A) Eigen value problem
   B) Steady state problem
   C) Transient problem
   D) Propogation problem

18) If the physical formulation of the problem is described as a differential equation, then the most popular solution method is the
   A) *Method of Weighted Residuals*
   B) *Variational Formulation*
   C) *Direct stiffness matrix*
   D) *None of the above*

19) Consider a differential equation $Dy''(x) + Q = 0$ Suppose that $y = h(x)$ is an approximate solution to it. Substitution then gives $Dh''(x) + Q = R$, where R is a
   A) Nonzero residual
   B) Zero residual
   C) Resultant
   D) None of the above

20) The MWR (Method of Weighted Residual) requires that $\int W_i(x)R(x) = 0$ where $W_i(x)$ are
   A) The weighting functions
   B) Weighted residual
   C) Error term
   D) None of the above

Set Q

SLR-EP – 443

Seat No.	

B.E. (Mechanical Engineering) (Part – I) Examination, 2016
Professional (Elective – III)
FINITE ELEMENT METHOD

Day and Date : Tuesday, 6-12-2016 Marks : 80

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

Instructions : *1) Answer **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data if **necessary** and mention it **clearly**.*

SECTION – I

2. a) Explain Weighted Residual Method. Classify its weak and nonweak forms. **7**

   b) Applications of FEM in different domains. **6**

   c) Solve by Galerkin method and compare u(0.8) with exact solution. **7**

$$\frac{d^2u}{dx^2} - 4u - x^2 = 0 \quad \text{BCS} : u(0) = 0 \; \frac{du}{dx}(1) = 1 \text{ find } u(0.8)$$

3. a) Discuss the various matrices stated in the following equation. **7**

$$[K] = \oint [B]^T [D][B]\, dv$$

   b) Derive **6**

$$\frac{\partial \pi}{\partial \{U\}} = \left(\sum_{C=1}^{E} \left[K^{(e)} \right] \right) \{U\} - \{F\} = 0 \cdot$$

   c) Discuss one dimensional, two dimensional and three dimensional elements and their properties. **7**

4. Write short notes on **any five** : **(4×5=20)**

   a) Advantage and disadvantage of FEM

   b) Galerkin method

   c) Properties of Global stiffness matrix

   d) Element connectivity

   e) Truss Element

   f) Numerical methods.

Set Q

SECTION – II

5. a) Derive 1D Quadratic element shape function in natural coordinates. **7**

   b) Explain valid and invalid mesh designs with neat sketch. **7**

   c) Explain shock spectrum analysis. **6**

6. a) Explain General FEM procedure. **7**

   b) Explain model validity and accuracy using approximation of geometry and material property. **7**

   c) Differentiate static and dynamic analysis. **6**

7. Write short notes on **any five**. **(4×5=20)**

   a) Commercial FEM software packages with their field applications

   b) Isoparametric element

   c) Jacobian

   d) Element distortion and check

   e) Modal analysis

   f) h and p Refinements.

SLR-EP – 443

Seat No.	

Set **R**

B.E. (Mechanical Engineering) (Part – I) Examination, 2016
Professional (Elective – III)
FINITE ELEMENT METHOD

Day and Date : Tuesday, 6-12-2016 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.***
3) Answer ***any two*** *questions from* ***each*** *Section.*
4) Figures to the ***right*** *indicate* ***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 : **(20×1=20)**

1) NAFEMS is a national agency which publishes guidelines on commercial software packages for following
   A) Finite Element Analysis B) CAM
   C) CAD D) None of the above

2) A problem which is not a function of a time
   A) Eigen value problem B) Steady state problem
   C) Transient problem D) Propogation problem

3) If the physical formulation of the problem is described as a differential equation, then the most popular solution method is the
   A) *Method of Weighted Residuals* B) *Variational Formulation*
   C) *Direct stiffness matrix* D) *None of the above*

4) Consider a differential equation $Dy''(x) + Q = 0$ Suppose that $y = h(x)$ is an approximate solution to it. Substitution then gives $Dh''(x) + Q = R$, where R is a
   A) Nonzero residual B) Zero residual
   C) Resultant D) None of the above

5) The MWR (Method of Weighted Residual) requires that $\int W_i(x)R(x) = 0$ where $W_i(x)$ are
   A) The weighting functions B) Weighted residual
   C) Error term D) None of the above

6) The equations defining approximate distribution are known as interpolation functions and can take any mathematical form in practice they are usually
   A) Polynomials B) Trigonometric functions
   C) Exponential function D) Hermetic function

P.T.O.

7) The coordinate system that are local to each element but are dimensionless and have a maximum absolute magnitude of unity.
   A) Global coordinate system B) Cartisian coordinate system
   C) Natural coordinate system D) Polar coordinate system

8) The element with quadratic interpolation function is called as
   A) Quadratic element B) Cubic element
   C) Linear D) None of the above

9) The bandwidth of a matrix after node numbering where 'D' is largest difference between nodes in a single element and 'f' is the number of degrees of freedom at each node is
   A) D × f B) D + f C) (D + 1) f D) (D – 1) f

10) Accuracy and reliability in modeling is achieved by
   A) Higher order element B) 1 D Element
   C) Both A and B D) None of above

11) The matrix showing relation between strain vector and displacement vector or temperature vector and temperature gradient is
   A) [D] B) [K] C) [C] D) [B]

12) The material property matrix is represented as
   A) [D] B) [K] C) [C] D) [B]

13) Which of the following is a Weighted Residual method ?
   A) Galerkin's method B) Variational formulations
   C) Potential energy method D) None of the above

14) Shock spectrum analysis is
   A) Steady state problem B) Eigen value problem
   C) Transient problem D) Static analysis

15) Tetrahedron with four corner nodes relates
   A) 3D simplex element B) Complex element
   C) Multiplex element D) None

16) A piston is fastened to the connecting rod using a gudgeon pin. What element must be used to define the connecting between the piston and gudgeon pin and gudgeon pin and connecting rod ?
   A) Isoparametric element B) Mass element
   C) Gap or contact element D) Axisymmetric shell

17) The function which dictate the nodal contribution of field variable is
   A) Stress function B) Displacement function
   C) Force function D) Shape function

18) For analysis of fluid problems the appropriate commercial software package is
   A) Catia B) Pro-E C) FLUENT D) Hypermesh

19) A measure of distortion of a element is
   A) bandwidth B) damping ratio C) aspect ratio D) shape function

20) In Computer Integrated Manufacturing (CIM) FEM is the following phase of a manufacturing
   A) CAD B) CAM C) CAE D) CAD/CAM

SLR-EP – 443

Seat No.	

B.E. (Mechanical Engineering) (Part – I) Examination, 2016
Professional (Elective – III)
FINITE ELEMENT METHOD

Day and Date : Tuesday, 6-12-2016 Marks : 80

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

Instructions : *1) Answer **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data if **necessary** and mention it **clearly**.*

SECTION – I

2. a) Explain Weighted Residual Method. Classify its weak and nonweak forms. **7**

   b) Applications of FEM in different domains. **6**

   c) Solve by Galerkin method and compare u(0.8) with exact solution. **7**

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$$\frac{\partial \pi}{\partial \{U\}} = \left(\sum_{C=1}^{E} \left[K^{(e)} \right] \right) \{U\} - \{F\} = 0 \cdot$$

   c) Discuss one dimensional, two dimensional and three dimensional elements and their properties. **7**

4. Write short notes on **any five** : **(4×5=20)**

   a) Advantage and disadvantage of FEM

   b) Galerkin method

   c) Properties of Global stiffness matrix

   d) Element connectivity

   e) Truss Element

   f) Numerical methods.

Set R

SECTION – II

5. a) Derive 1D Quadratic element shape function in natural coordinates. **7**

   b) Explain valid and invalid mesh designs with neat sketch. **7**

   c) Explain shock spectrum analysis. **6**

6. a) Explain General FEM procedure. **7**

   b) Explain model validity and accuracy using approximation of geometry and material property. **7**

   c) Differentiate static and dynamic analysis. **6**

7. Write short notes on **any five**. **(4×5=20)**

   a) Commercial FEM software packages with their field applications

   b) Isoparametric element

   c) Jacobian

   d) Element distortion and check

   e) Modal analysis

   f) h and p Refinements.

SLR-EP – 443

Seat No.	

Set **S**

B.E. (Mechanical Engineering) (Part – I) Examination, 2016
Professional (Elective – III)
FINITE ELEMENT METHOD

Day and Date : Tuesday, 6-12-2016 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.***
3) Answer ***any two*** *questions from* ***each*** *Section.*
4) Figures to the ***right*** *indicate* ***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 : **(20×1=20)**

1) A piston is fastened to the connecting rod using a gudgeon pin. What element must be used to define the connecting between the piston and gudgeon pin and gudgeon pin and connecting rod ?
   A) Isoparametric element B) Mass element
   C) Gap or contact element D) Axisymmetric shell

2) The function which dictate the nodal contribution of field variable is
   A) Stress function B) Displacement function
   C) Force function D) Shape function

3) For analysis of fluid problems the appropriate commercial software package is
   A) Catia B) Pro-E C) FLUENT D) Hypermesh

4) A measure of distortion of a element is
   A) bandwidth B) damping ratio C) aspect ratio D) shape function

5) In Computer Integrated Manufacturing (CIM) FEM is the following phase of a manufacturing
   A) CAD B) CAM C) CAE D) CAD/CAM

6) NAFEMS is a national agency which publishes guidelines on commercial software packages for following
   A) Finite Element Analysis B) CAM
   C) CAD D) None of the above

7) A problem which is not a function of a time
   A) Eigen value problem B) Steady state problem
   C) Transient problem D) Propogation problem

8) If the physical formulation of the problem is described as a differential equation, then the most popular solution method is the
   A) *Method of Weighted Residuals* B) *Variational Formulation*
   C) *Direct stiffness matrix* D) *None of the above*

P.T.O.

9) Consider a differential equation $Dy''(x) + Q = 0$ Suppose that $y = h(x)$ is an approximate solution to it. Substitution then gives $Dh''(x) + Q = R$, where R is a

A) Nonzero residual B) Zero residual
C) Resultant D) None of the above

10) The MWR (Method of Weighted Residual) requires that $\int W_i(x)R(x) = 0$ where $W_i(x)$ are

A) The weighting functions B) Weighted residual
C) Error term D) None of the above

11) The equations defining approximate distribution are known as interpolation functions and can take any mathematical form in practice they are usually

A) Polynomials B) Trigonometric functions
C) Exponential function D) Hermetic function

12) The coordinate system that are local to each element but are dimensionless and have a maximum absolute magnitude of unity.

A) Global coordinate system B) Cartisian coordinate system
C) Natural coordinate system D) Polar coordinate system

13) The element with quadratic interpolation function is called as

A) Quadratic element B) Cubic element
C) Linear D) None of the above

14) The bandwidth of a matrix after node numbering where 'D' is largest difference between nodes in a single element and 'f' is the number of degrees of freedom at each node is

A) $D \times f$ B) $D + f$ C) $(D + 1) f$ D) $(D - 1) f$

15) Accuracy and reliability in modeling is achieved by

A) Higher order element B) 1 D Element
C) Both A and B D) None of above

16) The matrix showing relation between strain vector and displacement vector or temperature vector and temperature gradient is

A) [D] B) [K] C) [C] D) [B]

17) The material property matrix is represented as

A) [D] B) [K] C) [C] D) [B]

18) Which of the following is a Weighted Residual method ?

A) Galerkin's method B) Variational formulations
C) Potential energy method D) None of the above

19) Shock spectrum analysis is

A) Steady state problem B) Eigen value problem
C) Transient problem D) Static analysis

20) Tetrahedron with four corner nodes relates

A) 3D simplex element B) Complex element
C) Multiplex element D) None

SLR-EP – 443

Seat No.	

B.E. (Mechanical Engineering) (Part – I) Examination, 2016
Professional (Elective – III)
FINITE ELEMENT METHOD

Day and Date : Tuesday, 6-12-2016 Marks : 80

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

Instructions : *1) Answer **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data if **necessary** and mention it **clearly**.*

SECTION – I

2. a) Explain Weighted Residual Method. Classify its weak and nonweak forms. **7**

   b) Applications of FEM in different domains. **6**

   c) Solve by Galerkin method and compare u(0.8) with exact solution. **7**

$$\frac{d^2u}{dx^2} - 4u - x^2 = 0 \quad \text{BCS} : u(0) = 0 \; \frac{du}{dx}(1) = 1 \text{ find } u(0.8)$$

3. a) Discuss the various matrices stated in the following equation. **7**

$$[K] = \oint [B]^T [D][B]\, dv$$

   b) Derive **6**

$$\frac{\partial \pi}{\partial \{U\}} = \left(\sum_{C=1}^{E} \left[K^{(e)} \right] \right) \{U\} - \{F\} = 0 \cdot$$

   c) Discuss one dimensional, two dimensional and three dimensional elements and their properties. **7**

4. Write short notes on **any five** : **(4×5=20)**

   a) Advantage and disadvantage of FEM

   b) Galerkin method

   c) Properties of Global stiffness matrix

   d) Element connectivity

   e) Truss Element

   f) Numerical methods.

Set S

SECTION – II

5. a) Derive 1D Quadratic element shape function in natural coordinates. **7**

   b) Explain valid and invalid mesh designs with neat sketch. **7**

   c) Explain shock spectrum analysis. **6**

6. a) Explain General FEM procedure. **7**

   b) Explain model validity and accuracy using approximation of geometry and material property. **7**

   c) Differentiate static and dynamic analysis. **6**

7. Write short notes on **any five**. **(4×5=20)**

   a) Commercial FEM software packages with their field applications

   b) Isoparametric element

   c) Jacobian

   d) Element distortion and check

   e) Modal analysis

   f) h and p Refinements.

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Seat No.	

Set P

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMOBILE ENGINEERING
(Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Figure to the **right** indicates **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 : **(1×20=20)**

1) The basic automobile structure consists of the suspension system, axles, wheels and
   a) Steering b) Brakes
   c) Frame d) Lights

2) Weight of the vehicle produces in the side members of the frame
   a) Vertical bending b) Horizontal bending
   c) Torsion d) All of these

3) The clutch is located between the transmission and the
   a) Engine b) Rear axle
   c) Propeller shaft d) Different

4) Increase of torque in a vehicle is obtained by
   a) Decreasing speed b) Decreasing power
   c) Decreasing petrol consumption d) All of the above

5) The central gear of an epicyclic gear set is called a
   a) Ring gear b) Sun gear
   c) Planet gear d) Internal gear

6) The function of a universal joint is to allow the propeller shaft to
   a) Change length b) Bend sideways
   c) Transfer torque at a angle d) Change inclination

7) The function of a shackle with a leaf spring is to
   a) Allow pivoting of spring end
   b) Allow spring length to change
   c) Control sides way
   d) Control rear torque

8) The angle formed by the line joining the stub axle-steering arm ball joints with the vertical, when this line slants forward at the top is called
   a) Positive camber
   b) Negative camber
   c) Positive castor
   d) Negative castor

9) The type of wheels preferred in sports cars are
   a) Disc wheel
   b) Wire wheel
   c) Magnesium alloy wheel
   d) Aluminum alloy wheel

10) The brake efficiency of a new vehicle is about
   a) 30 per cent b) 50 per cent c) 80 per cent d) 100 per cent

11) A discharged lead acid battery has on its plate
   a) Pb b) PbO_2 c) $PbSO_4$ d) H_2SO_4

12) Gradient resistance is expressed as
   a) WKr b) KV^2A c) W/G d) None of these

13) Function of overdrive is
   a) Give stability
   b) Give ride control
   c) Give high power
   d) Give high speed

14) The steering ratio for manual steering of cars is approximately
   a) 5 b) 15 c) 50 d) 100

15) The coefficient of friction for the clutch facing is approximately
   a) 0.1 b) 0.4 c) 0.8 d) 1.2

16) The maximum torque multiplication ratio in a torque converter is about
   a) 2.5 b) 10 c) 25 d) 100

17) Another name for a torsion bar is
   a) Stabilizer bar
   b) Strut rod
   c) Panhard rod
   d) Radius rod

18) Most popular manual steering gear for cars today is
   a) Rack and pinion type
   b) Worm and wheel type
   c) Cam and roller type
   d) Worm and Nut type

19) The brakes employed in cars are usually operated
   a) Mechanically
   b) Hydraulically
   c) By means of engine vacuum
   d) By compressed air

20) Differential is present in
   a) Two wheeler
   b) Four wheeler
   c) Both a) and b)
   d) None of these

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SLR-EP – 444

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMOBILE ENGINEERING
(Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of non-programmable calculator is allowed.*
3) Figure in ***right*** *indicates* ***full*** *marks.*
4) Assume suitable data ***if*** *necessary and mention it clearly.*

SECTION – I

2. a) Explain with figure conventional chassis layout. List various components and write their functions. **8**
   b) What are the functions and requirements of clutch in automobiles ? Explain with neat sketch electromagnetic clutch. **8**
   c) Write short notes on automotive body construction. **4**

3. a) Explain with neat sketch working of sliding mesh gear box and explain double declutching problem. **8**
   b) Discuss necessity of gear box with the help of vehicle performance curves. **6**
   c) Explain the function of final drive in automobiles and also explain its types. **6**

4. a) For typical motor car the road resistance is given by 23 N per 1000 N, the air resistance by expression $0.0827\ V^2$, transmission efficiency 88% in top speed, car weighs 19934 N when fully loaded. Calculate : **10**
      i) The brake power in KW required for a top speed of 144 km/hr
      ii) The acceleration in m/s^2 at 48 km/hr, assuming the torque at 48 km/hr in top gear 25% more than at 144 km/hr.
      iii) The BP in KW required for driving the car up a gradient of 1 in 5 at 48 km/hr, transmission efficiency 80% in bottom gear. The resistance being N and V the speed in km/hr and g, acceleration due to gravity is 9.81 m/s^2.
   b) Discuss various types of resistances acting on vehicle. **6**
   c) Write short note on any one : **4**
      i) Wind screen wiper
      ii) Transaxle

SECTION – II

5. a) Enlist the functions and requirements of steering system also explain Ackermann steering mechanism with neat sketch. **8**

   b) Explain the following terms with figures : **6**
      i) Caster angle
      ii) Camber angle
      iii) Slip angle

   c) Explain with a neat sketch the working of linkage type of power steering. **6**

6. a) Explain working of a hydraulic braking system with a neat sketch. What is meant by bleeding of brakes ? **8**

   b) Derive an expression for the stopping distance in meter of a truck equipped with all wheel brakes in terms of coefficient of friction and speed in km per hour. Calculate the value of μ if the vehicle is stopped in 27.45 m from 64 km/hr. If coefficient of friction is reduced to 0.3 by rain, what will be stopping distance ? Predict the stopping distance in either case, if instead of truck, a car weighing a quarter of truck is used in the experiment. **8**

   c) Write a short note on power brakes. **4**

7. a) Compare independent suspension with conventional suspension. Also enlist the types of independent suspension systems used in automobiles. **8**

   b) Write short notes on **any two** : **8**
      i) Leaf spring and coil springs
      ii) Reaction members used in automobiles
      iii) Sprung and unsprung mass

   c) Explain traction control device used in modern vehicles. **4**

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SLR-EP – 444

Seat No.	

Set Q

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMOBILE ENGINEERING
(Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Figure to the **right** indicates **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 : **(1×20=20)**

1) The maximum torque multiplication ratio in a torque converter is about
a) 2.5 b) 10 c) 25 d) 100

2) Another name for a torsion bar is
a) Stabilizer bar b) Strut rod
c) Panhard rod d) Radius rod

3) Most popular manual steering gear for cars today is
a) Rack and pinion type b) Worm and wheel type
c) Cam and roller type d) Worm and Nut type

4) The brakes employed in cars are usually operated
a) Mechanically b) Hydraulically
c) By means of engine vacuum d) By compressed air

5) Differential is present in
a) Two wheeler b) Four wheeler
c) Both a) and b) d) None of these

6) The basic automobile structure consists of the suspension system, axles, wheels and
a) Steering b) Brakes c) Frame d) Lights

7) Weight of the vehicle produces in the side members of the frame
a) Vertical bending b) Horizontal bending
c) Torsion d) All of these

P.T.O.

8) The clutch is located between the transmission and the
   a) Engine b) Rear axle
   c) Propeller shaft d) Different

9) Increase of torque in a vehicle is obtained by
   a) Decreasing speed b) Decreasing power
   c) Decreasing petrol consumption d) All of the above

10) The central gear of an epicyclic gear set is called a
   a) Ring gear b) Sun gear
   c) Planet gear d) Internal gear

11) The function of a universal joint is to allow the propeller shaft to
   a) Change length b) Bend sideways
   c) Transfer torque at a angle d) Change inclination

12) The function of a shackle with a leaf spring is to
   a) Allow pivoting of spring end b) Allow spring length to change
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13) The angle formed by the line joining the stub axle-steering arm ball joints with the vertical, when this line slants forward at the top is called
   a) Positive camber b) Negative camber
   c) Positive castor d) Negative castor

14) The type of wheels preferred in sports cars are
   a) Disc wheel b) Wire wheel
   c) Magnesium alloy wheel d) Aluminum alloy wheel

15) The brake efficiency of a new vehicle is about
   a) 30 per cent b) 50 per cent c) 80 per cent d) 100 per cent

16) A discharged lead acid battery has on its plate
   a) Pb b) PbO_2 c) $PbSO_4$ d) H_2SO_4

17) Gradient resistance is expressed as
   a) WKr b) KV^2A c) W/G d) None of these

18) Function of overdrive is
   a) Give stability b) Give ride control
   c) Give high power d) Give high speed

19) The steering ratio for manual steering of cars is approximately
   a) 5 b) 15 c) 50 d) 100

20) The coefficient of friction for the clutch facing is approximately
   a) 0.1 b) 0.4 c) 0.8 d) 1.2

SLR-EP – 444

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMOBILE ENGINEERING
(Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of non-programmable calculator is allowed.*
3) Figure in ***right*** *indicates* ***full*** *marks.*
4) Assume suitable data ***if*** *necessary and mention it clearly.*

SECTION – I

2. a) Explain with figure conventional chassis layout. List various components and write their functions. **8**
   b) What are the functions and requirements of clutch in automobiles ? Explain with neat sketch electromagnetic clutch. **8**
   c) Write short notes on automotive body construction. **4**

3. a) Explain with neat sketch working of sliding mesh gear box and explain double declutching problem. **8**
   b) Discuss necessity of gear box with the help of vehicle performance curves. **6**
   c) Explain the function of final drive in automobiles and also explain its types. **6**

4. a) For typical motor car the road resistance is given by 23 N per 1000 N, the air resistance by expression 0.0827 V^2, transmission efficiency 88% in top speed, car weighs 19934 N when fully loaded. Calculate : **10**
      i) The brake power in KW required for a top speed of 144 km/hr
      ii) The acceleration in m/s^2 at 48 km/hr, assuming the torque at 48 km/hr in top gear 25% more than at 144 km/hr.
      iii) The BP in KW required for driving the car up a gradient of 1 in 5 at 48 km/hr, transmission efficiency 80% in bottom gear. The resistance being N and V the speed in km/hr and g, acceleration due to gravity is 9.81 m/s^2.
   b) Discuss various types of resistances acting on vehicle. **6**
   c) Write short note on any one : **4**
      i) Wind screen wiper
      ii) Transaxle

SECTION – II

5. a) Enlist the functions and requirements of steering system also explain Ackermann steering mechanism with neat sketch. **8**

   b) Explain the following terms with figures : **6**
      i) Caster angle
      ii) Camber angle
      iii) Slip angle

   c) Explain with a neat sketch the working of linkage type of power steering. **6**

6. a) Explain working of a hydraulic braking system with a neat sketch. What is meant by bleeding of brakes ? **8**

   b) Derive an expression for the stopping distance in meter of a truck equipped with all wheel brakes in terms of coefficient of friction and speed in km per hour. Calculate the value of μ if the vehicle is stopped in 27.45 m from 64 km/hr. If coefficient of friction is reduced to 0.3 by rain, what will be stopping distance ? Predict the stopping distance in either case, if instead of truck, a car weighing a quarter of truck is used in the experiment. **8**

   c) Write a short note on power brakes. **4**

7. a) Compare independent suspension with conventional suspension. Also enlist the types of independent suspension systems used in automobiles. **8**

   b) Write short notes on **any two** : **8**
      i) Leaf spring and coil springs
      ii) Reaction members used in automobiles
      iii) Sprung and unsprung mass

   c) Explain traction control device used in modern vehicles. **4**

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SLR-EP – 444

Seat No.	

Set R

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMOBILE ENGINEERING
(Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figure to the* ***right*** *indicates* ***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 : **(1×20=20)**

1) A discharged lead acid battery has on its plate
a) Pb b) PbO_2 c) $PbSO_4$ d) H_2SO_4

2) Gradient resistance is expressed as
a) WKr b) KV^2A c) W/G d) None of these

3) Function of overdrive is
a) Give stability b) Give ride control
c) Give high power d) Give high speed

4) The steering ratio for manual steering of cars is approximately
a) 5 b) 15 c) 50 d) 100

5) The coefficient of friction for the clutch facing is approximately
a) 0.1 b) 0.4 c) 0.8 d) 1.2

6) The maximum torque multiplication ratio in a torque converter is about
a) 2.5 b) 10 c) 25 d) 100

7) Another name for a torsion bar is
a) Stabilizer bar b) Strut rod
c) Panhard rod d) Radius rod

8) Most popular manual steering gear for cars today is
a) Rack and pinion type b) Worm and wheel type
c) Cam and roller type d) Worm and Nut type

9) The brakes employed in cars are usually operated
a) Mechanically b) Hydraulically
c) By means of engine vacuum d) By compressed air

P.T.O.

10) Differential is present in
a) Two wheeler b) Four wheeler
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11) The basic automobile structure consists of the suspension system, axles, wheels and
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12) Weight of the vehicle produces in the side members of the frame
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20) The brake efficiency of a new vehicle is about
a) 30 per cent b) 50 per cent c) 80 per cent d) 100 per cent

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Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMOBILE ENGINEERING
(Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of non-programmable calculator is allowed.*
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SECTION – I

2. a) Explain with figure conventional chassis layout. List various components and write their functions. **8**
   b) What are the functions and requirements of clutch in automobiles ? Explain with neat sketch electromagnetic clutch. **8**
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SECTION – II

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   c) Explain with a neat sketch the working of linkage type of power steering. **6**

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   b) Derive an expression for the stopping distance in meter of a truck equipped with all wheel brakes in terms of coefficient of friction and speed in km per hour. Calculate the value of μ if the vehicle is stopped in 27.45 m from 64 km/hr. If coefficient of friction is reduced to 0.3 by rain, what will be stopping distance ? Predict the stopping distance in either case, if instead of truck, a car weighing a quarter of truck is used in the experiment. **8**

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      ii) Reaction members used in automobiles
      iii) Sprung and unsprung mass

   c) Explain traction control device used in modern vehicles. **4**

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Seat No.	

Set S

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMOBILE ENGINEERING
(Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figure to the* ***right*** *indicates* ***full*** *marks.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) The function of a universal joint is to allow the propeller shaft to
   a) Change length b) Bend sideways
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P.T.O.

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SLR-EP – 444

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2016
AUTOMOBILE ENGINEERING
(Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of non-programmable calculator is allowed.*
3) Figure in ***right*** *indicates* ***full*** *marks.*
4) Assume suitable data ***if*** *necessary and mention it clearly.*

SECTION – I

2. a) Explain with figure conventional chassis layout. List various components and write their functions. **8**
   b) What are the functions and requirements of clutch in automobiles ? Explain with neat sketch electromagnetic clutch. **8**
   c) Write short notes on automotive body construction. **4**

3. a) Explain with neat sketch working of sliding mesh gear box and explain double declutching problem. **8**
   b) Discuss necessity of gear box with the help of vehicle performance curves. **6**
   c) Explain the function of final drive in automobiles and also explain its types. **6**

4. a) For typical motor car the road resistance is given by 23 N per 1000 N, the air resistance by expression 0.0827 V^2, transmission efficiency 88% in top speed, car weighs 19934 N when fully loaded. Calculate : **10**
      i) The brake power in KW required for a top speed of 144 km/hr
      ii) The acceleration in m/s^2 at 48 km/hr, assuming the torque at 48 km/hr in top gear 25% more than at 144 km/hr.
      iii) The BP in KW required for driving the car up a gradient of 1 in 5 at 48 km/hr, transmission efficiency 80% in bottom gear. The resistance being N and V the speed in km/hr and g, acceleration due to gravity is 9.81 m/s^2.
   b) Discuss various types of resistances acting on vehicle. **6**
   c) Write short note on any one : **4**
      i) Wind screen wiper
      ii) Transaxle

SECTION – II

5. a) Enlist the functions and requirements of steering system also explain Ackermann steering mechanism with neat sketch. **8**

   b) Explain the following terms with figures : **6**
      i) Caster angle
      ii) Camber angle
      iii) Slip angle

   c) Explain with a neat sketch the working of linkage type of power steering. **6**

6. a) Explain working of a hydraulic braking system with a neat sketch. What is meant by bleeding of brakes ? **8**

   b) Derive an expression for the stopping distance in meter of a truck equipped with all wheel brakes in terms of coefficient of friction and speed in km per hour. Calculate the value of μ if the vehicle is stopped in 27.45 m from 64 km/hr. If coefficient of friction is reduced to 0.3 by rain, what will be stopping distance ? Predict the stopping distance in either case, if instead of truck, a car weighing a quarter of truck is used in the experiment. **8**

   c) Write a short note on power brakes. **4**

7. a) Compare independent suspension with conventional suspension. Also enlist the types of independent suspension systems used in automobiles. **8**

   b) Write short notes on **any two** : **8**
      i) Leaf spring and coil springs
      ii) Reaction members used in automobiles
      iii) Sprung and unsprung mass

   c) Explain traction control device used in modern vehicles. **4**

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SLR-EP – 445

Seat No.	

Set **P**

B.E. (Mechanical) (Part – I) Examination, 2016
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Question Number **1**, **2** and **6** are **compulsory**.*
*2) Answer **any two full** questions from the remaining in **each** Section.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them **clearly**.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*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. A) Choose the correct answer : **(1×10=10)**

1) Which of the following is input for process planning ?
A) Jigs and fixtures B) Design drawing
C) Machine D) Tools

2) Elimination of operation can be accomplished by
A) Changing product design B) Changing tooling
C) Changing auxiliary processes D) Changing machine setting

3) GPM is selected for
A) Cost B) Quality C) Quantity D) Flexibility

4) SPM is selected for
A) Project manufacturing B) Job production
C) Batch manufacturing D) Mass production

5) Which of the following is not the dept. of production engineering ?
A) Production design B) Tool design
C) Tool making D) Tool store and mgt.

6) Which of the following product is not continuous / process mfg. system ?
A) Cars B) Fertilizer C) Petrochemical D) Steel

7) Symbol used for inspection in method study is
   A) Cone B) Pyramid C) Square D) Triangle

8) Which of the following is the cause of tolerance stack ?
   A) Product design B) Inspection method
   C) Tooling D) Machines

9) The selection of the suitable process can be made on the basis of
   A) Product design B) Product material
   C) Volume of production D) Tool design

10) Which is the most important skill is not required by a process engineer ?
   A) Interpret engg. drawings
   B) Design of product
   C) Knowledge of jigs and fixtures
   D) Knowledge of manufacturing process

B) Match the pair : **10**

4

a) Cleaning	1) Supporting operation
b) Metal cutting	2) Auxiliary operation
c) Casting	3) Principal process operation
d) Packaging	4) Basic process operation

3

a) Product engineer	1) Process picture
b) Process engineer	2) Jigs and fixtures
c) Tool design	3) Manufacturing specifications

3

a) Job production	1) Capstan lathe
b) Batch production	2) Automatic lathe
c) Mass production	3) Centre lathe

SLR-EP – 445

Seat No.	

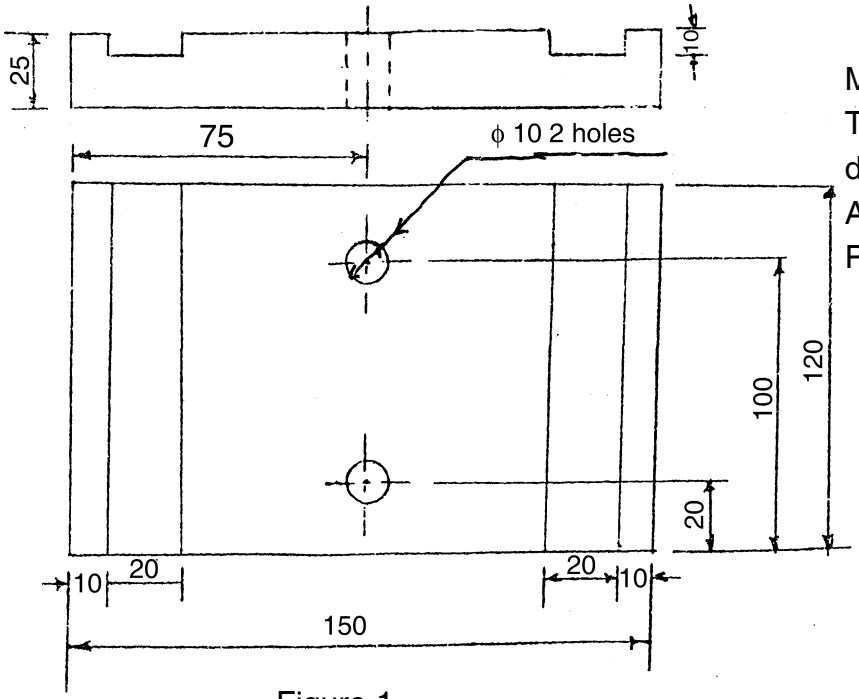
B.E. (Mechanical) (Part – I) Examination, 2016
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Q. **2** and Q. **6** are **compulsory**.*
*2) Solve **any 2** questions from **each** Section.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them **clearly**.*

SECTION – I

2. Prepare a process plan for manufacturing the component in Figure 1 w.r.t. data supplied there in along following lines :
   A) Route sheet
   B) Operations list indicating sequence of operation indicating machine selected, holding methods, tool specifications and machining parameters per set up.
   C) Gauges and inspection methods and instruments. **20**



MH – M.S.
Tolerances on m/cned dimensions are $\pm$0.1
All dimensions are in mm
Production Batch Type

Figure 1

3. a) What are the different types of production ? Explain in detail. **5**

   b) Define manufacturing system. What are the inputs and outputs of manufacturing system ? **5**

4. Explain position and function of product and process engineer in detail. **10**

5. a) Explain in detail manufacturing engineering. **5**

   b) What are the general guidelines for manual process ? **5**

SECTION – II

6. Draw the process picture sheet for any four operations for manufacturing the component in Figure 1 w.r.t. sequence. Use standard symbols for locating, clamping along with material removal. **20**

7. a) Discuss various sources of information for selection of machine tools. **5**

   b) How do you select machine tool ? Explain. **5**

8. How do you classify the operations ? **10**

9. a) Explain the factors for combining and eliminating the operations. **5**

   b) Write a note on technical feasibility study. **5**

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SLR-EP – 445

Seat No.	

Set **Q**

B.E. (Mechanical) (Part – I) Examination, 2016
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Note :
1) *Question Number **1**, **2** and **6** are **compulsory**.*
2) *Answer **any two full** questions from the remaining in **each** Section.*
3) *Figures to **right** indicate **full** marks.*
4) *Make suitable assumptions, **if required** and state them **clearly**.*
5) *Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
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. A) Match the pair : **10**

4

a) Cleaning	1) Supporting operation
b) Metal cutting	2) Auxiliary operation
c) Casting	3) Principal process operation
d) Packaging	4) Basic process operation

3

a) Product engineer	1) Process picture
b) Process engineer	2) Jigs and fixtures
c) Tool design	3) Manufacturing specifications

3

a) Job production	1) Capstan lathe
b) Batch production	2) Automatic lathe
c) Mass production	3) Centre lathe

P.T.O.

B) Choose the correct answer : **(1×10=10)**

1) Which of the following product is not continuous / process mfg. system ?
   A) Cars B) Fertilizer C) Petrochemical D) Steel

2) Symbol used for inspection in method study is
   A) Cone B) Pyramid C) Square D) Triangle

3) Which of the following is the cause of tolerance stack ?
   A) Product design B) Inspection method
   C) Tooling D) Machines

4) The selection of the suitable process can be made on the basis of
   A) Product design B) Product material
   C) Volume of production D) Tool design

5) Which is the most important skill is not required by a process engineer ?
   A) Interpret engg. drawings
   B) Design of product
   C) Knowledge of jigs and fixtures
   D) Knowledge of manufacturing process

6) Which of the following is input for process planning ?
   A) Jigs and fixtures B) Design drawing
   C) Machine D) Tools

7) Elimination of operation can be accomplished by
   A) Changing product design B) Changing tooling
   C) Changing auxiliary processes D) Changing machine setting

8) GPM is selected for
   A) Cost B) Quality C) Quantity D) Flexibility

9) SPM is selected for
   A) Project manufacturing B) Job production
   C) Batch manufacturing D) Mass production

10) Which of the following is not the dept. of production engineering ?
   A) Production design B) Tool design
   C) Tool making D) Tool store and mgt.

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SLR-EP – 445

Seat No.	

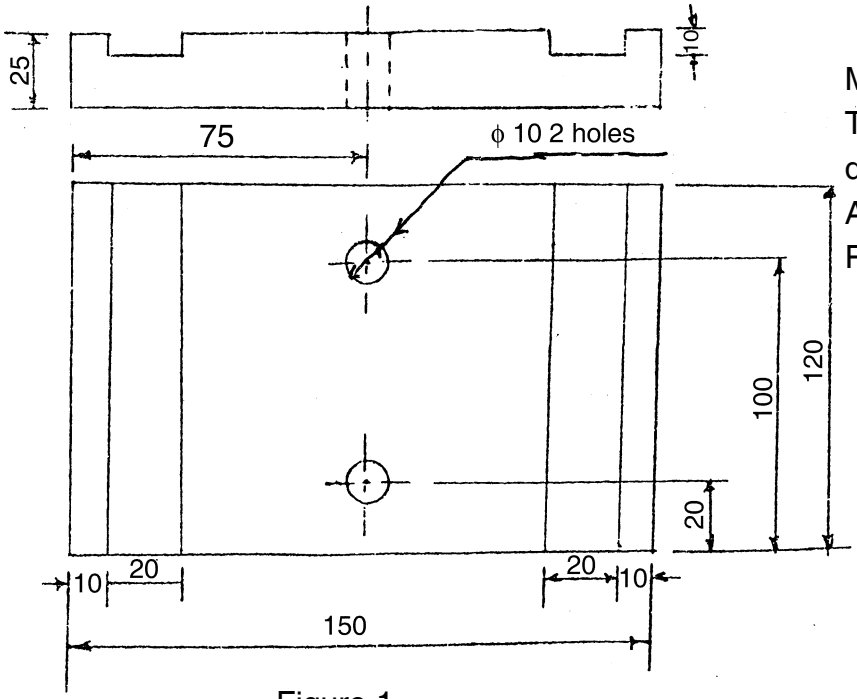
B.E. (Mechanical) (Part – I) Examination, 2016
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Q. **2** and Q. **6** are **compulsory**.*
*2) Solve **any 2** questions from **each** Section.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them **clearly**.*

SECTION – I

2. Prepare a process plan for manufacturing the component in Figure 1 w.r.t. data supplied there in along following lines :
   A) Route sheet
   B) Operations list indicating sequence of operation indicating machine selected, holding methods, tool specifications and machining parameters per set up.
   C) Gauges and inspection methods and instruments. **20**



MH – M.S.
Tolerances on m/cned dimensions are $\pm$0.1
All dimensions are in mm
Production Batch Type

Figure 1

Set Q

3. a) What are the different types of production ? Explain in detail. **5**

   b) Define manufacturing system. What are the inputs and outputs of manufacturing system ? **5**

4. Explain position and function of product and process engineer in detail. **10**

5. a) Explain in detail manufacturing engineering. **5**

   b) What are the general guidelines for manual process ? **5**

SECTION – II

6. Draw the process picture sheet for any four operations for manufacturing the component in Figure 1 w.r.t. sequence. Use standard symbols for locating, clamping along with material removal. **20**

7. a) Discuss various sources of information for selection of machine tools. **5**

   b) How do you select machine tool ? Explain. **5**

8. How do you classify the operations ? **10**

9. a) Explain the factors for combining and eliminating the operations. **5**

   b) Write a note on technical feasibility study. **5**

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SLR-EP – 445

Seat No.	

Set **R**

B.E. (Mechanical) (Part – I) Examination, 2016
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Question Number **1**, **2** and **6** are **compulsory**.*
*2) Answer **any two full** questions from the remaining in **each** Section.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them **clearly**.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*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. A) Choose the correct answer : **(1×10=10)**

1) Symbol used for inspection in method study is
A) Cone B) Pyramid C) Square D) Triangle

2) Which of the following is the cause of tolerance stack ?
A) Product design B) Inspection method
C) Tooling D) Machines

3) The selection of the suitable process can be made on the basis of
A) Product design B) Product material
C) Volume of production D) Tool design

4) Which is the most important skill is not required by a process engineer ?
A) Interpret engg. drawings
B) Design of product
C) Knowledge of jigs and fixtures
D) Knowledge of manufacturing process

5) Which of the following is input for process planning ?
A) Jigs and fixtures B) Design drawing
C) Machine D) Tools

6) Elimination of operation can be accomplished by
   A) Changing product design B) Changing tooling
   C) Changing auxiliary processes D) Changing machine setting

7) GPM is selected for
   A) Cost B) Quality C) Quantity D) Flexibility

8) SPM is selected for
   A) Project manufacturing B) Job production
   C) Batch manufacturing D) Mass production

9) Which of the following is not the dept. of production engineering ?
   A) Production design B) Tool design
   C) Tool making D) Tool store and mgt.

10) Which of the following product is not continuous / process mfg. system ?
   A) Cars B) Fertilizer C) Petrochemical D) Steel

B) Match the pair : **10**

4

a) Cleaning	1) Supporting operation
b) Metal cutting	2) Auxiliary operation
c) Casting	3) Principal process operation
d) Packaging	4) Basic process operation

3

a) Product engineer	1) Process picture
b) Process engineer	2) Jigs and fixtures
c) Tool design	3) Manufacturing specifications

3

a) Job production	1) Capstan lathe
b) Batch production	2) Automatic lathe
c) Mass production	3) Centre lathe

SLR-EP – 445

Seat No.	

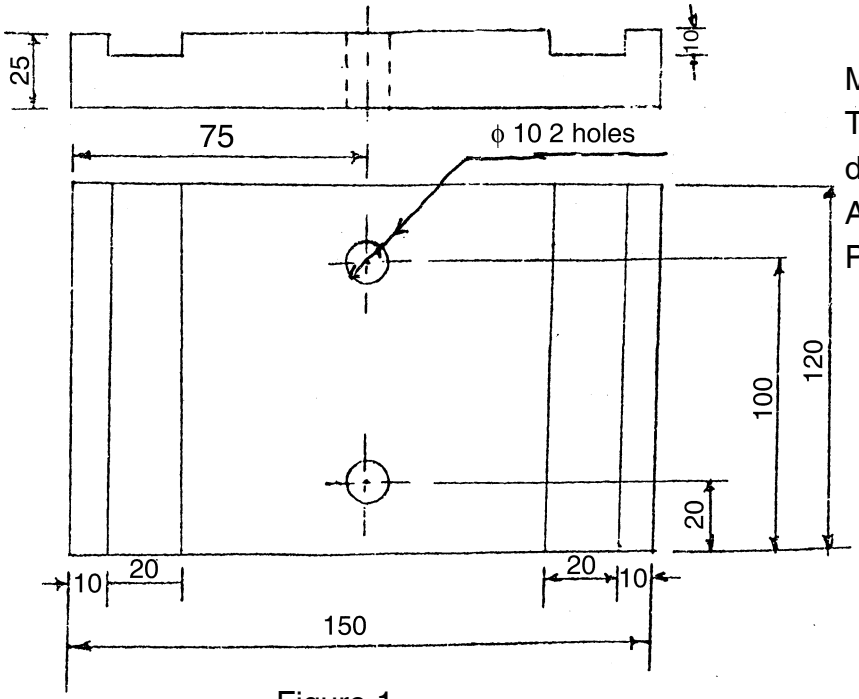
B.E. (Mechanical) (Part – I) Examination, 2016
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Q. **2** and Q. **6** are **compulsory**.*
*2) Solve **any 2** questions from **each** Section.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them **clearly**.*

SECTION – I

2. Prepare a process plan for manufacturing the component in Figure 1 w.r.t. data supplied there in along following lines :
   A) Route sheet
   B) Operations list indicating sequence of operation indicating machine selected, holding methods, tool specifications and machining parameters per set up.
   C) Gauges and inspection methods and instruments. **20**



MH – M.S.
Tolerances on m/cned dimensions are $\pm$0.1
All dimensions are in mm
Production Batch Type

Figure 1

Set R

3. a) What are the different types of production ? Explain in detail. **5**

   b) Define manufacturing system. What are the inputs and outputs of manufacturing system ? **5**

4. Explain position and function of product and process engineer in detail. **10**

5. a) Explain in detail manufacturing engineering. **5**

   b) What are the general guidelines for manual process ? **5**

SECTION – II

6. Draw the process picture sheet for any four operations for manufacturing the component in Figure 1 w.r.t. sequence. Use standard symbols for locating, clamping along with material removal. **20**

7. a) Discuss various sources of information for selection of machine tools. **5**

   b) How do you select machine tool ? Explain. **5**

8. How do you classify the operations ? **10**

9. a) Explain the factors for combining and eliminating the operations. **5**

   b) Write a note on technical feasibility study. **5**

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SLR-EP – 445

Seat No.	

Set **S**

B.E. (Mechanical) (Part – I) Examination, 2016
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Question Number **1**, **2** and **6** are **compulsory**.*
*2) Answer **any two full** questions from the remaining in **each** Section.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them **clearly**.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*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. A) Match the pair : **10**

4

a) Cleaning	1) Supporting operation
b) Metal cutting	2) Auxiliary operation
c) Casting	3) Principal process operation
d) Packaging	4) Basic process operation

3

a) Product engineer	1) Process picture
b) Process engineer	2) Jigs and fixtures
c) Tool design	3) Manufacturing specifications

3

a) Job production	1) Capstan lathe
b) Batch production	2) Automatic lathe
c) Mass production	3) Centre lathe

B) Choose the correct answer : **(1×10=10)**

1) GPM is selected for
   A) Cost B) Quality C) Quantity D) Flexibility
2) SPM is selected for
   A) Project manufacturing B) Job production
   C) Batch manufacturing D) Mass production
3) Which of the following is not the dept. of production engineering ?
   A) Production design B) Tool design
   C) Tool making D) Tool store and mgt.
4) Which of the following product is not continuous / process mfg. system ?
   A) Cars B) Fertilizer C) Petrochemical D) Steel
5) Symbol used for inspection in method study is
   A) Cone B) Pyramid C) Square D) Triangle
6) Which of the following is the cause of tolerance stack ?
   A) Product design B) Inspection method
   C) Tooling D) Machines
7) The selection of the suitable process can be made on the basis of
   A) Product design B) Product material
   C) Volume of production D) Tool design
8) Which is the most important skill is not required by a process engineer ?
   A) Interpret engg. drawings
   B) Design of product
   C) Knowledge of jigs and fixtures
   D) Knowledge of manufacturing process
9) Which of the following is input for process planning ?
   A) Jigs and fixtures B) Design drawing
   C) Machine D) Tools
10) Elimination of operation can be accomplished by
   A) Changing product design B) Changing tooling
   C) Changing auxiliary processes D) Changing machine setting

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SLR-EP – 445

Seat No.	

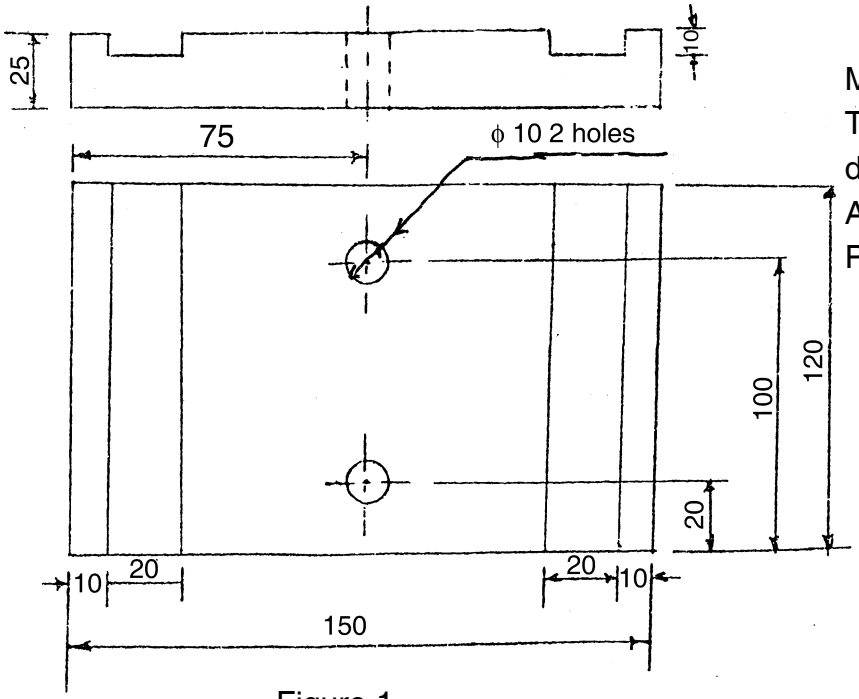
B.E. (Mechanical) (Part – I) Examination, 2016
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Tuesday, 6-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Q. **2** and Q. **6** are **compulsory**.*
*2) Solve **any 2** questions from **each** Section.*
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, **if required** and state them **clearly**.*

SECTION – I

2. Prepare a process plan for manufacturing the component in Figure 1 w.r.t. data supplied there in along following lines :
   A) Route sheet
   B) Operations list indicating sequence of operation indicating machine selected, holding methods, tool specifications and machining parameters per set up.
   C) Gauges and inspection methods and instruments. **20**



MH – M.S.
Tolerances on m/cned dimensions are $\pm$0.1
All dimensions are in mm
Production Batch Type

Figure 1

Set S

3. a) What are the different types of production ? Explain in detail. **5**

   b) Define manufacturing system. What are the inputs and outputs of manufacturing system ? **5**

4. Explain position and function of product and process engineer in detail. **10**

5. a) Explain in detail manufacturing engineering. **5**

   b) What are the general guidelines for manual process ? **5**

SECTION – II

6. Draw the process picture sheet for any four operations for manufacturing the component in Figure 1 w.r.t. sequence. Use standard symbols for locating, clamping along with material removal. **20**

7. a) Discuss various sources of information for selection of machine tools. **5**

   b) How do you select machine tool ? Explain. **5**

8. How do you classify the operations ? **10**

9. a) Explain the factors for combining and eliminating the operations. **5**

   b) Write a note on technical feasibility study. **5**

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SLR-EP – 446

Seat No.	

Set P

B.E. (Mechanical) (Part – I) Examination, 2016
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Thursday, 8-12-2016 Total 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 : **(20×1=20)**

1) The term robot was first used by
   a) Aurther C. Clarke b) Issac Asimov
   c) Leonardo Da Vinci d) Karl Capek

2) Robot grippers for industrial robot typically employ _____ actuator.
   a) Pneumatic b) Hydraulic c) Electric d) Magnetic

3) For short range distance measurements, which type of sensor in more suitable ?
   a) Tactile sensor b) Ultrasonic sensor
   c) Optical sensor d) Laser sensor

4) Forward Kinematics is
   a) Going from joint space to world space
   b) Going from world space to joint space
   c) Both a and b
   d) None of the above

5) In a CCD camera the term CCD stands for
   a) Charge Conduction Device b) Camera Charge Device
   c) Charge Coupled Device d) Camera Coupled Device

6) Which of the following is not a segmentation technique ?
   a) Edge detection b) Thresholding
   c) Region growing d) Template matching

7) Singularity in a robot occurs when
   a) Order of jacobian is 1 b) Order of jacobian is 0
   c) Order of jacobian is 2 d) None of the above

P.T.O.

8) Which of the following is a robot programming language ?
   a) SAIL b) MAIL c) RAIL d) TAIL

9) Lead through programming is an
   a) Off-line programming method b) On-line programming method
   c) Both a and b d) None of the above

10) UGV stands for
   a) Unarmed Ground Vehicle b) Unmanned Ground Vehicle
   c) Unlocked Grip Vehicle d) None of the above

11) The minimum numbers of wheel required for both static and dynamic balancing (Both in X and Y direction) is
   a) One b) Two c) Three d) Four

12) Tracked robots compare to wheeled robots have
   a) More traction b) Less traction
   c) Medium traction d) No traction

13) The two most commonly used technique in image sensing are
   a) RGB and HSV b) CCD and HSV
   c) CMOS and CCD d) CMOS and RGB

14) The frame rates for a standard video camera is about _____ frames per second.
   a) 100 – 1000 b) 100 – 200 c) 50 – 100 d) 25 – 30

15) Which of the following sensor is used in robot gripper ?
   a) Optical b) Tactile c) Laser d) Ultrasonic

16) Pick the best configuration of robot in terms of structural rigidity
   a) Cylindrical b) Cartesian c) SCARA d) Spherical

17) _____ is the path with specified qualities of motion such as velocity, acceleration at each point.
   a) Knot point b) Trajectory c) Via point d) Spline

18) The most widely used controlled in industrial robot control system is
   a) PI controller b) PD controller c) PID controller d) ID controller

19) The configuration of industrial robot in welding operation is usually
   a) Cartesian b) Cylindrical c) Spherical d) Jointed arm

20) The term UAV stands for
   a) Unmanned Air Vehicle b) Unmanned Arm Vehicle
   c) Unmanned Aerial Vehicle d) Unmanned Aircraft Vehicle

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SLR-EP – 446

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instruction**: Answer **any two** questions from Section **I** and **any two** from Section **II**.*

SECTION – I

2. a) What is Automation and explain the different types of automation with their merits and demerits ? **6**

   b) Explain with neat sketch any two types of robot configurations. **8**

   c) What are grippers and explain any two types of gripper used in robots ? **6**

3. a) Explain with neat sketch the working principles of DC motor. **6**

   b) What are sensors and explain any two types of proximity sensors ? **6**

   c) For the point 3i + 7j + 5k perform the following operations
      i) Rotate 30° about X-axis
      ii) Rotate 45° about Y-axis
      iii) Translate 8 units along Y axis. **8**

4. a) Obtain a rotation matrix for a robot arm when it is rotated about X-axis, and Y axis. **6**

   b) A robot arm points in X direction with joint 2 extended to 0.5 m. Find the tool linear velocity if joint 1 is rotating at 2rad/sec and joint 2 is extended at 1 m/sec. **6**

   c) Explain with neat block diagram the steps involved in robot vision system. **8**

SECTION – II

5. a) What is segmentation and explain the different technique of segmentation ? **8**
   b) List out the differences between wheeled and tracked robots. **6**
   c) List out the advantages, disadvantages and applications of wheeled robots. **6**

6. a) With neat sketch explain the any two types of robot work cell. **8**
   b) Differentiate between on-line programming and off-line programming in robots. **6**
   c) Explain the different programming languages used in robots. **6**

7. Write short notes on :
   a) Future scope of robots.
   b) Material handling applications of robot.
   c) PID controller.
   d) CCD camera. **(5×4=20)**

SLR-EP – 446

Seat No.	

Set Q

B.E. (Mechanical) (Part – I) Examination, 2016
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Thursday, 8-12-2016 Total 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 : **(20×1=20)**

1) Pick the best configuration of robot in terms of structural rigidity
a) Cylindrical b) Cartesian c) SCARA d) Spherical

2) _____ is the path with specified qualities of motion such as velocity, acceleration at each point.
a) Knot point b) Trajectory c) Via point d) Spline

3) The most widely used controlled in industrial robot control system is
a) PI controller b) PD controller c) PID controller d) ID controller

4) The configuration of industrial robot in welding operation is usually
a) Cartesian b) Cylindrical c) Spherical d) Jointed arm

5) The term UAV stands for
a) Unmanned Air Vehicle b) Unmanned Arm Vehicle
c) Unmanned Aerial Vehicle d) Unmanned Aircraft Vehicle

6) The term robot was first used by
a) Aurther C. Clarke b) Issac Asimov
c) Leonardo Da Vinci d) Karl Capek

7) Robot grippers for industrial robot typically employ _____ actuator.
a) Pneumatic b) Hydraulic c) Electric d) Magnetic

8) For short range distance measurements, which type of sensor in more suitable ?
a) Tactile sensor b) Ultrasonic sensor
c) Optical sensor d) Laser sensor

9) Forward Kinematics is
   a) Going from joint space to world space
   b) Going from world space to joint space
   c) Both a and b
   d) None of the above

10) In a CCD camera the term CCD stands for
   a) Charge Conduction Device b) Camera Charge Device
   c) Charge Coupled Device d) Camera Coupled Device

11) Which of the following is not a segmentation technique ?
   a) Edge detection b) Thresholding
   c) Region growing d) Template matching

12) Singularity in a robot occurs when
   a) Order of jacobian is 1 b) Order of jacobian is 0
   c) Order of jacobian is 2 d) None of the above

13) Which of the following is a robot programming language ?
   a) SAIL b) MAIL c) RAIL d) TAIL

14) Lead through programming is an
   a) Off-line programming method b) On-line programming method
   c) Both a and b d) None of the above

15) UGV stands for
   a) Unarmed Ground Vehicle b) Unmanned Ground Vehicle
   c) Unlocked Grip Vehicle d) None of the above

16) The minimum numbers of wheel required for both static and dynamic balancing (Both in X and Y direction) is
   a) One b) Two c) Three d) Four

17) Tracked robots compare to wheeled robots have
   a) More traction b) Less traction
   c) Medium traction d) No traction

18) The two most commonly used technique in image sensing are
   a) RGB and HSV b) CCD and HSV
   c) CMOS and CCD d) CMOS and RGB

19) The frame rates for a standard video camera is about _____ frames per second.
   a) 100 – 1000 b) 100 – 200 c) 50 – 100 d) 25 – 30

20) Which of the following sensor is used in robot gripper ?
   a) Optical b) Tactile c) Laser d) Ultrasonic

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SLR-EP – 446

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instruction**: Answer **any two** questions from Section **I** and **any two** from Section **II**.*

SECTION – I

2. a) What is Automation and explain the different types of automation with their merits and demerits ? **6**

   b) Explain with neat sketch any two types of robot configurations. **8**

   c) What are grippers and explain any two types of gripper used in robots ? **6**

3. a) Explain with neat sketch the working principles of DC motor. **6**

   b) What are sensors and explain any two types of proximity sensors ? **6**

   c) For the point 3i + 7j + 5k perform the following operations
      i) Rotate 30° about X-axis
      ii) Rotate 45° about Y-axis
      iii) Translate 8 units along Y axis. **8**

4. a) Obtain a rotation matrix for a robot arm when it is rotated about X-axis, and Y axis. **6**

   b) A robot arm points in X direction with joint 2 extended to 0.5 m. Find the tool linear velocity if joint 1 is rotating at 2rad/sec and joint 2 is extended at 1 m/sec. **6**

   c) Explain with neat block diagram the steps involved in robot vision system. **8**

SECTION – II

5. a) What is segmentation and explain the different technique of segmentation ? **8**
   b) List out the differences between wheeled and tracked robots. **6**
   c) List out the advantages, disadvantages and applications of wheeled robots. **6**

6. a) With neat sketch explain the any two types of robot work cell. **8**
   b) Differentiate between on-line programming and off-line programming in robots. **6**
   c) Explain the different programming languages used in robots. **6**

7. Write short notes on :
   a) Future scope of robots.
   b) Material handling applications of robot.
   c) PID controller.
   d) CCD camera. **(5×4=20)**

SLR-EP – 446

Seat No.	

Set R

B.E. (Mechanical) (Part – I) Examination, 2016
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Thursday, 8-12-2016 Total 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 : **(20×1=20)**

1) The minimum numbers of wheel required for both static and dynamic balancing (Both in X and Y direction) is
   a) One b) Two c) Three d) Four

2) Tracked robots compare to wheeled robots have
   a) More traction b) Less traction
   c) Medium traction d) No traction

3) The two most commonly used technique in image sensing are
   a) RGB and HSV b) CCD and HSV
   c) CMOS and CCD d) CMOS and RGB

4) The frame rates for a standard video camera is about _____ frames per second.
   a) 100 – 1000 b) 100 – 200 c) 50 – 100 d) 25 – 30

5) Which of the following sensor is used in robot gripper ?
   a) Optical b) Tactile c) Laser d) Ultrasonic

6) Pick the best configuration of robot in terms of structural rigidity
   a) Cylindrical b) Cartesian c) SCARA d) Spherical

7) _____ is the path with specified qualities of motion such as velocity, acceleration at each point.
   a) Knot point b) Trajectory c) Via point d) Spline

8) The most widely used controlled in industrial robot control system is
   a) PI controller b) PD controller c) PID controller d) ID controller

P.T.O.

9) The configuration of industrial robot in welding operation is usually
   a) Cartesian b) Cylindrical c) Spherical d) Jointed arm
10) The term UAV stands for
   a) Unmanned Air Vehicle b) Unmanned Arm Vehicle
   c) Unmanned Aerial Vehicle d) Unmanned Aircraft Vehicle
11) The term robot was first used by
   a) Aurther C. Clarke b) Issac Asimov
   c) Leonardo Da Vinci d) Karl Capek
12) Robot grippers for industrial robot typically employ _____ actuator.
   a) Pneumatic b) Hydraulic c) Electric d) Magnetic
13) For short range distance measurements, which type of sensor in more suitable ?
   a) Tactile sensor b) Ultrasonic sensor
   c) Optical sensor d) Laser sensor
14) Forward Kinematics is
   a) Going from joint space to world space
   b) Going from world space to joint space
   c) Both a and b
   d) None of the above
15) In a CCD camera the term CCD stands for
   a) Charge Conduction Device b) Camera Charge Device
   c) Charge Coupled Device d) Camera Coupled Device
16) Which of the following is not a segmentation technique ?
   a) Edge detection b) Thresholding
   c) Region growing d) Template matching
17) Singularity in a robot occurs when
   a) Order of jacobian is 1 b) Order of jacobian is 0
   c) Order of jacobian is 2 d) None of the above
18) Which of the following is a robot programming language ?
   a) SAIL b) MAIL c) RAIL d) TAIL
19) Lead through programming is an
   a) Off-line programming method b) On-line programming method
   c) Both a and b d) None of the above
20) UGV stands for
   a) Unarmed Ground Vehicle b) Unmanned Ground Vehicle
   c) Unlocked Grip Vehicle d) None of the above

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SLR-EP – 446

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instruction**: Answer **any two** questions from Section **I** and **any two** from Section **II**.*

SECTION – I

2. a) What is Automation and explain the different types of automation with their merits and demerits ? **6**

   b) Explain with neat sketch any two types of robot configurations. **8**

   c) What are grippers and explain any two types of gripper used in robots ? **6**

3. a) Explain with neat sketch the working principles of DC motor. **6**

   b) What are sensors and explain any two types of proximity sensors ? **6**

   c) For the point 3i + 7j + 5k perform the following operations
      i) Rotate 30° about X-axis
      ii) Rotate 45° about Y-axis
      iii) Translate 8 units along Y axis. **8**

4. a) Obtain a rotation matrix for a robot arm when it is rotated about X-axis, and Y axis. **6**

   b) A robot arm points in X direction with joint 2 extended to 0.5 m. Find the tool linear velocity if joint 1 is rotating at 2rad/sec and joint 2 is extended at 1 m/sec. **6**

   c) Explain with neat block diagram the steps involved in robot vision system. **8**

SECTION – II

5. a) What is segmentation and explain the different technique of segmentation ? **8**
   b) List out the differences between wheeled and tracked robots. **6**
   c) List out the advantages, disadvantages and applications of wheeled robots. **6**

6. a) With neat sketch explain the any two types of robot work cell. **8**
   b) Differentiate between on-line programming and off-line programming in robots. **6**
   c) Explain the different programming languages used in robots. **6**

7. Write short notes on :
   a) Future scope of robots.
   b) Material handling applications of robot.
   c) PID controller.
   d) CCD camera. **(5×4=20)**

SLR-EP – 446

Seat No.	

Set S

B.E. (Mechanical) (Part – I) Examination, 2016
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Thursday, 8-12-2016 Total 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 : **(20×1=20)**

1) Which of the following is not a segmentation technique ?
   a) Edge detection b) Thresholding
   c) Region growing d) Template matching

2) Singularity in a robot occurs when
   a) Order of jacobian is 1 b) Order of jacobian is 0
   c) Order of jacobian is 2 d) None of the above

3) Which of the following is a robot programming language ?
   a) SAIL b) MAIL c) RAIL d) TAIL

4) Lead through programming is an
   a) Off-line programming method b) On-line programming method
   c) Both a and b d) None of the above

5) UGV stands for
   a) Unarmed Ground Vehicle b) Unmanned Ground Vehicle
   c) Unlocked Grip Vehicle d) None of the above

6) The minimum numbers of wheel required for both static and dynamic balancing (Both in X and Y direction) is
   a) One b) Two c) Three d) Four

7) Tracked robots compare to wheeled robots have
   a) More traction b) Less traction
   c) Medium traction d) No traction

8) The two most commonly used technique in image sensing are
   a) RGB and HSV b) CCD and HSV
   c) CMOS and CCD d) CMOS and RGB

9) The frame rates for a standard video camera is about _____ frames per second.
   a) 100 – 1000 b) 100 – 200 c) 50 – 100 d) 25 – 30

10) Which of the following sensor is used in robot gripper ?
   a) Optical b) Tactile c) Laser d) Ultrasonic

11) Pick the best configuration of robot in terms of structural rigidity
   a) Cylindrical b) Cartesian c) SCARA d) Spherical

12) _____ is the path with specified qualities of motion such as velocity, acceleration at each point.
   a) Knot point b) Trajectory c) Via point d) Spline

13) The most widely used controlled in industrial robot control system is
   a) PI controller b) PD controller c) PID controller d) ID controller

14) The configuration of industrial robot in welding operation is usually
   a) Cartesian b) Cylindrical c) Spherical d) Jointed arm

15) The term UAV stands for
   a) Unmanned Air Vehicle b) Unmanned Arm Vehicle
   c) Unmanned Aerial Vehicle d) Unmanned Aircraft Vehicle

16) The term robot was first used by
   a) Aurther C. Clarke b) Issac Asimov
   c) Leonardo Da Vinci d) Karl Capek

17) Robot grippers for industrial robot typically employ _____ actuator.
   a) Pneumatic b) Hydraulic c) Electric d) Magnetic

18) For short range distance measurements, which type of sensor in more suitable ?
   a) Tactile sensor b) Ultrasonic sensor
   c) Optical sensor d) Laser sensor

19) Forward Kinematics is
   a) Going from joint space to world space
   b) Going from world space to joint space
   c) Both a and b
   d) None of the above

20) In a CCD camera the term CCD stands for
   a) Charge Conduction Device b) Camera Charge Device
   c) Charge Coupled Device d) Camera Coupled Device

_____

SLR-EP – 446

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instruction**: Answer **any two** questions from Section **I** and **any two** from Section **II**.*

SECTION – I

2. a) What is Automation and explain the different types of automation with their merits and demerits ? **6**

   b) Explain with neat sketch any two types of robot configurations. **8**

   c) What are grippers and explain any two types of gripper used in robots ? **6**

3. a) Explain with neat sketch the working principles of DC motor. **6**

   b) What are sensors and explain any two types of proximity sensors ? **6**

   c) For the point 3i + 7j + 5k perform the following operations
      i) Rotate 30° about X-axis
      ii) Rotate 45° about Y-axis
      iii) Translate 8 units along Y axis. **8**

4. a) Obtain a rotation matrix for a robot arm when it is rotated about X-axis, and Y axis. **6**

   b) A robot arm points in X direction with joint 2 extended to 0.5 m. Find the tool linear velocity if joint 1 is rotating at 2rad/sec and joint 2 is extended at 1 m/sec. **6**

   c) Explain with neat block diagram the steps involved in robot vision system. **8**

SECTION – II

5. a) What is segmentation and explain the different technique of segmentation ? **8**
   b) List out the differences between wheeled and tracked robots. **6**
   c) List out the advantages, disadvantages and applications of wheeled robots. **6**

6. a) With neat sketch explain the any two types of robot work cell. **8**
   b) Differentiate between on-line programming and off-line programming in robots. **6**
   c) Explain the different programming languages used in robots. **6**

7. Write short notes on :
   a) Future scope of robots.
   b) Material handling applications of robot.
   c) PID controller.
   d) CCD camera. **(5×4=20)**

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Seat No.	

Set P

B.E. (Mechanical) (Part – I) Examination, 2016
SUGAR ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of scientific calculator is* ***allowed****.*
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 : 20

1. Choose the correct answer : **(1×20=20)**

1) Area of the feeder table
a) 2R/3 b) 3R/2 c) 2L/3 d) 0.25 L

2) Mill setting depends upon
a) pH value of juice b) size of the trash plate
c) desired rate of crushing d) none of the above

3) Underfeed roller diameter is
a) Two third of mill diameter b) Three fourth of mill diameter
c) Half to two third of mill diameter d) None of the above

4) Juice clarifier is used for
a) Heating of juice b) Sulphitation of juice
c) Settling of mud d) None of the above

5) Inventor of multiple effect evaporators
a) Pieter Honing b) Nobert Rillieux c) E. Hugot d) CGM Perk

6) Vapour line juice heater is installed
a) Between last body and condenser
b) Between juice sulphiter and juice clarifier
c) Between weighing machine and juice sulphiter
d) None of the above

7) Mill sanitation is required for
a) To extract the maximum amount of juice
b) Weighing of juice
c) To prevent the fermentation of juice
d) Heating of juice

8) This roller is used for first mill in case of top roller
   a) Underfeed roller b) Lime roller c) Messchart roller d) Lotus roller
9) The vacuum in the last evaporator body of multiple effect evaporator
   a) 200 to 250 mm b) 600 to 625 mm
   c) 400 to 500 mm d) None of the above
10) If condensate water from juice heater is not removed
   a) Entrainment increases b) Heater starts vibrating
   c) Water gets evaporated d) Formation of conglomerates
11) In India the massecuite boiling scheme preferred is
   a) Two massecuite boiling scheme b) Three massecuite boiling scheme
   c) Three and half boiling scheme d) Four massecuite boiling scheme
12) Disadvantage of batch type centrifugal machine
   a) Running at high speed b) Irregular use of electricity
   c) Size of the sugar crystal increases d) None of the above
13) Sucrose molecules from the bulk of solution will be transported to the crystal face is due to
   a) Metastable process b) Diffusion process
   c) Labile process d) None of the above
14) Crystallisers are located
   a) Above the pan b) On the floor
   c) Below the pan d) Near to the centrifugal machine
15) Factor affecting the centrifugal machine performance
   a) Ploughing operation b) Grain size
   c) Temperature of massecuite d) None of the above
16) Humidity of sugar godown should not exceed
   a) Above 60% b) Above 90%
   c) Above 80% d) None of the above
17) In rotary dryer, hot air and sugar flows in the
   a) Same direction b) Bottom direction
   c) Counter current direction d) All the above
18) Sugar elevator is used for
   a) Packing the sugar b) Lifting the sugar to higher level
   c) Drying of sugar d) All the above
19) In vacuum pan for formation of sugar crystal
   a) State of conglomerate is important
   b) State of super saturation of mother liquid is important
   c) State of evaporation is important
   d) None of the above
20) In this water treatment bacteria utilizes the oxygen to degrade the organic matter
   a) Anaerobic type b) Screening type c) Aerobic type d) Sanitation type

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SLR-EP – 447

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
SUGAR ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of scientific calculator is* ***allowed****.*

SECTION – I

2. a) Discuss fibrizer used in the sugar industry with neat sketch. **7**
   b) Explain three roller crusher mill with neat sketch. **7**
   c) Why mill sanitation is required ? Explain mill setting. **6**

3. a) Discuss vertical juice heater with neat sketch. **7**
   b) Discuss measurement of weighing of juice. Explain lever and counterweight weighing machine. **7**
   c) Explain two entrainment catchers with neat sketch. **6**

4. Write short notes on (**any four**) : **(4×5=20)**
   a) Cane unloading
   b) Direct vapour contact juice heater
   c) Long tube vertical falling film evaporator
   d) Chevron grooves on the roller
   e) Mill drive.

SECTION – II

5. a) Explain the construction and working of vacuum pan with neat sketch. **7**
   b) How sugar solution can be classified according to the degree of saturation ? **7**
   c) Discuss continuous centrifugal machine with neat sketch. **6**

Set P

6. a) Explain rotary dryer with neat sketch. **7**
   b) Explain sugar grader. How gradation of is done ? **7**
   c) Why industrial waste water treatments are essential ? Explain any one treatment with neat sketch. **6**

7. Write short notes on (**any four**) : **(4×5=20)**
   a) False grain and conglomerates
   b) Slurry preparation methods in vacuum pan
   c) Air pollution control in sugar industry
   d) Automation of centrifugal machine operation
   e) Vertical crystalliser.

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Seat No.	

Set **Q**

B.E. (Mechanical) (Part – I) Examination, 2016
SUGAR ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of scientific calculator is* ***allowed****.*
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 : 20

1. Choose the correct answer : **(1×20=20)**

1) Humidity of sugar godown should not exceed
   a) Above 60% b) Above 90%
   c) Above 80% d) None of the above

2) In rotary dryer, hot air and sugar flows in the
   a) Same direction b) Bottom direction
   c) Counter current direction d) All the above

3) Sugar elevator is used for
   a) Packing the sugar b) Lifting the sugar to higher level
   c) Drying of sugar d) All the above

4) In vacuum pan for formation of sugar crystal
   a) State of conglomerate is important
   b) State of super saturation of mother liquid is important
   c) State of evaporation is important
   d) None of the above

5) In this water treatment bacteria utilizes the oxygen to degrade the organic matter
   a) Anaerobic type b) Screening type
   c) Aerobic type d) Sanitation type

6) Area of the feeder table
   a) 2R/3 b) 3R/2 c) 2L/3 d) 0.25 L

7) Mill setting depends upon
   a) pH value of juice b) size of the trash plate
   c) desired rate of crushing d) none of the above

P.T.O.

8) Underfeed roller diameter is
   a) Two third of mill diameter b) Three fourth of mill diameter
   c) Half to two third of mill diameter d) None of the above
9) Juice clarifier is used for
   a) Heating of juice b) Sulphitation of juice
   c) Settling of mud d) None of the above
10) Inventor of multiple effect evaporators
   a) Pieter Honing b) Nobert Rillieux c) E. Hugot d) CGM Perk
11) Vapour line juice heater is installed
   a) Between last body and condenser
   b) Between juice sulphiter and juice clarifier
   c) Between weighing machine and juice sulphiter
   d) None of the above
12) Mill sanitation is required for
   a) To extract the maximum amount of juice
   b) Weighing of juice
   c) To prevent the fermentation of juice
   d) Heating of juice
13) This roller is used for first mill in case of top roller
   a) Underfeed roller b) Lime roller c) Messchart roller d) Lotus roller
14) The vacuum in the last evaporator body of multiple effect evaporator
   a) 200 to 250 mm b) 600 to 625 mm
   c) 400 to 500 mm d) None of the above
15) If condensate water from juice heater is not removed
   a) Entrainment increases b) Heater starts vibrating
   c) Water gets evaporated d) Formation of conglomerates
16) In India the massecuite boiling scheme preferred is
   a) Two massecuite boiling scheme b) Three massecuite boiling scheme
   c) Three and half boiling scheme d) Four massecuite boiling scheme
17) Disadvantage of batch type centrifugal machine
   a) Running at high speed b) Irregular use of electricity
   c) Size of the sugar crystal increases d) None of the above
18) Sucrose molecules from the bulk of solution will be transported to the crystal face is due to
   a) Metastable process b) Diffusion process
   c) Labile process d) None of the above
19) Crystallisers are located
   a) Above the pan b) On the floor
   c) Below the pan d) Near to the centrifugal machine
20) Factor affecting the centrifugal machine performance
   a) Ploughing operation b) Grain size
   c) Temperature of massecuite d) None of the above

SLR-EP – 447

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
SUGAR ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of scientific calculator is* ***allowed****.*

SECTION – I

2. a) Discuss fibrizer used in the sugar industry with neat sketch. **7**
   b) Explain three roller crusher mill with neat sketch. **7**
   c) Why mill sanitation is required ? Explain mill setting. **6**

3. a) Discuss vertical juice heater with neat sketch. **7**
   b) Discuss measurement of weighing of juice. Explain lever and counterweight weighing machine. **7**
   c) Explain two entrainment catchers with neat sketch. **6**

4. Write short notes on (**any four**) : **(4×5=20)**
   a) Cane unloading
   b) Direct vapour contact juice heater
   c) Long tube vertical falling film evaporator
   d) Chevron grooves on the roller
   e) Mill drive.

SECTION – II

5. a) Explain the construction and working of vacuum pan with neat sketch. **7**
   b) How sugar solution can be classified according to the degree of saturation ? **7**
   c) Discuss continuous centrifugal machine with neat sketch. **6**

Set Q

6. a) Explain rotary dryer with neat sketch. **7**
   b) Explain sugar grader. How gradation of is done ? **7**
   c) Why industrial waste water treatments are essential ? Explain any one treatment with neat sketch. **6**

7. Write short notes on (**any four**) : **(4×5=20)**
   a) False grain and conglomerates
   b) Slurry preparation methods in vacuum pan
   c) Air pollution control in sugar industry
   d) Automation of centrifugal machine operation
   e) Vertical crystalliser.

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SLR-EP – 447

Seat No.	

Set **R**

B.E. (Mechanical) (Part – I) Examination, 2016
SUGAR ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of scientific calculator is* ***allowed****.*
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 : 20

1. Choose the correct answer : **(1×20=20)**

1) In India the massecuite boiling scheme preferred is
   a) Two massecuite boiling scheme b) Three massecuite boiling scheme
   c) Three and half boiling scheme d) Four massecuite boiling scheme

2) Disadvantage of batch type centrifugal machine
   a) Running at high speed b) Irregular use of electricity
   c) Size of the sugar crystal increases d) None of the above

3) Sucrose molecules from the bulk of solution will be transported to the crystal face is due to
   a) Metastable process b) Diffusion process
   c) Labile process d) None of the above

4) Crystallisers are located
   a) Above the pan b) On the floor
   c) Below the pan d) Near to the centrifugal machine

5) Factor affecting the centrifugal machine performance
   a) Ploughing operation b) Grain size
   c) Temperature of massecuite d) None of the above

6) Humidity of sugar godown should not exceed
   a) Above 60% b) Above 90%
   c) Above 80% d) None of the above

7) In rotary dryer, hot air and sugar flows in the
   a) Same direction b) Bottom direction
   c) Counter current direction d) All the above

P.T.O.

8) Sugar elevator is used for
   a) Packing the sugar
   b) Lifting the sugar to higher level
   c) Drying of sugar
   d) All the above

9) In vacuum pan for formation of sugar crystal
   a) State of conglomerate is important
   b) State of super saturation of mother liquid is important
   c) State of evaporation is important
   d) None of the above

10) In this water treatment bacteria utilizes the oxygen to degrade the organic matter
   a) Anaerobic type b) Screening type c) Aerobic type d) Sanitation type

11) Area of the feeder table
   a) 2R/3 b) 3R/2 c) 2L/3 d) 0.25 L

12) Mill setting depends upon
   a) pH value of juice
   b) size of the trash plate
   c) desired rate of crushing
   d) none of the above

13) Underfeed roller diameter is
   a) Two third of mill diameter
   b) Three fourth of mill diameter
   c) Half to two third of mill diameter
   d) None of the above

14) Juice clarifier is used for
   a) Heating of juice
   b) Sulphitation of juice
   c) Settling of mud
   d) None of the above

15) Inventor of multiple effect evaporators
   a) Pieter Honing b) Nobert Rillieux c) E. Hugot d) CGM Perk

16) Vapour line juice heater is installed
   a) Between last body and condenser
   b) Between juice sulphiter and juice clarifier
   c) Between weighing machine and juice sulphiter
   d) None of the above

17) Mill sanitation is required for
   a) To extract the maximum amount of juice
   b) Weighing of juice
   c) To prevent the fermentation of juice
   d) Heating of juice

18) This roller is used for first mill in case of top roller
   a) Underfeed roller b) Lime roller c) Messchart roller d) Lotus roller

19) The vacuum in the last evaporator body of multiple effect evaporator
   a) 200 to 250 mm
   b) 600 to 625 mm
   c) 400 to 500 mm
   d) None of the above

20) If condensate water from juice heater is not removed
   a) Entrainment increases
   b) Heater starts vibrating
   c) Water gets evaporated
   d) Formation of conglomerates

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Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
SUGAR ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of scientific calculator is* ***allowed****.*

SECTION – I

2. a) Discuss fibrizer used in the sugar industry with neat sketch. **7**
   b) Explain three roller crusher mill with neat sketch. **7**
   c) Why mill sanitation is required ? Explain mill setting. **6**

3. a) Discuss vertical juice heater with neat sketch. **7**
   b) Discuss measurement of weighing of juice. Explain lever and counterweight weighing machine. **7**
   c) Explain two entrainment catchers with neat sketch. **6**

4. Write short notes on (**any four**) : **(4×5=20)**
   a) Cane unloading
   b) Direct vapour contact juice heater
   c) Long tube vertical falling film evaporator
   d) Chevron grooves on the roller
   e) Mill drive.

SECTION – II

5. a) Explain the construction and working of vacuum pan with neat sketch. **7**
   b) How sugar solution can be classified according to the degree of saturation ? **7**
   c) Discuss continuous centrifugal machine with neat sketch. **6**

Set R

6. a) Explain rotary dryer with neat sketch. **7**
   b) Explain sugar grader. How gradation of is done ? **7**
   c) Why industrial waste water treatments are essential ? Explain any one treatment with neat sketch. **6**

7. Write short notes on (**any four**) : **(4×5=20)**
   a) False grain and conglomerates
   b) Slurry preparation methods in vacuum pan
   c) Air pollution control in sugar industry
   d) Automation of centrifugal machine operation
   e) Vertical crystalliser.

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Seat No.	

Set **S**

B.E. (Mechanical) (Part – I) Examination, 2016
SUGAR ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of scientific calculator is **allowed**.*
*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 : 20

1. Choose the correct answer : **(1×20=20)**

1) Vapour line juice heater is installed
   a) Between last body and condenser
   b) Between juice sulphiter and juice clarifier
   c) Between weighing machine and juice sulphiter
   d) None of the above

2) Mill sanitation is required for
   a) To extract the maximum amount of juice
   b) Weighing of juice
   c) To prevent the fermentation of juice
   d) Heating of juice

3) This roller is used for first mill in case of top roller
   a) Underfeed roller b) Lime roller c) Messchart roller d) Lotus roller

4) The vacuum in the last evaporator body of multiple effect evaporator
   a) 200 to 250 mm b) 600 to 625 mm
   c) 400 to 500 mm d) None of the above

5) If condensate water from juice heater is not removed
   a) Entrainment increases b) Heater starts vibrating
   c) Water gets evaporated d) Formation of conglomerates

6) In India the massecuite boiling scheme preferred is
   a) Two massecuite boiling scheme b) Three massecuite boiling scheme
   c) Three and half boiling scheme d) Four massecuite boiling scheme

7) Disadvantage of batch type centrifugal machine
   a) Running at high speed b) Irregular use of electricity
   c) Size of the sugar crystal increases d) None of the above

P.T.O.

8) Sucrose molecules from the bulk of solution will be transported to the crystal face is due to
   a) Metastable process b) Diffusion process
   c) Labile process d) None of the above
9) Crystallisers are located
   a) Above the pan b) On the floor
   c) Below the pan d) Near to the centrifugal machine
10) Factor affecting the centrifugal machine performance
   a) Ploughing operation b) Grain size
   c) Temperature of massecuite d) None of the above
11) Humidity of sugar godown should not exceed
   a) Above 60% b) Above 90%
   c) Above 80% d) None of the above
12) In rotary dryer, hot air and sugar flows in the
   a) Same direction b) Bottom direction
   c) Counter current direction d) All the above
13) Sugar elevator is used for
   a) Packing the sugar b) Lifting the sugar to higher level
   c) Drying of sugar d) All the above
14) In vacuum pan for formation of sugar crystal
   a) State of conglomerate is important
   b) State of super saturation of mother liquid is important
   c) State of evaporation is important
   d) None of the above
15) In this water treatment bacteria utilizes the oxygen to degrade the organic matter
   a) Anaerobic type b) Screening type
   c) Aerobic type d) Sanitation type
16) Area of the feeder table
   a) 2R/3 b) 3R/2 c) 2L/3 d) 0.25 L
17) Mill setting depends upon
   a) pH value of juice b) size of the trash plate
   c) desired rate of crushing d) none of the above
18) Underfeed roller diameter is
   a) Two third of mill diameter b) Three fourth of mill diameter
   c) Half to two third of mill diameter d) None of the above
19) Juice clarifier is used for
   a) Heating of juice b) Sulphitation of juice
   c) Settling of mud d) None of the above
20) Inventor of multiple effect evaporators
   a) Pieter Honing b) Nobert Rillieux
   c) E. Hugot d) CGM Perk

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Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
SUGAR ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of scientific calculator is* ***allowed****.*

SECTION – I

2. a) Discuss fibrizer used in the sugar industry with neat sketch. **7**
   b) Explain three roller crusher mill with neat sketch. **7**
   c) Why mill sanitation is required ? Explain mill setting. **6**

3. a) Discuss vertical juice heater with neat sketch. **7**
   b) Discuss measurement of weighing of juice. Explain lever and counterweight weighing machine. **7**
   c) Explain two entrainment catchers with neat sketch. **6**

4. Write short notes on (**any four**) : **(4×5=20)**
   a) Cane unloading
   b) Direct vapour contact juice heater
   c) Long tube vertical falling film evaporator
   d) Chevron grooves on the roller
   e) Mill drive.

SECTION – II

5. a) Explain the construction and working of vacuum pan with neat sketch. **7**
   b) How sugar solution can be classified according to the degree of saturation ? **7**
   c) Discuss continuous centrifugal machine with neat sketch. **6**

Set S

6. a) Explain rotary dryer with neat sketch. **7**
   b) Explain sugar grader. How gradation of is done ? **7**
   c) Why industrial waste water treatments are essential ? Explain any one treatment with neat sketch. **6**

7. Write short notes on (**any four**) : **(4×5=20)**
   a) False grain and conglomerates
   b) Slurry preparation methods in vacuum pan
   c) Air pollution control in sugar industry
   d) Automation of centrifugal machine operation
   e) Vertical crystalliser.

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Seat No.	

Set **P**

B.E. (Mechanical) (Part – I) Examination, 2016
TEXTILE ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* *1) Attempt **any two** questions from **each** Section.*
*2) **Use** of non-programmable calculator, steam table, psychometric chart is **allowed**.*
*3) **Assume** suitable data **wherever** necessary.*
*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 : 20

1. Choose the correct answer : **(20×1=20)**

1) In indirect yarn system
   A) Number and yarn diameter are directly proportionate
   B) Number and yarn diameter are indirectly proportionate
   C) Number and diameter have no relation
   D) Number and diameter are same

2) Viscose is _____ type fibre.
   A) Natural B) Manmade C) Regenerated D) Animal

3) Weft means
   A) Set of threads parallel to selvedge
   B) Set of threads perpendicular to selvedge
   C) Any thread in the fabric
   D) Set of threads parallel and perpendicular to each other

4) Comber is used for
   A) Removal of short fibres B) Removal of cotton seeds
   C) Individualization of fibres D) Twisting of fibres

5) If weight of the 9000 m yarn weighs 100 grams. It Denier will be
   A) 90 B) 900 C) 10 D) 100

6) Shedding mechanism has object of
   A) Divide warp into two layers B) Insert pick in the shed
   C) Push the weft to the fell of the cloth D) Release the warp sheet

7) Which process is a temporary process ?
   A) Winding B) Warping C) Sizing D) Weaving

P.T.O.

8) Jacquard capacity is expressed in
   A) Number of cylinders B) Number of hooks
   C) Number of jacks D) Number of harnesses

9) Horizontal stripe effect in the fabric is produced by using
   A) Sectional warping machine B) Dobby mechanism
   C) Drop Box mechanism D) Jacquard

10) Desizing process is used for
   A) Improving the whiteness of fabric B) For improving luster of fabric
   C) For removal of size paste D) For improving the absorbency of fabric

11) Solapur centre is famous for
   A) Chaddar B) Suiting C) Dhoti D) Saree

12) Differential motion is used on
   A) Comber B) Draw Frame C) Ring Frame D) Speed Frame

13) 'Starting marks' defect in the fabric can be reduced by using
   A) Best quality yarn B) Higher tension on warp sheet
   C) Clutch motion D) Brake motion

14) For 2 up 1 down twill weave how many tappets are required ?
   A) 1 B) 2 C) 3 D) 4

15) Machine vibrations can be reduced by
   A) Using dampers B) Reducing speed
   C) Increasing height of the machine D) Increasing weight of the machine

16) Routine and preventive are the types of
   A) Tensile testing B) Maintenance
   C) Shedding mechanisms D) Let off motions

17) If the denting order is 2
   A) EPI and reed count are same B) PPI and reed count are same
   C) EPI will be double the reed count D) PPI will be double the reed count

18) Which fabric strength is suitable to test knitted fabric ?
   A) Tensile B) Ballistic C) Tearing D) Bursting

19) Checks type fabric can be produced by
   A) Sectional warping and drop box motion
   B) Sectional warping and Jacquard
   C) Beam warping and drop box motion
   D) Beam warping and Jacquard

20) Arrange the technologies in ascending order with reference to their speeds
   A) Projectile – Air Jet – Water Jet – Rapier
   B) Air Jet – Water Jet – Rapier – Projectile
   C) Projectile – Rapier – Water Jet – Air Jet
   D) Rapier – Water Jet – Air Jet – Projectile

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Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
TEXTILE ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80

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

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*

2) ***Use*** *of non-programmable calculator, steam table, psychometric chart is* ***allowed****.*

3) ***Assume*** *suitable data* ***wherever*** *necessary.*

SECTION – I

2. a) What are the essential and desirable properties of the textile fibre ? **8**

   b) What are the objects of the carding machine ? With line diagram explain the working of the machine. **7**

   c) What is yarn numbering system ? Explain in brief the most commonly used systems. **5**

3. a) Explain the objects and working principle of Comber. **8**

   b) Which type of size ingredients are used in size paste ? What are their functions ? **7**

   c) Give the advantages of the textured yarn. **5**

4. a) What are the primary motions of the loom ? Explain any one in details. **8**

   b) What are the elements in the beam warping machine ? Write their functions. **7**

   c) Give the process sequence of wet processing machines for a dyed cotton fabric. **5**

SECTION – II

5. a) Give the object and working of differential motion used on speed frame. **8**

   b) What are the different factors to be considered for construction of the shedding tappet ? **7**

   c) Give the functions of clutch and brake motions used on auto loom. **5**

6. a) Give the list of equipments and their functions required for erection of textile machines. **8**

   b) Give the advantages of routine and preventive maintenance. **7**

   c) What are the different types of lubricants used in textile industry ? **5**

7. a) Give the different applications of non-woven fabrics. Give the process flow for any such fabric. **8**

   b) Compare air jet and water jet weaving technologies. **7**

   c) Calculate the production of air jet weaving machine in meters per shift of 8 hours running at 1000 rpm and producing the fabric having 28 picks per cm at 95% efficiency. **5**

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Seat No.	

Set Q

B.E. (Mechanical) (Part – I) Examination, 2016
TEXTILE ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* *1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of non-programmable calculator, steam table, psychometric chart is* ***allowed****.*
3) ***Assume*** *suitable data* ***wherever*** *necessary.*
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 : 20

1. Choose the correct answer : **(20×1=20)**

1) Routine and preventive are the types of
A) Tensile testing B) Maintenance
C) Shedding mechanisms D) Let off motions

2) If the denting order is 2
A) EPI and reed count are same B) PPI and reed count are same
C) EPI will be double the reed count D) PPI will be double the reed count

3) Which fabric strength is suitable to test knitted fabric ?
A) Tensile B) Ballistic C) Tearing D) Bursting

4) Checks type fabric can be produced by
A) Sectional warping and drop box motion
B) Sectional warping and Jacquard
C) Beam warping and drop box motion
D) Beam warping and Jacquard

5) Arrange the technologies in ascending order with reference to their speeds
A) Projectile – Air Jet – Water Jet – Rapier
B) Air Jet – Water Jet – Rapier – Projectile
C) Projectile – Rapier – Water Jet – Air Jet
D) Rapier – Water Jet – Air Jet – Projectile

6) In indirect yarn system
A) Number and yarn diameter are directly proportionate
B) Number and yarn diameter are indirectly proportionate
C) Number and diameter have no relation
D) Number and diameter are same

P.T.O.

7) Viscose is _____ type fibre.
A) Natural B) Manmade C) Regenerated D) Animal

8) Weft means
A) Set of threads parallel to selvedge
B) Set of threads perpendicular to selvedge
C) Any thread in the fabric
D) Set of threads parallel and perpendicular to each other

9) Comber is used for
A) Removal of short fibres B) Removal of cotton seeds
C) Individualization of fibres D) Twisting of fibres

10) If weight of the 9000 m yarn weighs 100 grams. It Denier will be
A) 90 B) 900 C) 10 D) 100

11) Shedding mechanism has object of
A) Divide warp into two layers B) Insert pick in the shed
C) Push the weft to the fell of the cloth D) Release the warp sheet

12) Which process is a temporary process ?
A) Winding B) Warping C) Sizing D) Weaving

13) Jacquard capacity is expressed in
A) Number of cylinders B) Number of hooks
C) Number of jacks D) Number of harnesses

14) Horizontal stripe effect in the fabric is produced by using
A) Sectional warping machine B) Dobby mechanism
C) Drop Box mechanism D) Jacquard

15) Desizing process is used for
A) Improving the whiteness of fabric B) For improving luster of fabric
C) For removal of size paste D) For improving the absorbency of fabric

16) Solapur centre is famous for
A) Chaddar B) Suiting C) Dhoti D) Saree

17) Differential motion is used on
A) Comber B) Draw Frame C) Ring Frame D) Speed Frame

18) 'Starting marks' defect in the fabric can be reduced by using
A) Best quality yarn B) Higher tension on warp sheet
C) Clutch motion D) Brake motion

19) For 2 up 1 down twill weave how many tappets are required ?
A) 1 B) 2 C) 3 D) 4

20) Machine vibrations can be reduced by
A) Using dampers B) Reducing speed
C) Increasing height of the machine D) Increasing weight of the machine

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Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
TEXTILE ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80

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

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*

2) ***Use*** *of non-programmable calculator, steam table, psychometric chart is* ***allowed****.*

3) ***Assume*** *suitable data* ***wherever*** *necessary.*

SECTION – I

2. a) What are the essential and desirable properties of the textile fibre ? **8**

   b) What are the objects of the carding machine ? With line diagram explain the working of the machine. **7**

   c) What is yarn numbering system ? Explain in brief the most commonly used systems. **5**

3. a) Explain the objects and working principle of Comber. **8**

   b) Which type of size ingredients are used in size paste ? What are their functions ? **7**

   c) Give the advantages of the textured yarn. **5**

4. a) What are the primary motions of the loom ? Explain any one in details. **8**

   b) What are the elements in the beam warping machine ? Write their functions. **7**

   c) Give the process sequence of wet processing machines for a dyed cotton fabric. **5**

SECTION – II

5. a) Give the object and working of differential motion used on speed frame. **8**

   b) What are the different factors to be considered for construction of the shedding tappet ? **7**

   c) Give the functions of clutch and brake motions used on auto loom. **5**

6. a) Give the list of equipments and their functions required for erection of textile machines. **8**

   b) Give the advantages of routine and preventive maintenance. **7**

   c) What are the different types of lubricants used in textile industry ? **5**

7. a) Give the different applications of non-woven fabrics. Give the process flow for any such fabric. **8**

   b) Compare air jet and water jet weaving technologies. **7**

   c) Calculate the production of air jet weaving machine in meters per shift of 8 hours running at 1000 rpm and producing the fabric having 28 picks per cm at 95% efficiency. **5**

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Seat No.	

Set **R**

B.E. (Mechanical) (Part – I) Examination, 2016
TEXTILE ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) *Attempt* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of non-programmable calculator, steam table, psychometric chart is* ***allowed****.*
3) ***Assume*** *suitable data* ***wherever*** *necessary.*
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 : 20

1. Choose the correct answer : **(20×1=20)**

1) Solapur centre is famous for
A) Chaddar B) Suiting C) Dhoti D) Saree

2) Differential motion is used on
A) Comber B) Draw Frame C) Ring Frame D) Speed Frame

3) 'Starting marks' defect in the fabric can be reduced by using
A) Best quality yarn B) Higher tension on warp sheet
C) Clutch motion D) Brake motion

4) For 2 up 1 down twill weave how many tappets are required ?
A) 1 B) 2 C) 3 D) 4

5) Machine vibrations can be reduced by
A) Using dampers B) Reducing speed
C) Increasing height of the machine D) Increasing weight of the machine

6) Routine and preventive are the types of
A) Tensile testing B) Maintenance
C) Shedding mechanisms D) Let off motions

7) If the denting order is 2
A) EPI and reed count are same B) PPI and reed count are same
C) EPI will be double the reed count D) PPI will be double the reed count

8) Which fabric strength is suitable to test knitted fabric ?
A) Tensile B) Ballistic C) Tearing D) Bursting

P.T.O.

9) Checks type fabric can be produced by
   A) Sectional warping and drop box motion
   B) Sectional warping and Jacquard
   C) Beam warping and drop box motion
   D) Beam warping and Jacquard

10) Arrange the technologies in ascending order with reference to their speeds
   A) Projectile – Air Jet – Water Jet – Rapier
   B) Air Jet – Water Jet – Rapier – Projectile
   C) Projectile – Rapier – Water Jet – Air Jet
   D) Rapier – Water Jet – Air Jet – Projectile

11) In indirect yarn system
   A) Number and yarn diameter are directly proportionate
   B) Number and yarn diameter are indirectly proportionate
   C) Number and diameter have no relation
   D) Number and diameter are same

12) Viscose is _____ type fibre.
   A) Natural B) Manmade C) Regenerated D) Animal

13) Weft means
   A) Set of threads parallel to selvedge
   B) Set of threads perpendicular to selvedge
   C) Any thread in the fabric
   D) Set of threads parallel and perpendicular to each other

14) Comber is used for
   A) Removal of short fibres B) Removal of cotton seeds
   C) Individualization of fibres D) Twisting of fibres

15) If weight of the 9000 m yarn weighs 100 grams. It Denier will be
   A) 90 B) 900 C) 10 D) 100

16) Shedding mechanism has object of
   A) Divide warp into two layers B) Insert pick in the shed
   C) Push the weft to the fell of the cloth D) Release the warp sheet

17) Which process is a temporary process ?
   A) Winding B) Warping C) Sizing D) Weaving

18) Jacquard capacity is expressed in
   A) Number of cylinders B) Number of hooks
   C) Number of jacks D) Number of harnesses

19) Horizontal stripe effect in the fabric is produced by using
   A) Sectional warping machine B) Dobby mechanism
   C) Drop Box mechanism D) Jacquard

20) Desizing process is used for
   A) Improving the whiteness of fabric B) For improving luster of fabric
   C) For removal of size paste D) For improving the absorbency of fabric

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SLR-EP – 448

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
TEXTILE ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80

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

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*

2) ***Use*** *of non-programmable calculator, steam table, psychometric chart is* ***allowed****.*

3) ***Assume*** *suitable data* ***wherever*** *necessary.*

SECTION – I

2. a) What are the essential and desirable properties of the textile fibre ? **8**

   b) What are the objects of the carding machine ? With line diagram explain the working of the machine. **7**

   c) What is yarn numbering system ? Explain in brief the most commonly used systems. **5**

3. a) Explain the objects and working principle of Comber. **8**

   b) Which type of size ingredients are used in size paste ? What are their functions ? **7**

   c) Give the advantages of the textured yarn. **5**

4. a) What are the primary motions of the loom ? Explain any one in details. **8**

   b) What are the elements in the beam warping machine ? Write their functions. **7**

   c) Give the process sequence of wet processing machines for a dyed cotton fabric. **5**

SECTION – II

5. a) Give the object and working of differential motion used on speed frame. **8**

   b) What are the different factors to be considered for construction of the shedding tappet ? **7**

   c) Give the functions of clutch and brake motions used on auto loom. **5**

6. a) Give the list of equipments and their functions required for erection of textile machines. **8**

   b) Give the advantages of routine and preventive maintenance. **7**

   c) What are the different types of lubricants used in textile industry ? **5**

7. a) Give the different applications of non-woven fabrics. Give the process flow for any such fabric. **8**

   b) Compare air jet and water jet weaving technologies. **7**

   c) Calculate the production of air jet weaving machine in meters per shift of 8 hours running at 1000 rpm and producing the fabric having 28 picks per cm at 95% efficiency. **5**

SLR-EP – 448

Seat No.	

Set **S**

B.E. (Mechanical) (Part – I) Examination, 2016
TEXTILE ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) *Attempt* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of non-programmable calculator, steam table, psychometric chart is* ***allowed****.*
3) ***Assume*** *suitable data* ***wherever*** *necessary.*
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 : 20

1. Choose the correct answer : **(20×1=20)**

1) Shedding mechanism has object of
A) Divide warp into two layers B) Insert pick in the shed
C) Push the weft to the fell of the cloth D) Release the warp sheet

2) Which process is a temporary process ?
A) Winding B) Warping C) Sizing D) Weaving

3) Jacquard capacity is expressed in
A) Number of cylinders B) Number of hooks
C) Number of jacks D) Number of harnesses

4) Horizontal stripe effect in the fabric is produced by using
A) Sectional warping machine B) Dobby mechanism
C) Drop Box mechanism D) Jacquard

5) Desizing process is used for
A) Improving the whiteness of fabric B) For improving luster of fabric
C) For removal of size paste D) For improving the absorbency of fabric

6) Solapur centre is famous for
A) Chaddar B) Suiting C) Dhoti D) Saree

7) Differential motion is used on
A) Comber B) Draw Frame C) Ring Frame D) Speed Frame

8) 'Starting marks' defect in the fabric can be reduced by using
A) Best quality yarn B) Higher tension on warp sheet
C) Clutch motion D) Brake motion

P.T.O.

9) For 2 up 1 down twill weave how many tappets are required ?
A) 1 B) 2 C) 3 D) 4

10) Machine vibrations can be reduced by
A) Using dampers B) Reducing speed
C) Increasing height of the machine D) Increasing weight of the machine

11) Routine and preventive are the types of
A) Tensile testing B) Maintenance
C) Shedding mechanisms D) Let off motions

12) If the denting order is 2
A) EPI and reed count are same B) PPI and reed count are same
C) EPI will be double the reed count D) PPI will be double the reed count

13) Which fabric strength is suitable to test knitted fabric ?
A) Tensile B) Ballistic C) Tearing D) Bursting

14) Checks type fabric can be produced by
A) Sectional warping and drop box motion
B) Sectional warping and Jacquard
C) Beam warping and drop box motion
D) Beam warping and Jacquard

15) Arrange the technologies in ascending order with reference to their speeds
A) Projectile – Air Jet – Water Jet – Rapier
B) Air Jet – Water Jet – Rapier – Projectile
C) Projectile – Rapier – Water Jet – Air Jet
D) Rapier – Water Jet – Air Jet – Projectile

16) In indirect yarn system
A) Number and yarn diameter are directly proportionate
B) Number and yarn diameter are indirectly proportionate
C) Number and diameter have no relation
D) Number and diameter are same

17) Viscose is _____ type fibre.
A) Natural B) Manmade C) Regenerated D) Animal

18) Weft means
A) Set of threads parallel to selvedge
B) Set of threads perpendicular to selvedge
C) Any thread in the fabric
D) Set of threads parallel and perpendicular to each other

19) Comber is used for
A) Removal of short fibres B) Removal of cotton seeds
C) Individualization of fibres D) Twisting of fibres

20) If weight of the 9000 m yarn weighs 100 grams. It Denier will be
A) 90 B) 900 C) 10 D) 100

_____

SLR-EP – 448

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
TEXTILE ENGINEERING (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80

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

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*

2) ***Use*** *of non-programmable calculator, steam table, psychometric chart is* ***allowed****.*

3) ***Assume*** *suitable data* ***wherever*** *necessary.*

SECTION – I

2. a) What are the essential and desirable properties of the textile fibre ? **8**

   b) What are the objects of the carding machine ? With line diagram explain the working of the machine. **7**

   c) What is yarn numbering system ? Explain in brief the most commonly used systems. **5**

3. a) Explain the objects and working principle of Comber. **8**

   b) Which type of size ingredients are used in size paste ? What are their functions ? **7**

   c) Give the advantages of the textured yarn. **5**

4. a) What are the primary motions of the loom ? Explain any one in details. **8**

   b) What are the elements in the beam warping machine ? Write their functions. **7**

   c) Give the process sequence of wet processing machines for a dyed cotton fabric. **5**

SECTION – II

5. a) Give the object and working of differential motion used on speed frame. **8**

   b) What are the different factors to be considered for construction of the shedding tappet ? **7**

   c) Give the functions of clutch and brake motions used on auto loom. **5**

6. a) Give the list of equipments and their functions required for erection of textile machines. **8**

   b) Give the advantages of routine and preventive maintenance. **7**

   c) What are the different types of lubricants used in textile industry ? **5**

7. a) Give the different applications of non-woven fabrics. Give the process flow for any such fabric. **8**

   b) Compare air jet and water jet weaving technologies. **7**

   c) Calculate the production of air jet weaving machine in meters per shift of 8 hours running at 1000 rpm and producing the fabric having 28 picks per cm at 95% efficiency. **5**

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SLR-EP – 449

Seat No.	

Set **P**

B.E. (Mechanical) (Part – I) Examination, 2016
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Answer **any two full** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make **suitable** assumptions, if required and state them **clearly**.*
*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 : 20

1. Choose the correct answer : **(1×20=20)**

1) The details of machinery and equipments are shown in the project report under the head
   a) Capital cost and source of finance b) General information
   c) Project description d) Market potential

2) The important social consideration for a project is
   a) Prevention of environmental damage b) Promotion of employment
   c) Introduction of import substitution d) Development of the local area

3) To provide financial assistance to entrepreneurs the government has set up a number of
   a) Financial Institutions b) Financial Advisors
   c) Financial Intermediaries d) Industrial Estates

4) The person who creates an enterprise is called
   a) Entrepreneur b) Managers c) Leaders d) Owners

5) Which of the following is not a personal barrier to an entrepreneur ?
   a) Lack of sustained motivation b) Practical values
   c) Lack of clear perception d) Lack of vision

6) _____ is a form of organization, which is owned by two or more partners.
   a) Partnership Firm b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company

7) A voluntary association of minimum two and maximum 50 members is called
   a) Public Limited Company b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company

8) A _____ is the most common and the oldest form of business/organization.
   a) Public Limited Company b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company

9) Which of the following describes how the product or service will be distributed, priced and promoted ?
   a) Financial Plan
   b) Operations Plan
   c) Market Plan
   d) Management and Organization Plan

10) Which of the following involves information regarding anticipated risks and the ways to mitigate them ?
   a) Management and Organization Plan
   b) Contingency Plan
   c) Operations Plan
   d) Financial Plan

11) Which of the following is the short term source of finance ?
   a) Lease Finance b) Hire Purchase c) Public Deposits d) Trade Credit

12) Bank credit is source of
   a) Long term financing
   b) Short-term financing
   c) Medium term financing
   d) Short as well as long term financing

13) Managerial Bottleneck arises due to
   a) Lack of managerial capacity
   b) Lack of infrastructure
   c) Adequate managerial resources
   d) Inadequate managerial resources

14) Which of the following bring synergy between technology and finance ?
   a) NMCP
   b) CLCSS
   c) Technology Bureau for small enterprises
   d) ISO 9000/14001 certification fee reimbursement scheme

15) Which of the following step was taken by the government to create new entrepreneurs in the country ?
   a) Micro, Small, Medium, Enterprise Development
   b) Scheme of Survey, Studies and Policy Research
   c) Rajiv Gandhi Udyami Mitra Yojana (RGUMY)
   d) Entrepreneurship Development Programs (EDPs)

16) Royalty is the amount paid by the franchisee to the
   a) Licensor b) License c) Franchisor d) Legal Advisor

17) The main function of SIDO is
   a) Co-ordination
   b) Industrial development
   c) Extension
   d) All

18) Which of the following sector is termed as priority sector ?
   a) Large Scale Sector
   b) Tiny Enterprise Sector
   c) Medium Enterprise Sector
   d) Small Scale Sector

19) Which of the following is an internal factor that influences entrepreneurs ?
   a) Technological Capacity
   b) Political Interference
   c) Social Environment
   d) Economic Conditions

20) Which of the following is not a function of an entrepreneur ?
   a) Altering the government system
   b) Arranging finance
   c) Staffing
   d) Risk and uncertainty bearing

SLR-EP – 449

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Answer **any two full** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make suitable assumptions, **if required** and state them **clearly**.*

SECTION – I

2. a) Define entrepreneur, entrepreneurship and its importance. **10**
   b) Discuss growth of entrepreneurial activity. **10**

3. a) Discuss characteristics and qualities of entrepreneur. **10**
   b) Discuss classification and types of entrepreneur. **10**

4. a) Explain factors influencing entrepreneurial development. **10**
   b) Write a note on EDP. **10**

SECTION – II

5. a) Discuss idea generation, sources and its classification. **10**
   b) Explain phases of project. **10**

6. a) Discuss in detail project appraisal methods. **10**
   b) Write a note on Micro Small Medium Enterprises (MSMEs) and Tax benefits to SMEs. **10**

7. a) Write notes on SISI and SIDBI. **10**
   b) Describe organization structure of a small scale industries with the help of suitable example. **10**

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Set P

Set P

SLR-EP – 449

Seat No.	

Set **Q**

B.E. (Mechanical) (Part – I) Examination, 2016
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Answer **any two full** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make **suitable** assumptions, if required and state them **clearly**.*
*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 : 20

1. Choose the correct answer : **(1×20=20)**

1) Royalty is the amount paid by the franchisee to the
a) Licensor b) License c) Franchisor d) Legal Advisor

2) The main function of SIDO is
a) Co-ordination b) Industrial development
c) Extension d) All

3) Which of the following sector is termed as priority sector ?
a) Large Scale Sector b) Tiny Enterprise Sector
c) Medium Enterprise Sector d) Small Scale Sector

4) Which of the following is an internal factor that influences entrepreneurs ?
a) Technological Capacity b) Political Interference
c) Social Environment d) Economic Conditions

5) Which of the following is not a function of an entrepreneur ?
a) Altering the government system b) Arranging finance
c) Staffing d) Risk and uncertainty bearing

6) The details of machinery and equipments are shown in the project report under the head
a) Capital cost and source of finance b) General information
c) Project description d) Market potential

7) The important social consideration for a project is
a) Prevention of environmental damage b) Promotion of employment
c) Introduction of import substitution d) Development of the local area

8) To provide financial assistance to entrepreneurs the government has set up a number of
a) Financial Institutions b) Financial Advisors
c) Financial Intermediaries d) Industrial Estates

9) The person who creates an enterprise is called
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10) Which of the following is not a personal barrier to an entrepreneur ?
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   c) Lack of clear perception d) Lack of vision
11) _____ is a form of organization, which is owned by two or more partners.
   a) Partnership Firm b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company
12) A voluntary association of minimum two and maximum 50 members is called
   a) Public Limited Company b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company
13) A _____ is the most common and the oldest form of business/organization.
   a) Public Limited Company b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company
14) Which of the following describes how the product or service will be distributed, priced and promoted ?
   a) Financial Plan b) Operations Plan
   c) Market Plan d) Management and Organization Plan
15) Which of the following involves information regarding anticipated risks and the ways to mitigate them ?
   a) Management and Organization Plan b) Contingency Plan
   c) Operations Plan d) Financial Plan
16) Which of the following is the short term source of finance ?
   a) Lease Finance b) Hire Purchase c) Public Deposits d) Trade Credit
17) Bank credit is source of
   a) Long term financing b) Short-term financing
   c) Medium term financing d) Short as well as long term financing
18) Managerial Bottleneck arises due to
   a) Lack of managerial capacity b) Lack of infrastructure
   c) Adequate managerial resources d) Inadequate managerial resources
19) Which of the following bring synergy between technology and finance ?
   a) NMCP
   b) CLCSS
   c) Technology Bureau for small enterprises
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20) Which of the following step was taken by the government to create new entrepreneurs in the country ?
   a) Micro, Small, Medium, Enterprise Development
   b) Scheme of Survey, Studies and Policy Research
   c) Rajiv Gandhi Udyami Mitra Yojana (RGUMY)
   d) Entrepreneurship Development Programs (EDPs)

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SLR-EP – 449

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Answer **any two full** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make suitable assumptions, **if required** and state them **clearly**.*

SECTION – I

2. a) Define entrepreneur, entrepreneurship and its importance. **10**
   b) Discuss growth of entrepreneurial activity. **10**

3. a) Discuss characteristics and qualities of entrepreneur. **10**
   b) Discuss classification and types of entrepreneur. **10**

4. a) Explain factors influencing entrepreneurial development. **10**
   b) Write a note on EDP. **10**

SECTION – II

5. a) Discuss idea generation, sources and its classification. **10**
   b) Explain phases of project. **10**

6. a) Discuss in detail project appraisal methods. **10**
   b) Write a note on Micro Small Medium Enterprises (MSMEs) and Tax benefits to SMEs. **10**

7. a) Write notes on SISI and SIDBI. **10**
   b) Describe organization structure of a small scale industries with the help of suitable example. **10**

Set Q

Set Q

SLR-EP – 449

Seat No.	

Set **R**

B.E. (Mechanical) (Part – I) Examination, 2016
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Answer **any two full** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make **suitable** assumptions, if required and state them **clearly**.*
*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 : 20

1. Choose the correct answer : **(1×20=20)**

1) Which of the following is the short term source of finance ?
a) Lease Finance b) Hire Purchase c) Public Deposits d) Trade Credit

2) Bank credit is source of
a) Long term financing b) Short-term financing
c) Medium term financing d) Short as well as long term financing

3) Managerial Bottleneck arises due to
a) Lack of managerial capacity b) Lack of infrastructure
c) Adequate managerial resources d) Inadequate managerial resources

4) Which of the following bring synergy between technology and finance ?
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6) Royalty is the amount paid by the franchisee to the
a) Licensor b) License c) Franchisor d) Legal Advisor

7) The main function of SIDO is
a) Co-ordination b) Industrial development
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8) Which of the following sector is termed as priority sector ?
   a) Large Scale Sector b) Tiny Enterprise Sector
   c) Medium Enterprise Sector d) Small Scale Sector

9) Which of the following is an internal factor that influences entrepreneurs ?
   a) Technological Capacity b) Political Interference
   c) Social Environment d) Economic Conditions

10) Which of the following is not a function of an entrepreneur ?
   a) Altering the government system b) Arranging finance
   c) Staffing d) Risk and uncertainty bearing

11) The details of machinery and equipments are shown in the project report under the head
   a) Capital cost and source of finance b) General information
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12) The important social consideration for a project is
   a) Prevention of environmental damage b) Promotion of employment
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13) To provide financial assistance to entrepreneurs the government has set up a number of
   a) Financial Institutions b) Financial Advisors
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14) The person who creates an enterprise is called
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15) Which of the following is not a personal barrier to an entrepreneur ?
   a) Lack of sustained motivation b) Practical values
   c) Lack of clear perception d) Lack of vision

16) _____ is a form of organization, which is owned by two or more partners.
   a) Partnership Firm b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company

17) A voluntary association of minimum two and maximum 50 members is called
   a) Public Limited Company b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company

18) A _____ is the most common and the oldest form of business/organization.
   a) Public Limited Company b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company

19) Which of the following describes how the product or service will be distributed, priced and promoted ?
   a) Financial Plan b) Operations Plan
   c) Market Plan d) Management and Organization Plan

20) Which of the following involves information regarding anticipated risks and the ways to mitigate them ?
   a) Management and Organization Plan b) Contingency Plan
   c) Operations Plan d) Financial Plan

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SLR-EP – 449

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Answer **any two full** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
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SECTION – I

2. a) Define entrepreneur, entrepreneurship and its importance. **10**
   b) Discuss growth of entrepreneurial activity. **10**

3. a) Discuss characteristics and qualities of entrepreneur. **10**
   b) Discuss classification and types of entrepreneur. **10**

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   b) Write a note on EDP. **10**

SECTION – II

5. a) Discuss idea generation, sources and its classification. **10**
   b) Explain phases of project. **10**

6. a) Discuss in detail project appraisal methods. **10**
   b) Write a note on Micro Small Medium Enterprises (MSMEs) and Tax benefits to SMEs. **10**

7. a) Write notes on SISI and SIDBI. **10**
   b) Describe organization structure of a small scale industries with the help of suitable example. **10**

Set R

SLR-EP – 449

Seat No.	

Set **S**

B.E. (Mechanical) (Part – I) Examination, 2016
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Thursday, 8-12-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Answer **any two full** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make **suitable** assumptions, if required and state them **clearly**.*
*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 : 20

1. Choose the correct answer : **(1×20=20)**

1) _____ is a form of organization, which is owned by two or more partners.
   a) Partnership Firm b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company

2) A voluntary association of minimum two and maximum 50 members is called
   a) Public Limited Company b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company

3) A _____ is the most common and the oldest form of business/organization.
   a) Public Limited Company b) Joint Hindu Family Business
   c) Sole Proprietorship d) Private Limited Company

4) Which of the following describes how the product or service will be distributed, priced and promoted ?
   a) Financial Plan b) Operations Plan
   c) Market Plan d) Management and Organization Plan

5) Which of the following involves information regarding anticipated risks and the ways to mitigate them ?
   a) Management and Organization Plan b) Contingency Plan
   c) Operations Plan d) Financial Plan

6) Which of the following is the short term source of finance ?
   a) Lease Finance b) Hire Purchase c) Public Deposits d) Trade Credit

7) Bank credit is source of
   a) Long term financing b) Short-term financing
   c) Medium term financing d) Short as well as long term financing

8) Managerial Bottleneck arises due to
   a) Lack of managerial capacity b) Lack of infrastructure
   c) Adequate managerial resources d) Inadequate managerial resources

P.T.O.

9) Which of the following bring synergy between technology and finance ?
   a) NMCP
   b) CLCSS
   c) Technology Bureau for small enterprises
   d) ISO 9000/14001 certification fee reimbursement scheme

10) Which of the following step was taken by the government to create new entrepreneurs in the country ?
   a) Micro, Small, Medium, Enterprise Development
   b) Scheme of Survey, Studies and Policy Research
   c) Rajiv Gandhi Udyami Mitra Yojana (RGUMY)
   d) Entrepreneurship Development Programs (EDPs)

11) Royalty is the amount paid by the franchisee to the
   a) Licensor b) License c) Franchisor d) Legal Advisor

12) The main function of SIDO is
   a) Co-ordination b) Industrial development
   c) Extension d) All

13) Which of the following sector is termed as priority sector ?
   a) Large Scale Sector b) Tiny Enterprise Sector
   c) Medium Enterprise Sector d) Small Scale Sector

14) Which of the following is an internal factor that influences entrepreneurs ?
   a) Technological Capacity b) Political Interference
   c) Social Environment d) Economic Conditions

15) Which of the following is not a function of an entrepreneur ?
   a) Altering the government system b) Arranging finance
   c) Staffing d) Risk and uncertainty bearing

16) The details of machinery and equipments are shown in the project report under the head
   a) Capital cost and source of finance b) General information
   c) Project description d) Market potential

17) The important social consideration for a project is
   a) Prevention of environmental damage b) Promotion of employment
   c) Introduction of import substitution d) Development of the local area

18) To provide financial assistance to entrepreneurs the government has set up a number of
   a) Financial Institutions b) Financial Advisors
   c) Financial Intermediaries d) Industrial Estates

19) The person who creates an enterprise is called
   a) Entrepreneur b) Managers c) Leaders d) Owners

20) Which of the following is not a personal barrier to an entrepreneur ?
   a) Lack of sustained motivation b) Practical values
   c) Lack of clear perception d) Lack of vision

SLR-EP – 449

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2016
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Thursday, 8-12-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Answer **any two full** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make suitable assumptions, **if required** and state them **clearly**.*

SECTION – I

2. a) Define entrepreneur, entrepreneurship and its importance. **10**
   b) Discuss growth of entrepreneurial activity. **10**

3. a) Discuss characteristics and qualities of entrepreneur. **10**
   b) Discuss classification and types of entrepreneur. **10**

4. a) Explain factors influencing entrepreneurial development. **10**
   b) Write a note on EDP. **10**

SECTION – II

5. a) Discuss idea generation, sources and its classification. **10**
   b) Explain phases of project. **10**

6. a) Discuss in detail project appraisal methods. **10**
   b) Write a note on Micro Small Medium Enterprises (MSMEs) and Tax benefits to SMEs. **10**

7. a) Write notes on SISI and SIDBI. **10**
   b) Describe organization structure of a small scale industries with the help of suitable example. **10**

Set S

Set S

SLR-EP – 450

Seat No.	

Set P

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
AUTOMOBILE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if necessary****.*
3) Use of non-programmable calculator is ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*
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)**

1) The co-efficient of friction for the clutch facing is approximately
a) 0.1 b) 0.4 c) 0.8 d) 1.2

2) The clutch is located between the transmission and the
a) Engine b) Rear axle
c) Propeller shaft d) Differential gear box

3) Increase of torque in a vehicle is obtained by
a) Decreasing speed b) Decreasing power
c) Decreasing petrol consumption d) All of the above

4) The component of torque convertor that allows multiplication of torque is the
a) Turbine b) Impeller c) Pump d) Stator

5) The function of universal joint is to allow the propeller shaft to
a) Change length b) Bend sideway
c) Transfer torque at angle d) Change inclination

6) The smaller gear inside differential casing are
a) Pinion gear b) Sun gear c) Side gear d) Ring gear

7) The inner end of the axle shaft is splined to
a) Sun gear b) Planet pinion
c) Crown wheel d) Differential cage

P.T.O.

8) The type of rear axle used on truck is
   a) Semi-floating b) Fully-floating
   c) Three quarter floating d) None of these

9) Most commonly used power plant on automobile is
   a) I.C. Engine b) Gas turbine c) Battery d) None of these

10) Free pedal play in car clutches is about
   a) 3 mm b) 30 mm c) 60 mm d) 100 mm

11) The type of steering gear used in a Maruti 800 car is
   a) Rack and pinion b) Worm and roller
   c) Worm and wheel d) None of these

12) Cornering force divided by slip angle is called
   a) Cornering power b) Self-righting torque
   c) Pneumatic trail d) Castor trail

13) The brake efficiency of a new vehicle is about
   a) 30 percent b) 50 percent c) 80 percent d) 100 percent

14) In antilock brakes
   a) Locking is prevented b) Pressure modulation is done
   c) Wheel skidding is prevented d) All of the above

15) The MacPherson suspension system consists of
   a) A telescopic strut b) A single arm
   c) A diagonal stay d) All above

16) The unsprung weight is weight of the
   a) Weight of passenger carriage b) Weight of the wheel axle system
   c) Weight of driver carriage d) None of these

17) Odometer is used for indicating
   a) Vehicle speed b) Distance travelled
   c) Engine rpm d) None of the above

18) The electrolyte used in lead acid battery is diluted
   a) Sulphuric acid b) Nitric acid c) Lactic acid d) All of the above

19) Electronic control module gets signals from
   a) Different parameter measuring devices
   b) Sensors used at various locations
   c) Driver controls
   d) All of the above

20) The vertical oscillations of unsprung mass is called as
   a) Hopping b) Rolling
   c) Pitching d) None of the above

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SLR-EP – 450

Seat No.	

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
AUTOMOBILE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if necessary****.*
3) Use of non-programmable calculator is ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) What are the type of automobile layout ? Explain Front engine rear wheel drive layout. **7**
   b) List various type of automobile bodies. Explain any two with figure. **6**
   c) Explain Electric vehicle with figure. **7**

3. a) Explain various type of resistances to vehicle movement. **4**
   b) A truck has a gross vehicle weight of 89026 N. Engine power is 77.3 kW at a governed speed of 2400 rpm and maximum torque 345.8 Nm at 1400 rpm. Rear axle ratio is 6.166 : 1. Fourth speed reduction ratio in transmission is 1.605 : 1. Drive line losses amount to 10.7 kW at 2400 rpm and 6.3 kW at 1400 rpm. Effective wheel dia. Is 0.950 m, frontal area of truck is 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air condition : **10**
      a) At governed engine speed
      b) At speed of maximum torque.
      c) Explain Electromagnetic clutch with figure. **6**

4. a) What is epicyclic gear box ? Explain with figure. **6**
   b) Explain in detail sliding mesh gear box with diagram. **6**
   c) Compare constant mesh gear box with synchromesh gear box. **8**

SECTION – II

5. a) Enlist the different types of steering gear boxes used in automobiles ? Explain with sketch ball and nut type of steering gear box. **8**

   b) Explain the terms : **6**

      i) King pin inclination and steering axis inclination.

      ii) Toe-in and Toe-out

      iii) Cornering power.

   c) Write short notes on : **6**

      1) Slip angle

      2) Antilock brakes.

6. a) What is power brake ? Explain with neat sketch air braking system and list advantages and disadvantages of it. **8**

   b) A car whose wheel base is equal to five times the height of its C.G. above the ground. If the vehicle is braked on all the four wheels over a road and if the coefficient of adhesion between car tyres and road is 0.6, determine the dynamic weight transferred. **4**

   c) Write short notes on : **8**

      1) Lead acid battery.

      2) Two wheeler layout.

7. a) Enlist the requirements of automobile suspension system. Compare independent suspension system with conventional suspension. **8**

   b) Explain telescopic shock absorber with neat sketch. **6**

   c) Write short notes on : **6**

      1) Stabilizer bar

      2) Engine electronic control module.

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SLR-EP – 450

Seat No.	

Set Q

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
AUTOMOBILE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if necessary****.*
3) Use of non-programmable calculator is ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*
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)**

1) The unsprung weight is weight of the
   a) Weight of passenger carriage b) Weight of the wheel axle system
   c) Weight of driver carriage d) None of these

2) Odometer is used for indicating
   a) Vehicle speed b) Distance travelled
   c) Engine rpm d) None of the above

3) The electrolyte used in lead acid battery is diluted
   a) Sulphuric acid b) Nitric acid c) Lactic acid d) All of the above

4) Electronic control module gets signals from
   a) Different parameter measuring devices
   b) Sensors used at various locations
   c) Driver controls
   d) All of the above

5) The vertical oscillations of unsprung mass is called as
   a) Hopping b) Rolling
   c) Pitching d) None of the above

6) The co-efficient of friction for the clutch facing is approximately
   a) 0.1 b) 0.4 c) 0.8 d) 1.2

P.T.O.

7) The clutch is located between the transmission and the
   a) Engine b) Rear axle
   c) Propeller shaft d) Differential gear box

8) Increase of torque in a vehicle is obtained by
   a) Decreasing speed b) Decreasing power
   c) Decreasing petrol consumption d) All of the above

9) The component of torque convertor that allows multiplication of torque is the
   a) Turbine b) Impeller c) Pump d) Stator

10) The function of universal joint is to allow the propeller shaft to
   a) Change length b) Bend sideway
   c) Transfer torque at angle d) Change inclination

11) The smaller gear inside differential casing are
   a) Pinion gear b) Sun gear c) Side gear d) Ring gear

12) The inner end of the axle shaft is splined to
   a) Sun gear b) Planet pinion
   c) Crown wheel d) Differential cage

13) The type of rear axle used on truck is
   a) Semi-floating b) Fully-floating
   c) Three quarter floating d) None of these

14) Most commonly used power plant on automobile is
   a) I.C. Engine b) Gas turbine c) Battery d) None of these

15) Free pedal play in car clutches is about
   a) 3 mm b) 30 mm c) 60 mm d) 100 mm

16) The type of steering gear used in a Maruti 800 car is
   a) Rack and pinion b) Worm and roller
   c) Worm and wheel d) None of these

17) Cornering force divided by slip angle is called
   a) Cornering power b) Self-righting torque
   c) Pneumatic trail d) Castor trail

18) The brake efficiency of a new vehicle is about
   a) 30 percent b) 50 percent c) 80 percent d) 100 percent

19) In antilock brakes
   a) Locking is prevented b) Pressure modulation is done
   c) Wheel skidding is prevented d) All of the above

20) The MacPherson suspension system consists of
   a) A telescopic strut b) A single arm
   c) A diagonal stay d) All above

Set Q

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SLR-EP – 450

Seat No.	

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
AUTOMOBILE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if necessary****.*
3) Use of non-programmable calculator is ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) What are the type of automobile layout ? Explain Front engine rear wheel drive layout. **7**
   b) List various type of automobile bodies. Explain any two with figure. **6**
   c) Explain Electric vehicle with figure. **7**

3. a) Explain various type of resistances to vehicle movement. **4**
   b) A truck has a gross vehicle weight of 89026 N. Engine power is 77.3 kW at a governed speed of 2400 rpm and maximum torque 345.8 Nm at 1400 rpm. Rear axle ratio is 6.166 : 1. Fourth speed reduction ratio in transmission is 1.605 : 1. Drive line losses amount to 10.7 kW at 2400 rpm and 6.3 kW at 1400 rpm. Effective wheel dia. Is 0.950 m, frontal area of truck is 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air condition : **10**
      a) At governed engine speed
      b) At speed of maximum torque.
      c) Explain Electromagnetic clutch with figure. **6**

4. a) What is epicyclic gear box ? Explain with figure. **6**
   b) Explain in detail sliding mesh gear box with diagram. **6**
   c) Compare constant mesh gear box with synchromesh gear box. **8**

SECTION – II

5. a) Enlist the different types of steering gear boxes used in automobiles ? Explain with sketch ball and nut type of steering gear box. **8**

   b) Explain the terms : **6**

      i) King pin inclination and steering axis inclination.

      ii) Toe-in and Toe-out

      iii) Cornering power.

   c) Write short notes on : **6**

      1) Slip angle

      2) Antilock brakes.

6. a) What is power brake ? Explain with neat sketch air braking system and list advantages and disadvantages of it. **8**

   b) A car whose wheel base is equal to five times the height of its C.G. above the ground. If the vehicle is braked on all the four wheels over a road and if the coefficient of adhesion between car tyres and road is 0.6, determine the dynamic weight transferred. **4**

   c) Write short notes on : **8**

      1) Lead acid battery.

      2) Two wheeler layout.

7. a) Enlist the requirements of automobile suspension system. Compare independent suspension system with conventional suspension. **8**

   b) Explain telescopic shock absorber with neat sketch. **6**

   c) Write short notes on : **6**

      1) Stabilizer bar

      2) Engine electronic control module.

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SLR-EP – 450

Seat No.	

Set R

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
AUTOMOBILE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if necessary****.*
3) Use of non-programmable calculator is ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*
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)**

1) The type of steering gear used in a Maruti 800 car is
   a) Rack and pinion b) Worm and roller
   c) Worm and wheel d) None of these

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3) The brake efficiency of a new vehicle is about
   a) 30 percent b) 50 percent c) 80 percent d) 100 percent

4) In antilock brakes
   a) Locking is prevented b) Pressure modulation is done
   c) Wheel skidding is prevented d) All of the above

5) The MacPherson suspension system consists of
   a) A telescopic strut b) A single arm
   c) A diagonal stay d) All above

6) The unsprung weight is weight of the
   a) Weight of passenger carriage b) Weight of the wheel axle system
   c) Weight of driver carriage d) None of these

P.T.O.

7) Odometer is used for indicating
   a) Vehicle speed b) Distance travelled
   c) Engine rpm d) None of the above

8) The electrolyte used in lead acid battery is diluted
   a) Sulphuric acid b) Nitric acid c) Lactic acid d) All of the above

9) Electronic control module gets signals from
   a) Different parameter measuring devices
   b) Sensors used at various locations
   c) Driver controls
   d) All of the above

10) The vertical oscillations of unsprung mass is called as
   a) Hopping b) Rolling
   c) Pitching d) None of the above

11) The co-efficient of friction for the clutch facing is approximately
   a) 0.1 b) 0.4 c) 0.8 d) 1.2

12) The clutch is located between the transmission and the
   a) Engine b) Rear axle
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13) Increase of torque in a vehicle is obtained by
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14) The component of torque convertor that allows multiplication of torque is the
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15) The function of universal joint is to allow the propeller shaft to
   a) Change length b) Bend sideway
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16) The smaller gear inside differential casing are
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18) The type of rear axle used on truck is
   a) Semi-floating b) Fully-floating
   c) Three quarter floating d) None of these

19) Most commonly used power plant on automobile is
   a) I.C. Engine b) Gas turbine c) Battery d) None of these

20) Free pedal play in car clutches is about
   a) 3 mm b) 30 mm c) 60 mm d) 100 mm

Set R

SLR-EP – 450

Seat No.	

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
AUTOMOBILE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if necessary****.*
3) Use of non-programmable calculator is ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) What are the type of automobile layout ? Explain Front engine rear wheel drive layout. **7**
   b) List various type of automobile bodies. Explain any two with figure. **6**
   c) Explain Electric vehicle with figure. **7**

3. a) Explain various type of resistances to vehicle movement. **4**
   b) A truck has a gross vehicle weight of 89026 N. Engine power is 77.3 kW at a governed speed of 2400 rpm and maximum torque 345.8 Nm at 1400 rpm. Rear axle ratio is 6.166 : 1. Fourth speed reduction ratio in transmission is 1.605 : 1. Drive line losses amount to 10.7 kW at 2400 rpm and 6.3 kW at 1400 rpm. Effective wheel dia. Is 0.950 m, frontal area of truck is 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air condition : **10**
      a) At governed engine speed
      b) At speed of maximum torque.
      c) Explain Electromagnetic clutch with figure. **6**

4. a) What is epicyclic gear box ? Explain with figure. **6**
   b) Explain in detail sliding mesh gear box with diagram. **6**
   c) Compare constant mesh gear box with synchromesh gear box. **8**

SECTION – II

5. a) Enlist the different types of steering gear boxes used in automobiles ? Explain with sketch ball and nut type of steering gear box. **8**

   b) Explain the terms : **6**

      i) King pin inclination and steering axis inclination.

      ii) Toe-in and Toe-out

      iii) Cornering power.

   c) Write short notes on : **6**

      1) Slip angle

      2) Antilock brakes.

6. a) What is power brake ? Explain with neat sketch air braking system and list advantages and disadvantages of it. **8**

   b) A car whose wheel base is equal to five times the height of its C.G. above the ground. If the vehicle is braked on all the four wheels over a road and if the coefficient of adhesion between car tyres and road is 0.6, determine the dynamic weight transferred. **4**

   c) Write short notes on : **8**

      1) Lead acid battery.

      2) Two wheeler layout.

7. a) Enlist the requirements of automobile suspension system. Compare independent suspension system with conventional suspension. **8**

   b) Explain telescopic shock absorber with neat sketch. **6**

   c) Write short notes on : **6**

      1) Stabilizer bar

      2) Engine electronic control module.

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SLR-EP – 450

Seat No.	

Set S

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
AUTOMOBILE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if necessary****.*
3) Use of non-programmable calculator is ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*
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)**

1) The smaller gear inside differential casing are
a) Pinion gear b) Sun gear c) Side gear d) Ring gear

2) The inner end of the axle shaft is splined to
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3) The type of rear axle used on truck is
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4) Most commonly used power plant on automobile is
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a) 3 mm b) 30 mm c) 60 mm d) 100 mm

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c) Worm and wheel d) None of these

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a) Cornering power b) Self-righting torque
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P.T.O.

8) The brake efficiency of a new vehicle is about
   a) 30 percent b) 50 percent c) 80 percent d) 100 percent

9) In antilock brakes
   a) Locking is prevented b) Pressure modulation is done
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10) The MacPherson suspension system consists of
   a) A telescopic strut b) A single arm
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   a) Weight of passenger carriage b) Weight of the wheel axle system
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   a) Sulphuric acid b) Nitric acid c) Lactic acid d) All of the above

14) Electronic control module gets signals from
   a) Different parameter measuring devices
   b) Sensors used at various locations
   c) Driver controls
   d) All of the above

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   a) Hopping b) Rolling
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16) The co-efficient of friction for the clutch facing is approximately
   a) 0.1 b) 0.4 c) 0.8 d) 1.2

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19) The component of torque convertor that allows multiplication of torque is the
   a) Turbine b) Impeller c) Pump d) Stator

20) The function of universal joint is to allow the propeller shaft to
   a) Change length b) Bend sideway
   c) Transfer torque at angle d) Change inclination

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SLR-EP – 450

Seat No.	

B.E. (Mechanical) (Part – II) (Old) Examination, 2016
AUTOMOBILE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if necessary****.*
3) Use of non-programmable calculator is ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) What are the type of automobile layout ? Explain Front engine rear wheel drive layout. **7**
   b) List various type of automobile bodies. Explain any two with figure. **6**
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   b) A truck has a gross vehicle weight of 89026 N. Engine power is 77.3 kW at a governed speed of 2400 rpm and maximum torque 345.8 Nm at 1400 rpm. Rear axle ratio is 6.166 : 1. Fourth speed reduction ratio in transmission is 1.605 : 1. Drive line losses amount to 10.7 kW at 2400 rpm and 6.3 kW at 1400 rpm. Effective wheel dia. Is 0.950 m, frontal area of truck is 6.95 m^2. Calculate the grades which the vehicle can climb in fourth gear in still air condition : **10**
      a) At governed engine speed
      b) At speed of maximum torque.
      c) Explain Electromagnetic clutch with figure. **6**

4. a) What is epicyclic gear box ? Explain with figure. **6**
   b) Explain in detail sliding mesh gear box with diagram. **6**
   c) Compare constant mesh gear box with synchromesh gear box. **8**

SECTION – II

5. a) Enlist the different types of steering gear boxes used in automobiles ? Explain with sketch ball and nut type of steering gear box. **8**

   b) Explain the terms : **6**

      i) King pin inclination and steering axis inclination.

      ii) Toe-in and Toe-out

      iii) Cornering power.

   c) Write short notes on : **6**

      1) Slip angle

      2) Antilock brakes.

6. a) What is power brake ? Explain with neat sketch air braking system and list advantages and disadvantages of it. **8**

   b) A car whose wheel base is equal to five times the height of its C.G. above the ground. If the vehicle is braked on all the four wheels over a road and if the coefficient of adhesion between car tyres and road is 0.6, determine the dynamic weight transferred. **4**

   c) Write short notes on : **8**

      1) Lead acid battery.

      2) Two wheeler layout.

7. a) Enlist the requirements of automobile suspension system. Compare independent suspension system with conventional suspension. **8**

   b) Explain telescopic shock absorber with neat sketch. **6**

   c) Write short notes on : **6**

      1) Stabilizer bar

      2) Engine electronic control module.

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SLR-EP – 451

Seat No.	

Set P

B.E. (Mech.) (Part – II) (Old) Examination, 2016
Elective – II : PRODUCTION MANAGEMENT

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***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 : 20

1. Choose the correct answer : **(20×1=20)**

1) Manufacturing of a cold drink is
   a) Job type production b) Batch type production
   c) Continuous type production d) None of the above

2) TPM means
   a) Total Production Management b) Total Process Management
   c) Total Product Mix d) None of these

3) In ABC analysis C stands for
   a) Components having high cost and high usage
   b) Components having low cost and low usage
   c) Components having high cost and low usage
   d) Components having low cost and high usage

4) Regression analysis is a
   a) Delphi model b) Group technique
   c) Causal model d) Time series model

5) Bill of material is a subsequence of
   a) MPS b) Line balancing c) Routing d) None of these

6) Production planning and control means
   a) Preplanning and routing b) Scheduling and dispatching
   c) Expediting d) All of above

7) Long term forecasting considers a period of
   a) One year or less b) One to three years
   c) More than three years d) None of these

8) Penalty cost is included in
   a) Shortage cost b) Ordering cost c) Holding cost d) None of these

P.T.O.

9) 'Buffer stock' is the level of stock
   a) Half of the actual stock
   b) At which the ordering process should start
   c) Minimum stock level below which actual stock should not fall
   d) Maximum stock in inventory

10) Re-ordering level is calculated as
   a) Maximum consumption rate × Maximum re-order period
   b) Minimum consumption rate × Minimum re-order period
   c) Maximum consumption rate × Minimum re-order period
   d) Minimum consumption rate × Maximum re-order period

11) JIT is targeted for
   a) Average inventory b) Zero inventory
   c) High inventory d) None of above

12) The length of time between placing an order and receipt of material is called as
   a) Lead time b) Order time c) Cycle time d) Process time

13) Which of the following is not an inventory ?
   a) Machines b) Raw material
   c) Finished products d) Consumable tools

14) OEE in TPM means
   a) Overall Engine Effectiveness b) Overall Engine Emission
   c) Overall Equipment Efficiency d) None of these

15) The following classes of costs are usually involved in inventory decisions except
   a) Cost of ordering b) Carrying cost
   c) Cost of shortages d) Machining cost

16) Services are
   a) Tangible b) Intangible c) Both of above d) None of above

17) Determining start and finish times for waiting jobs by assigning them to earliest available time slot at the work centre is known as
   a) Backward scheduling b) Forward scheduling
   c) General scheduling d) None of above

18) Mean rate of consumption during lead time (R) multiplied by mean lead time (L) is equal to
   a) Reserve stock b) Buffer stock c) Other stock d) None of above

19) Pareto principle is used in
   a) ABC analysis b) XYZ analysis c) SDE analysis d) None of above

20) Gantt chart is used for
   a) Routing b) Sequencing c) Scheduling d) Dispatching

SLR-EP – 451

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
Elective – II : PRODUCTION MANAGEMENT

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***N.B.** : Solve **any two** questions from **each** Section.*

SECTION – I

2. a) Explain the objective and scope of production management in detail. **7**

   b) Explain in detail aggregate planning. **7**

   c) Explain the production management framework. **6**

3. a) A dealer for electrical appliances forecasts the demand for the Geyser at the rate of 500 per month for the next three months. The actual demands turned out to be 400, 560 and 700. Calculate the forecast error and bias, comment on the same. **7**

   b) Explain exponential smoothening method of forecasting. **6**

   c) Compare production planning with production control. **7**

4. a) Five jobs are to be processed on two machines M1 and M2 in the order M1, M2 processing time in hours are given below.

Job	01	02	03	04	05
Machine M1	05	01	09	03	10
Machine M2	02	06	07	08	04

   Find out the optimum sequence and total elapsed time. **7**

   b) What are the functions and objectives of scheduling ? **7**

   c) Explain the factors affecting investment decisions in detail. **6**

SECTION – II

5. a) ABC corporation has got a demand for particular part at 10,000 units per year. The cost per unit is Rs. 2 and it costs Rs. 36 to place an order and to process the delivery. The inventory carrying cost is estimated at 9 percent of average inventory investment. Determine :
   i) EOQ
   ii) Optimum numbers of orders to be placed per annum
   iii) Minimum total cost of inventory per annum. **7**

   b) Explain in brief the inputs to MRP processor. **7**

   c) Explain various costs associated with inventory. **6**

6. a) Explain how total productive maintenance differ from conventional breakdown maintenance. **7**

   b) Explain the principles of material handling. **6**

   c) Explain in detail the term JIT. **7**

7. Write notes on (**five** marks **each**) : **20**
   i) ABC analysis
   ii) Reliability
   iii) Supply chain management
   iv) Kanban system.

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SLR-EP – 451

Seat No.	

Set Q

B.E. (Mech.) (Part – II) (Old) Examination, 2016
Elective – II : PRODUCTION MANAGEMENT

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***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 : 20

1. Choose the correct answer : **(20×1=20)**

1) Services are
a) Tangible b) Intangible c) Both of above d) None of above

2) Determining start and finish times for waiting jobs by assigning them to earliest available time slot at the work centre is known as
a) Backward scheduling b) Forward scheduling
c) General scheduling d) None of above

3) Mean rate of consumption during lead time (R) multiplied by mean lead time (L) is equal to
a) Reserve stock b) Buffer stock c) Other stock d) None of above

4) Pareto principle is used in
a) ABC analysis b) XYZ analysis c) SDE analysis d) None of above

5) Gantt chart is used for
a) Routing b) Sequencing c) Scheduling d) Dispatching

6) Manufacturing of a cold drink is
a) Job type production b) Batch type production
c) Continuous type production d) None of the above

7) TPM means
a) Total Production Management b) Total Process Management
c) Total Product Mix d) None of these

8) In ABC analysis C stands for
a) Components having high cost and high usage
b) Components having low cost and low usage
c) Components having high cost and low usage
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P.T.O.

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   a) Delphi model
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   c) Causal model
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11) Production planning and control means
   a) Preplanning and routing
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12) Long term forecasting considers a period of
   a) One year or less
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15) Re-ordering level is calculated as
   a) Maximum consumption rate × Maximum re-order period
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   a) Overall Engine Effectiveness
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20) The following classes of costs are usually involved in inventory decisions except
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   b) Carrying cost
   c) Cost of shortages
   d) Machining cost

SLR-EP – 451

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
Elective – II : PRODUCTION MANAGEMENT

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***N.B.** : Solve **any two** questions from **each** Section.*

SECTION – I

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   Find out the optimum sequence and total elapsed time. **7**

   b) What are the functions and objectives of scheduling ? **7**

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SECTION – II

5. a) ABC corporation has got a demand for particular part at 10,000 units per year. The cost per unit is Rs. 2 and it costs Rs. 36 to place an order and to process the delivery. The inventory carrying cost is estimated at 9 percent of average inventory investment. Determine :
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   b) Explain in brief the inputs to MRP processor. **7**

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6. a) Explain how total productive maintenance differ from conventional breakdown maintenance. **7**

   b) Explain the principles of material handling. **6**

   c) Explain in detail the term JIT. **7**

7. Write notes on (**five** marks **each**) : **20**
   i) ABC analysis
   ii) Reliability
   iii) Supply chain management
   iv) Kanban system.

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SLR-EP – 451

Seat No.	

Set R

B.E. (Mech.) (Part – II) (Old) Examination, 2016
Elective – II : PRODUCTION MANAGEMENT

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***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 : 20

1. Choose the correct answer : **(20×1=20)**

1) JIT is targeted for
   a) Average inventory b) Zero inventory
   c) High inventory d) None of above

2) The length of time between placing an order and receipt of material is called as
   a) Lead time b) Order time c) Cycle time d) Process time

3) Which of the following is not an inventory ?
   a) Machines b) Raw material
   c) Finished products d) Consumable tools

4) OEE in TPM means
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5) The following classes of costs are usually involved in inventory decisions except
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6) Services are
   a) Tangible b) Intangible c) Both of above d) None of above

7) Determining start and finish times for waiting jobs by assigning them to earliest available time slot at the work centre is known as
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P.T.O.

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SLR-EP – 451

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
Elective – II : PRODUCTION MANAGEMENT

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***N.B.** : Solve **any two** questions from **each** Section.*

SECTION – I

2. a) Explain the objective and scope of production management in detail. **7**

   b) Explain in detail aggregate planning. **7**

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   Find out the optimum sequence and total elapsed time. **7**

   b) What are the functions and objectives of scheduling ? **7**

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SECTION – II

5. a) ABC corporation has got a demand for particular part at 10,000 units per year. The cost per unit is Rs. 2 and it costs Rs. 36 to place an order and to process the delivery. The inventory carrying cost is estimated at 9 percent of average inventory investment. Determine :
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   b) Explain in brief the inputs to MRP processor. **7**

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6. a) Explain how total productive maintenance differ from conventional breakdown maintenance. **7**

   b) Explain the principles of material handling. **6**

   c) Explain in detail the term JIT. **7**

7. Write notes on (**five** marks **each**) : **20**
   i) ABC analysis
   ii) Reliability
   iii) Supply chain management
   iv) Kanban system.

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SLR-EP – 451

Seat No.	

Set S

B.E. (Mech.) (Part – II) (Old) Examination, 2016
Elective – II : PRODUCTION MANAGEMENT

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***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.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Production planning and control means
   a) Preplanning and routing b) Scheduling and dispatching
   c) Expediting d) All of above

2) Long term forecasting considers a period of
   a) One year or less b) One to three years
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P.T.O.

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19) Regression analysis is a
   a) Delphi model
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20) Bill of material is a subsequence of
   a) MPS b) Line balancing c) Routing d) None of these

SLR-EP – 451

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
Elective – II : PRODUCTION MANAGEMENT

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***N.B.** : Solve **any two** questions from **each** Section.*

SECTION – I

2. a) Explain the objective and scope of production management in detail. **7**

   b) Explain in detail aggregate planning. **7**

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3. a) A dealer for electrical appliances forecasts the demand for the Geyser at the rate of 500 per month for the next three months. The actual demands turned out to be 400, 560 and 700. Calculate the forecast error and bias, comment on the same. **7**

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   Find out the optimum sequence and total elapsed time. **7**

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SECTION – II

5. a) ABC corporation has got a demand for particular part at 10,000 units per year. The cost per unit is Rs. 2 and it costs Rs. 36 to place an order and to process the delivery. The inventory carrying cost is estimated at 9 percent of average inventory investment. Determine :
   i) EOQ
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6. a) Explain how total productive maintenance differ from conventional breakdown maintenance. **7**

   b) Explain the principles of material handling. **6**

   c) Explain in detail the term JIT. **7**

7. Write notes on (**five** marks **each**) : **20**
   i) ABC analysis
   ii) Reliability
   iii) Supply chain management
   iv) Kanban system.

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SLR-EP – 452

Seat No.	

Set P

B.E. (Mech.) (Part – II) (Old) Examination, 2016
MATERIAL HANDLING SYSTEMS (Elective – II)

Day and Date : Thursday, 24-11-2016 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 : **(20×1=20)**

1) Overbridge crane has
   a) Transverse and longitudinal movement
   b) Angular movement
   c) Circular movement
   d) None of the above

2) For _____ type material flow having less difficulty in returning empty containers.
   a) Straight line b) Inverted c) L shaped d) U shaped

3) Hand truck are characterised by
   a) Pallet + Walk + No Stack + Powered
   b) Pallet + Walk + No Stack + Manual
   c) Non-Pallet + Walk + Stack + Powered
   d) Non-Pallet + Walk + No Stack + Manual

4) Symbol ☐ represents for
   a) Operation b) Store c) Inspection d) Movement

5) Conveyors and industrial trucks are the _____ equipment.
   a) Transport b) Positioning
   c) Storage d) Identification and control equipment

6) Material handling consists of movement of material from
   a) One machine to another b) One shop to another shop
   c) Stores to shop d) All of the above

7) The equipment used to handle materials at a single location so that, it is in the correct position for Machining
   a) Transport equipment b) Storage equipment
   c) Positioning equipment d) None of these

P.T.O.

8) _____ Conveyor is used to transport flat bottoms materials.
   a) Belt conveyor b) Roller conveyor
   c) Chain conveyor d) None of the above

9) Conveyor are used for _____ type industry.
   a) Process layout b) Line layout c) Fixed layout d) None of the above

10) _____ equipments are worked on counterbalanced principle.
   a) Gravity conveyor b) Fork lift trucks
   c) Picking Robot d) Warehouse Trolley

11) Assembly chart show
   a) Lay out of the product
   b) Sequence in which component are assembled
   c) Figure component
   d) None of these

12) _____ types of restrictions are considered in manual material handling.
   a) Physical b) Financial c) Ethical d) All of these

13) Equipment evaluation sheet consists of equipment characteristics, utilization and _____
   a) Safety b) Vendor characteristics
   c) Flexibility d) Unit load

14) The material handling equation consists of the material characteristics, the move requirement, and
   a) The method capabilities b) Human capabilities
   c) Load d) Gravity

15) Procedure chart gives the information about
   a) Inventory b) Inspection
   c) Communication d) Material requirement

16) For single storing building when the flat floor area is available then _____ system is used.
   a) Horizontal flow b) Vertical c) Zig-Zag d) Inclined

17) Loads are supported by arms (cantilever) in _____ racks.
   a) Sliding rack b) Push back rack c) Drive in rack d) Cantilever rack

18) The handling of a quantity designed to be treated as a single mass
   a) Unit load b) Unit mass c) Unit wt. d) None of these

19) Form to chart gives the information about
   a) Density of moves between depts. b) Equipment
   c) Selection procedure d) None of these

20) In power equipment automatic correction according to
   a) Gravity b) Manual c) Signal d) Equipment

_____

SLR-EP – 452

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
MATERIAL HANDLING SYSTEMS (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*

2) ***Draw*** *neat diagram* ***where*** *necessary.*

3) Solve ***any two*** *questions in* ***each*** *Section.*

SECTION – I

2. a) Explain diff. types of material handling principles applied to plant layout. **7**

   b) Explain any three types of storing equipments. **7**

   c) Explain any three types of industrial trucks. **6**

3. a) Define material handling system and give equipment classification. **7**

   b) "Material handling is supporting activity for the manufacturing but it is the significant element of productivity improvement". Justify the above statement. **7**

   c) Explain material handling in CIMS. **6**

4. Write a short notes (**any three**) : **20**

   a) Types of conveyor (any three) **6**

   b) Hoisting equipments **6**

   c) Automated Guided Vehicles (AGV) **7**

   d) Containerization and Palletisation. **7**

Set P

SECTION – II

5. a) Describe different activities at the receiving, shipping, in Process function to improve the efficiency of MHS. **7**

   b) Explain with figure material handling equation. **7**

   c) Explain in detail choice of material handling equipments. **6**

6. a) Describe with figure types of flow patterns for material handling. **7**

   b) Discuss the importance of material handling safety. **7**

   c) Explain with figure string diagram. **6**

7. Write a short notes (**any three**) : **20**

   a) Common forklift accidents in industry **7**

   b) Procedure chart **6**

   c) Equipment evaluation sheet **7**

   d) Selection of material handling equipment in Sugar plant. **6**

SLR-EP – 452

Seat No.	

Set Q

B.E. (Mech.) (Part – II) (Old) Examination, 2016
MATERIAL HANDLING SYSTEMS (Elective – II)

Day and Date : Thursday, 24-11-2016 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 : **(20×1=20)**

1) For single storing building when the flat floor area is available then _____ system is used.
a) Horizontal flow b) Vertical c) Zig-Zag d) Inclined

2) Loads are supported by arms (cantilever) in _____ racks.
a) Sliding rack b) Push back rack c) Drive in rack d) Cantilever rack

3) The handling of a quantity designed to be treated as a single mass
a) Unit load b) Unit mass c) Unit wt. d) None of these

4) Form to chart gives the information about
a) Density of moves between depts. b) Equipment
c) Selection procedure d) None of these

5) In power equipment automatic correction according to
a) Gravity b) Manual c) Signal d) Equipment

6) Overbridge crane has
a) Transverse and longitudinal movement
b) Angular movement
c) Circular movement
d) None of the above

7) For _____ type material flow having less difficulty in returning empty containers.
a) Straight line b) Inverted c) L shaped d) U shaped

8) Hand truck are characterised by
a) Pallet + Walk + No Stack + Powered
b) Pallet + Walk + No Stack + Manual
c) Non-Pallet + Walk + Stack + Powered
d) Non-Pallet + Walk + No Stack + Manual

P.T.O.

9) Symbol  represents for
   a) Operation b) Store c) Inspection d) Movement

10) Conveyors and industrial trucks are the _____ equipment.
   a) Transport b) Positioning
   c) Storage d) Identification and control equipment

11) Material handling consists of movement of material from
   a) One machine to another b) One shop to another shop
   c) Stores to shop d) All of the above

12) The equipment used to handle materials at a single location so that, it is in the correct position for Machining
   a) Transport equipment b) Storage equipment
   c) Positioning equipment d) None of these

13) _____ Conveyor is used to transport flat bottoms materials.
   a) Belt conveyor b) Roller conveyor
   c) Chain conveyor d) None of the above

14) Conveyor are used for _____ type industry.
   a) Process layout b) Line layout c) Fixed layout d) None of the above

15) _____ equipments are worked on counterbalanced principle.
   a) Gravity conveyor b) Fork lift trucks
   c) Picking Robot d) Warehouse Trolley

16) Assembly chart show
   a) Lay out of the product
   b) Sequence in which component are assembled
   c) Figure component
   d) None of these

17) _____ types of restrictions are considered in manual material handling.
   a) Physical b) Financial c) Ethical d) All of these

18) Equipment evaluation sheet consists of equipment characteristics, utilization and _____
   a) Safety b) Vendor characteristics
   c) Flexibility d) Unit load

19) The material handling equation consists of the material characteristics, the move requirement, and
   a) The method capabilities b) Human capabilities
   c) Load d) Gravity

20) Procedure chart gives the information about
   a) Inventory b) Inspection
   c) Communication d) Material requirement

_____

SLR-EP – 452

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
MATERIAL HANDLING SYSTEMS (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*

2) ***Draw*** *neat diagram* ***where*** *necessary.*

3) Solve ***any two*** *questions in* ***each*** *Section.*

SECTION – I

2. a) Explain diff. types of material handling principles applied to plant layout. **7**

   b) Explain any three types of storing equipments. **7**

   c) Explain any three types of industrial trucks. **6**

3. a) Define material handling system and give equipment classification. **7**

   b) "Material handling is supporting activity for the manufacturing but it is the significant element of productivity improvement". Justify the above statement. **7**

   c) Explain material handling in CIMS. **6**

4. Write a short notes (**any three**) : **20**

   a) Types of conveyor (any three) **6**

   b) Hoisting equipments **6**

   c) Automated Guided Vehicles (AGV) **7**

   d) Containerization and Palletisation. **7**

Set Q

SECTION – II

5. a) Describe different activities at the receiving, shipping, in Process function to improve the efficiency of MHS. **7**

   b) Explain with figure material handling equation. **7**

   c) Explain in detail choice of material handling equipments. **6**

6. a) Describe with figure types of flow patterns for material handling. **7**

   b) Discuss the importance of material handling safety. **7**

   c) Explain with figure string diagram. **6**

7. Write a short notes (**any three**) : **20**

   a) Common forklift accidents in industry **7**

   b) Procedure chart **6**

   c) Equipment evaluation sheet **7**

   d) Selection of material handling equipment in Sugar plant. **6**

SLR-EP – 452

Seat No.	

Set R

B.E. (Mech.) (Part – II) (Old) Examination, 2016
MATERIAL HANDLING SYSTEMS (Elective – II)

Day and Date : Thursday, 24-11-2016 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 : **(20×1=20)**

1) Assembly chart show
   a) Lay out of the product
   b) Sequence in which component are assembled
   c) Figure component
   d) None of these

2) _____ types of restrictions are considered in manual material handling.
   a) Physical b) Financial c) Ethical d) All of these

3) Equipment evaluation sheet consists of equipment characteristics, utilization and _____
   a) Safety b) Vendor characteristics
   c) Flexibility d) Unit load

4) The material handling equation consists of the material characteristics, the move requirement, and
   a) The method capabilities b) Human capabilities
   c) Load d) Gravity

5) Procedure chart gives the information about
   a) Inventory b) Inspection
   c) Communication d) Material requirement

6) For single storing building when the flat floor area is available then _____ system is used.
   a) Horizontal flow b) Vertical c) Zig-Zag d) Inclined

7) Loads are supported by arms (cantilever) in _____ racks.
   a) Sliding rack b) Push back rack c) Drive in rack d) Cantilever rack

8) The handling of a quantity designed to be treated as a single mass
   a) Unit load b) Unit mass c) Unit wt. d) None of these

P.T.O.

9) Form to chart gives the information about
   a) Density of moves between depts. b) Equipment
   c) Selection procedure d) None of these

10) In power equipment automatic correction according to
   a) Gravity b) Manual c) Signal d) Equipment

11) Overbridge crane has
   a) Transverse and longitudinal movement
   b) Angular movement
   c) Circular movement
   d) None of the above

12) For _____ type material flow having less difficulty in returning empty containers.
   a) Straight line b) Inverted c) L shaped d) U shaped

13) Hand truck are characterised by
   a) Pallet + Walk + No Stack + Powered
   b) Pallet + Walk + No Stack + Manual
   c) Non-Pallet + Walk + Stack + Powered
   d) Non-Pallet + Walk + No Stack + Manual

14) Symbol  represents for
   a) Operation b) Store c) Inspection d) Movement

15) Conveyors and industrial trucks are the _____ equipment.
   a) Transport b) Positioning
   c) Storage d) Identification and control equipment

16) Material handling consists of movement of material from
   a) One machine to another b) One shop to another shop
   c) Stores to shop d) All of the above

17) The equipment used to handle materials at a single location so that, it is in the correct position for Machining
   a) Transport equipment b) Storage equipment
   c) Positioning equipment d) None of these

18) _____ Conveyor is used to transport flat bottoms materials.
   a) Belt conveyor b) Roller conveyor
   c) Chain conveyor d) None of the above

19) Conveyor are used for _____ type industry.
   a) Process layout b) Line layout c) Fixed layout d) None of the above

20) _____ equipments are worked on counterbalanced principle.
   a) Gravity conveyor b) Fork lift trucks
   c) Picking Robot d) Warehouse Trolley

_____

SLR-EP – 452

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
MATERIAL HANDLING SYSTEMS (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80

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

Instructions: *1) Figures to the **right** indicate **full** marks.*

*2) **Draw** neat diagram **where** necessary.*

*3) Solve **any two** questions in **each** Section.*

SECTION – I

2. a) Explain diff. types of material handling principles applied to plant layout. **7**

   b) Explain any three types of storing equipments. **7**

   c) Explain any three types of industrial trucks. **6**

3. a) Define material handling system and give equipment classification. **7**

   b) "Material handling is supporting activity for the manufacturing but it is the significant element of productivity improvement". Justify the above statement. **7**

   c) Explain material handling in CIMS. **6**

4. Write a short notes (**any three**) : **20**

   a) Types of conveyor (any three) **6**

   b) Hoisting equipments **6**

   c) Automated Guided Vehicles (AGV) **7**

   d) Containerization and Palletisation. **7**

SECTION – II

5. a) Describe different activities at the receiving, shipping, in Process function to improve the efficiency of MHS. **7**

   b) Explain with figure material handling equation. **7**

   c) Explain in detail choice of material handling equipments. **6**

6. a) Describe with figure types of flow patterns for material handling. **7**

   b) Discuss the importance of material handling safety. **7**

   c) Explain with figure string diagram. **6**

7. Write a short notes (**any three**) : **20**

   a) Common forklift accidents in industry **7**

   b) Procedure chart **6**

   c) Equipment evaluation sheet **7**

   d) Selection of material handling equipment in Sugar plant. **6**

SLR-EP – 452

Seat No.	

Set S

B.E. (Mech.) (Part – II) (Old) Examination, 2016
MATERIAL HANDLING SYSTEMS (Elective – II)

Day and Date : Thursday, 24-11-2016 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 : **(20×1=20)**

1) Material handling consists of movement of material from
   a) One machine to another b) One shop to another shop
   c) Stores to shop d) All of the above

2) The equipment used to handle materials at a single location so that, it is in the correct position for Machining
   a) Transport equipment b) Storage equipment
   c) Positioning equipment d) None of these

3) _____ Conveyor is used to transport flat bottoms materials.
   a) Belt conveyor b) Roller conveyor
   c) Chain conveyor d) None of the above

4) Conveyor are used for _____ type industry.
   a) Process layout b) Line layout c) Fixed layout d) None of the above

5) _____ equipments are worked on counterbalanced principle.
   a) Gravity conveyor b) Fork lift trucks
   c) Picking Robot d) Warehouse Trolley

6) Assembly chart show
   a) Lay out of the product
   b) Sequence in which component are assembled
   c) Figure component
   d) None of these

7) _____ types of restrictions are considered in manual material handling.
   a) Physical b) Financial c) Ethical d) All of these

8) Equipment evaluation sheet consists of equipment characteristics, utilization and _____
   a) Safety b) Vendor characteristics
   c) Flexibility d) Unit load

P.T.O.

9) The material handling equation consists of the material characteristics, the move requirement, and
   a) The method capabilities b) Human capabilities
   c) Load d) Gravity

10) Procedure chart gives the information about
   a) Inventory b) Inspection
   c) Communication d) Material requirement

11) For single storing building when the flat floor area is available then _____ system is used.
   a) Horizontal flow b) Vertical c) Zig-Zag d) Inclined

12) Loads are supported by arms (cantilever) in _____ racks.
   a) Sliding rack b) Push back rack c) Drive in rack d) Cantilever rack

13) The handling of a quantity designed to be treated as a single mass
   a) Unit load b) Unit mass c) Unit wt. d) None of these

14) Form to chart gives the information about
   a) Density of moves between depts. b) Equipment
   c) Selection procedure d) None of these

15) In power equipment automatic correction according to
   a) Gravity b) Manual c) Signal d) Equipment

16) Overbridge crane has
   a) Transverse and longitudinal movement
   b) Angular movement
   c) Circular movement
   d) None of the above

17) For _____ type material flow having less difficulty in returning empty containers.
   a) Straight line b) Inverted c) L shaped d) U shaped

18) Hand truck are characterised by
   a) Pallet + Walk + No Stack + Powered
   b) Pallet + Walk + No Stack + Manual
   c) Non-Pallet + Walk + Stack + Powered
   d) Non-Pallet + Walk + No Stack + Manual

19) Symbol  represents for
   a) Operation b) Store c) Inspection d) Movement

20) Conveyors and industrial trucks are the _____ equipment.
   a) Transport b) Positioning
   c) Storage d) Identification and control equipment

_____

SLR-EP – 452

Seat No.	

B.E. (Mech.) (Part – II) (Old) Examination, 2016
MATERIAL HANDLING SYSTEMS (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80

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

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*

2) ***Draw*** *neat diagram* ***where*** *necessary.*

3) Solve ***any two*** *questions in* ***each*** *Section.*

SECTION – I

2. a) Explain diff. types of material handling principles applied to plant layout. **7**

   b) Explain any three types of storing equipments. **7**

   c) Explain any three types of industrial trucks. **6**

3. a) Define material handling system and give equipment classification. **7**

   b) "Material handling is supporting activity for the manufacturing but it is the significant element of productivity improvement". Justify the above statement. **7**

   c) Explain material handling in CIMS. **6**

4. Write a short notes (**any three**) : **20**

   a) Types of conveyor (any three) **6**

   b) Hoisting equipments **6**

   c) Automated Guided Vehicles (AGV) **7**

   d) Containerization and Palletisation. **7**

Set S

SECTION – II

5. a) Describe different activities at the receiving, shipping, in Process function to improve the efficiency of MHS. **7**

   b) Explain with figure material handling equation. **7**

   c) Explain in detail choice of material handling equipments. **6**

6. a) Describe with figure types of flow patterns for material handling. **7**

   b) Discuss the importance of material handling safety. **7**

   c) Explain with figure string diagram. **6**

7. Write a short notes (**any three**) : **20**

   a) Common forklift accidents in industry **7**

   b) Procedure chart **6**

   c) Equipment evaluation sheet **7**

   d) Selection of material handling equipment in Sugar plant. **6**

SLR-EP – 453

Seat No.	

Set P

B.E. (Mechanical) (Part – II) (New) Examination, 2016
MECHATRONICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 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.***
3) Solve ***any two*** *of the* ***remaining three*** *questions from* ***each*** *Section.*
4) Support your answers with ***neat*** *sketches* ***wherever required****.*
5) Make suitable assumptions ***if necessary*** *and state them* ***clearly****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) A sensor has a non-linear output characteristic. Which amplifier circuit must we use to make the final output linear ?
a) inverting b) integrating c) logarithmic d) difference

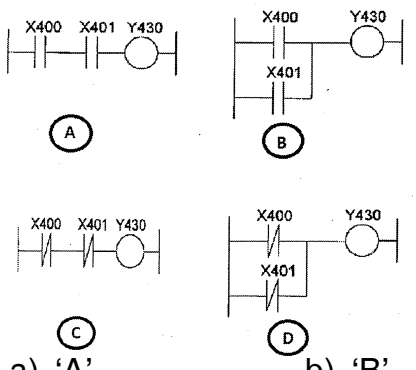
2) In _____ transmission we transmit all "n" bits at a time.
a) Serial b) Synchronous c) Parallel d) Mixed

3) A set of rules that govern data communications between the sender and receiver is called
a) Rule b) Law c) Option d) Protocol

4) In the OSI model, a program such as a web browser is a part of _____ layer.
a) Physical b) Data link c) Application d) Session

5) In a _____ , if master node fails, the whole network cannot function.
a) Ring topology b) Star topology c) Tree topology d) Mesh topology

6) There are five ladder diagrams labelled A, B, C and D. Which one of these represents NOR logic ?



a) 'A' b) 'B' c) 'C' d) 'D'

P.T.O.

7) Decide whether each of these statements is true (T) or false (F).
A triac output channel from a PLC :
1) is used only AC switching.
2) is isolated from the output by an optocoupler.
Decide whether each of these statements is true (T) or false (F) and thus which option best describes the two statements ?
a) (1) T and (2) F b) (1) F and (2) T c) (1) T and (2) T d) (1) F and (2) F

8) The term PLC stands for
a) Personal Logic Computer b) Programmable Local Computer
c) Personal Logic Controller d) Programmable Logic Controller

9) A comparator is basically an OPAMP with
a) No feedback b) Only one feedback
c) One feed forward circuit d) None of the above

10) Filters that transmit all frequencies above a defined cut-off frequency are known as
a) Low pass filters b) High pass filters c) Band pass filters d) All pass filters

11) Alternative functions such as timer, serial port, write and read signals are provided on _____ in the 8051.
a) Port 0 b) Port 1 c) Port 3 d) Port 2

12) Which port can be used as the high address bus to access external memory ?
a) Port 0 b) Port 2 c) Port 3 d) Port 1

13) The 8085 but architecture consists of _____ address lines and _____ data lines.
a) 8 and 8 b) 16 and 8 c) 16 and 16 d) 8 and 16

14) The various flags used in 8085 are
a) Sign, Zero, Parity, Auxillary and Borrow
b) Sign, Carry, Borrow and Parity
c) Sign, Error, Parity, Carry, Borrow
d) Sign, Zero, Parity, Auxillary and Carry

15) What form of sound actuator would usually be used for ultrasonic applications ?
a) Piezoelectric actuator b) Hydraulic actuator
c) Piezomagnetic actuator d) Pneumatic speaker

16) Large force, high power and rugged operation conditions warrants the use of _____ actuators
a) Electrical b) Pneumatic c) Magnetic d) Hydraulic

17) Pyroelectric sensors when heated to a temperature just below its _____ temperature in an electric field and the material cooled while remaining in the field, the electric dipoles within the material line up and it becomes polarised.
a) Crystallization b) Curie c) Eutectic d) Kelvin

18) Gauge factor for semi-conductor strain gauges is typically
a) 10 to 20 b) – 20 to 50 c) 20 to 50 d) – 50 to 200

19) Variable inductance transducers are based on
a) Peltier effect b) Faradays law c) Pascal's law d) Murphy's law

20) The _____ of a transducer is the range of input values for which there is no output.
a) Resolution b) Repeatability c) Dead band d) Stability

SLR-EP – 453

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
MECHATRONICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) The first question from* ***each*** *Section (Question No.* ***2*** *and Question No.* ***6****) is* ***compulsory****.*
2) Solve ***any two*** *of the* ***remaining three*** *questions from* ***each*** *Section.*
3) Support your answers with ***neat*** *sketches* ***wherever required****.*
4) Make suitable assumptions ***if necessary*** *and state them* ***clearly****.*

SECTION – I

2. Solve **any four** questions : **20**
   a) Discuss the working of a washing machine from a mechatronic perspective.
   b) Define with regards to sensor characteristics : Hysteresis, Rise time, Time constant, Precision and Stability and Drift.
   c) What do you understand by the term “Signal Conditioning” ?
   d) Define microprocessor and microcontroller. How do the two differ ?
   e) What is memory ? What are the different types of memory ?
   f) What are OPAMPs ? List its types and their applications.

3. a) Discuss applications of sensors for condition monitoring. **6**
   b) What are the different types of signal filters ? **4**

4. a) List applications of DC, AC and Stepper Motors. **6**
   b) Explain data acquisition and computer based instrumentation. **4**

5. a) Sketch the 8051 pin diagram. List the features 8051 I/O ports. **6**
   b) Discuss how a car engine management system works. **4**

SECTION – II

6. Solve **any four** questions : **20**

   a) Sketch the ladder diagram for a device used to control motor rotation similar to a DPDT switch. When a switch is momentarily pressed the motor moves in one direction and when a second switch is momentarily pressed the motor moves in another direction.

   b) Discuss in brief CANbus and SCADA.

   c) What are Genetic Algorithms ? List its applications.

   d) Discuss the role of Mechantronics in Automotive systems.

   e) Discuss the role of Mechatronics in Industrial automation.

   f) Explain different network topologies.

7. a) Explain the OSI networking model. **6**

   b) Draw the ladder diagram for the following task. The presence of an item as it passes over a conveyor is detected using a proximity sensor. The conveyor motor is stopped for about 20 seconds for the operation to be carried out and the conveyor is started again. The motor for the conveyor belt is started by a normally open start switch and stopped by a normally closed switch. **4**

8. a) What is Fuzzy logic ? List its applications. **6**

   b) What is an Internal Relay ? Explain using a suitable example. **4**

9. a) Discuss the role of Mechantronics in MEMs. **6**

   b) Draw the ladder diagram for a circuit that will switch on an output for 100 sec and then switch it off. The output is activated via an internal relay. **4**

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SLR-EP – 453

Seat No.	

Set Q

B.E. (Mechanical) (Part – II) (New) Examination, 2016
MECHATRONICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 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.***
3) Solve ***any two*** *of the* ***remaining three*** *questions from* ***each*** *Section.*
4) Support your answers with ***neat*** *sketches* ***wherever required****.*
5) Make suitable assumptions ***if necessary*** *and state them* ***clearly****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) Large force, high power and rugged operation conditions warrants the use of _____ actuators
a) Electrical b) Pneumatic c) Magnetic d) Hydraulic

2) Pyroelectric sensors when heated to a temperature just below its_____ temperature in an electric field and the material cooled while remaining in the field, the electric dipoles within the material line up and it becomes polarised.
a) Crystallization b) Curie c) Eutectic d) Kelvin

3) Gauge factor for semi-conductor strain gauges is typically
a) 10 to 20 b) – 20 to 50 c) 20 to 50 d) – 50 to 200

4) Variable inductance transducers are based on
a) Peltier effect b) Faradays law c) Pascal's law d) Murphy's law

5) The _____ of a transducer is the range of input values for which there is no output.
a) Resolution b) Repeatability c) Dead band d) Stability

6) A sensor has a non-linear output characteristic. Which amplifier circuit must we use to make the final output linear ?
a) inverting b) integrating c) logarithmic d) difference

7) In _____ transmission we transmit all "n" bits at a time.
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8) A set of rules that govern data communications between the sender and receiver is called
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9) In the OSI model, a program such as a web browser is a part of _____ layer.
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10) In a _____ , if master node fails, the whole network cannot function.
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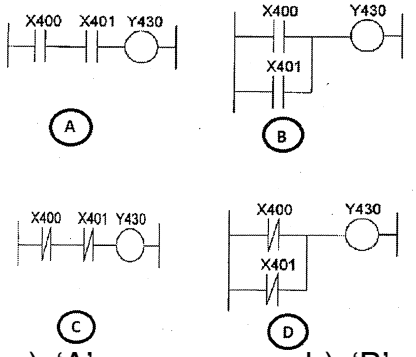
P.T.O.

11) There are five ladder diagrams labelled A, B, C and D. Which one of these represents NOR logic ?



a) 'A' b) 'B' c) 'C' d) 'D'

12) Decide whether each of these statements is true (T) or false (F).
A triac output channel from a PLC :
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a) (1) T and (2) F b) (1) F and (2) T c) (1) T and (2) T d) (1) F and (2) F

13) The term PLC stands for
a) Personal Logic Computer b) Programmable Local Computer
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14) A comparator is basically an OPAMP with
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15) Filters that transmit all frequencies above a defined cut-off frequency are known as
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16) Alternative functions such as timer, serial port, write and read signals are provided on _____ in the 8051.
a) Port 0 b) Port 1 c) Port 3 d) Port 2

17) Which port can be used as the high address bus to access external memory ?
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18) The 8085 but architecture consists of _____ address lines and _____ data lines.
a) 8 and 8 b) 16 and 8 c) 16 and 16 d) 8 and 16

19) The various flags used in 8085 are
a) Sign, Zero, Parity, Auxillary and Borrow
b) Sign, Carry, Borrow and Parity
c) Sign, Error, Parity, Carry, Borrow
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20) What form of sound actuator would usually be used for ultrasonic applications ?
a) Piezoelectric actuator b) Hydraulic actuator
c) Piezomagnetic actuator d) Pneumatic speaker

SLR-EP – 453

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
MECHATRONICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) The first question from* ***each*** *Section (Question No.* ***2*** *and Question No.* ***6****) is* ***compulsory****.*
2) Solve ***any two*** *of the* ***remaining three*** *questions from* ***each*** *Section.*
3) Support your answers with ***neat*** *sketches* ***wherever required****.*
4) Make suitable assumptions ***if necessary*** *and state them* ***clearly****.*

SECTION – I

2. Solve **any four** questions : **20**
   a) Discuss the working of a washing machine from a mechatronic perspective.
   b) Define with regards to sensor characteristics : Hysteresis, Rise time, Time constant, Precision and Stability and Drift.
   c) What do you understand by the term “Signal Conditioning” ?
   d) Define microprocessor and microcontroller. How do the two differ ?
   e) What is memory ? What are the different types of memory ?
   f) What are OPAMPs ? List its types and their applications.

3. a) Discuss applications of sensors for condition monitoring. **6**
   b) What are the different types of signal filters ? **4**

4. a) List applications of DC, AC and Stepper Motors. **6**
   b) Explain data acquisition and computer based instrumentation. **4**

5. a) Sketch the 8051 pin diagram. List the features 8051 I/O ports. **6**
   b) Discuss how a car engine management system works. **4**

SECTION – II

6. Solve **any four** questions : **20**

   a) Sketch the ladder diagram for a device used to control motor rotation similar to a DPDT switch. When a switch is momentarily pressed the motor moves in one direction and when a second switch is momentarily pressed the motor moves in another direction.

   b) Discuss in brief CANbus and SCADA.

   c) What are Genetic Algorithms ? List its applications.

   d) Discuss the role of Mechantronics in Automotive systems.

   e) Discuss the role of Mechatronics in Industrial automation.

   f) Explain different network topologies.

7. a) Explain the OSI networking model. **6**

   b) Draw the ladder diagram for the following task. The presence of an item as it passes over a conveyor is detected using a proximity sensor. The conveyor motor is stopped for about 20 seconds for the operation to be carried out and the conveyor is started again. The motor for the conveyor belt is started by a normally open start switch and stopped by a normally closed switch. **4**

8. a) What is Fuzzy logic ? List its applications. **6**

   b) What is an Internal Relay ? Explain using a suitable example. **4**

9. a) Discuss the role of Mechantronics in MEMs. **6**

   b) Draw the ladder diagram for a circuit that will switch on an output for 100 sec and then switch it off. The output is activated via an internal relay. **4**

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SLR-EP – 453

Seat No.	

Set R

B.E. (Mechanical) (Part – II) (New) Examination, 2016
MECHATRONICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

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a) Port 0 b) Port 1 c) Port 3 d) Port 2

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3) The 8085 but architecture consists of _____ address lines and _____ data lines.
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5) What form of sound actuator would usually be used for ultrasonic applications ?
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a) Electrical b) Pneumatic c) Magnetic d) Hydraulic

7) Pyroelectric sensors when heated to a temperature just below its_____ temperature in an electric field and the material cooled while remaining in the field, the electric dipoles within the material line up and it becomes polarised.
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8) Gauge factor for semi-conductor strain gauges is typically
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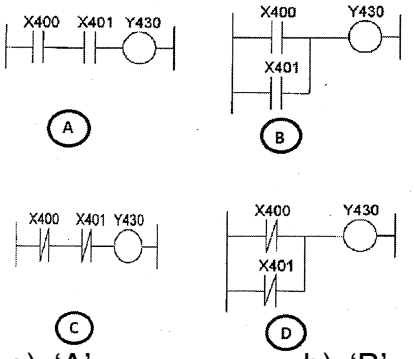

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SLR-EP – 453

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
MECHATRONICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) The first question from* ***each*** *Section (Question No.* ***2*** *and Question No.* ***6****) is* ***compulsory****.*
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SECTION – I

2. Solve **any four** questions : **20**
   a) Discuss the working of a washing machine from a mechatronic perspective.
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SECTION – II

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   a) Sketch the ladder diagram for a device used to control motor rotation similar to a DPDT switch. When a switch is momentarily pressed the motor moves in one direction and when a second switch is momentarily pressed the motor moves in another direction.

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   f) Explain different network topologies.

7. a) Explain the OSI networking model. **6**

   b) Draw the ladder diagram for the following task. The presence of an item as it passes over a conveyor is detected using a proximity sensor. The conveyor motor is stopped for about 20 seconds for the operation to be carried out and the conveyor is started again. The motor for the conveyor belt is started by a normally open start switch and stopped by a normally closed switch. **4**

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   b) Draw the ladder diagram for a circuit that will switch on an output for 100 sec and then switch it off. The output is activated via an internal relay. **4**

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SLR-EP – 453

Seat No.	

Set S

B.E. (Mechanical) (Part – II) (New) Examination, 2016
MECHATRONICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 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.*
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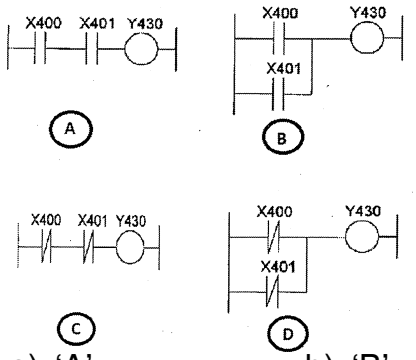

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SLR-EP – 453

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
MECHATRONICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) The first question from* ***each*** *Section (Question No.* ***2*** *and Question No.* ***6****) is* ***compulsory****.*
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SECTION – I

2. Solve **any four** questions : **20**
   a) Discuss the working of a washing machine from a mechatronic perspective.
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5. a) Sketch the 8051 pin diagram. List the features 8051 I/O ports. **6**
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SECTION – II

6. Solve **any four** questions : **20**

   a) Sketch the ladder diagram for a device used to control motor rotation similar to a DPDT switch. When a switch is momentarily pressed the motor moves in one direction and when a second switch is momentarily pressed the motor moves in another direction.

   b) Discuss in brief CANbus and SCADA.

   c) What are Genetic Algorithms ? List its applications.

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   f) Explain different network topologies.

7. a) Explain the OSI networking model. **6**

   b) Draw the ladder diagram for the following task. The presence of an item as it passes over a conveyor is detected using a proximity sensor. The conveyor motor is stopped for about 20 seconds for the operation to be carried out and the conveyor is started again. The motor for the conveyor belt is started by a normally open start switch and stopped by a normally closed switch. **4**

8. a) What is Fuzzy logic ? List its applications. **6**

   b) What is an Internal Relay ? Explain using a suitable example. **4**

9. a) Discuss the role of Mechantronics in MEMs. **6**

   b) Draw the ladder diagram for a circuit that will switch on an output for 100 sec and then switch it off. The output is activated via an internal relay. **4**

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SLR-EP – 454

Seat No.	

Set P

B.E. (Mech.) (Part – II) (New) Examination, 2016
COMPUTATIONAL FLUID DYNAMICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Assume*** *suitable data if necessary.*
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 : 20

1. Choose the correct answer : **(1×20=20)**

1) The method in which the boundary occupied by the fluid is divided into a surface mesh is
   a) Finite volume method b) Finite element method
   c) Boundary element method d) Spectral element method

2) Skewness is equal to
   a) (optimal cell size – cell size)/cell size
   b) (optimal cell size – cell size)/optimal cell size
   c) (cell size – optimal cell size)/optimal cell size
   d) (optimal cell size – cell size)

3) The forces which act directly on surface of fluid element called
   a) fluid forces b) body forces c) direct forces d) none of the above

4) Meshing is
   a) Localization process b) Merging process
   c) Discretization process d) None of these

5) Finite difference method is
   a) exact solution method b) approximate solution method
   c) unique solution method d) none of these

6) Truncation error becomes zero as mesh spacing tends to
   a) maximum b) minimum c) zero d) none of these

7) When a direct computation of the dependent variables can be made in terms of known quantities, the computation is said to be
   a) implicit b) explicit c) unique d) dependent

P.T.O.

8) When Mach number > 0.3, the flow is
   a) Incompressible
   b) Compressible
   c) Either compressible or incompressible
   d) None of these

9) Representation of finite difference derivative is based on
   a) Taylor series expansion
   b) Newton's 2nd law
   c) Frederick law
   d) None of these

10) In turbulent flow, inertial forces
   a) are greater than viscous forces
   b) are lesser than viscous forces
   c) are equal to viscous forces
   d) none of these

11) The difference between the exact solution to the mathematical model and the discretized equations used to approximate it is called
   a) modeling error
   b) discretization error
   c) convergence error
   d) none of these

12) The greater will be the rate of convergence
   a) better will be the mesh quality
   b) worst will be the mesh quality
   c) medium will be the mesh quality
   d) none of these

13) The ratio of momentum diffusivity and thermal diffusivity is called
   a) Reynolds number
   b) Mach number
   c) Ruark number
   d) Prandtl number

14) The numerical method for solving the differential equations by approximating them with difference equations is called
   a) finite volume
   b) finite difference
   c) finite element
   d) none of these

15) The test used to check accuracy of solution is called
   a) grid independence test
   b) solution test
   c) optimal test
   d) aspect test

16) The meshes which only requires the element size on the lines and surfaces that define the geometry as input
   a) Structured mesh
   b) Unstructured mesh
   c) Dirichlet mesh
   d) None of these

17) Formula of forward differencing is
   a) $\Delta hf(x) = f(x + h) - f(x)$
   b) $2\Delta hf(x) = f(x + h) - f(x - h)$
   c) $\Delta hf(x) = f(x) - f(x + h)$
   d) $\Delta hf(x) = f(x + h) + f(x - h)$

18) The ratio between the longest side and the shortest side of mesh is called
   a) mesh orthogonality
   b) mesh skewness
   c) mesh aspect ratio
   d) mesh smoothness

19) The mesh requires the blocking as input called
   a) Structured mesh
   b) Unstructured mesh
   c) Dirichlet mesh
   d) None of these

20) A process in which flow in boundary layer can no longer stay attached to the surface and separates from the surface is called
   a) force separation
   b) boundary separation
   c) flow separation
   d) surface separation

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SLR-EP – 454

Seat No.	

B.E. (Mech.) (Part – II) (New) Examination, 2016
COMPUTATIONAL FLUID DYNAMICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 80
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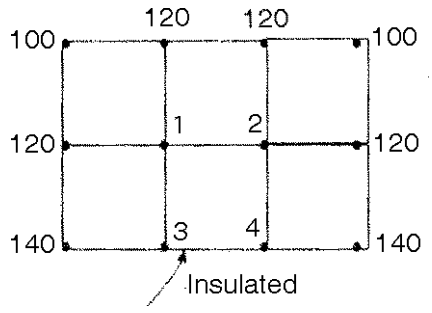
SECTION – I

2. a) Explain the steps involved in CFD. **7**
   b) List out the advantages of CFD. **6**
   c) Derive an expression for three dimensional momentum equation in X-direction. **7**

3. a) Derive an expression for unsteady one dimensional heat conduction equation. **7**
   b) Explain four basic rules of a finite control volume. **7**
   c) What is FDM ? **6**

4. a) Explain Explicit and Implicit Schemes of a unsteady ID heat conduction equation. **7**
   b) Write a short notes on Grid Independence Test. **6**
   c) Consider steady two dimensional heat transfer in a long solid bar of a rectangular cross section is given in the fig. The measured temperatures at selected points of the outer surfaces are as shown. The thermal conductivity of the body K = 20 W/M °C and there is no heat generation. Using the FDM with a mesh size of $\Delta x = \Delta y = 1$ cm, determine the temperatures at the indicated points in the medium. **7**



SECTION – II

5. a) Explain the Relaxation Technique. **6**
   b) Write short note on simple algorithm steps of Patankar and Spalding. **7**
   c) Explain different plots of computer graphics. **7**

6. a) Explain the FVM for steady two dimensional convection and diffusion. **6**
   b) Explain the FVM for one dimensional steady state diffusion. **7**
   c) Write short note on Stream function and Vorticity method. **7**

7. a) Explain the effect of turbulence fluctuations on properties of the mean flow. **7**
   b) What is turbulence ? Explain K-ω turbulence Models. **6**
   c) Consider transient heat conduction in a plane wall with variable heat generation and constant thermal conductivity. The nodal network of the medium consists of nodes 0, 1, 2, 3 and 4 with a uniform nodal spacing of Δx. The wall is initially at specified temperature. Using the energy balance approach, obtain the explicit finite formulation of the boundary nodes for case of uniform heat flux q_o at the left boundary (node 0) and convection at the right boundary (node 4) with a convection coefficient of h and ambient temperature of T_∞. **7**

SLR-EP – 454

Seat No.	

Set Q

B.E. (Mech.) (Part – II) (New) Examination, 2016
COMPUTATIONAL FLUID DYNAMICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Assume*** *suitable data if necessary.*
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 : 20

1. Choose the correct answer : **(1×20=20)**

1) The meshes which only requires the element size on the lines and surfaces that define the geometry as input
   a) Structured mesh b) Unstructured mesh
   c) Dirichlet mesh d) None of these

2) Formula of forward differencing is
   a) $\Delta hf(x) = f(x + h) - f(x)$ b) $2\Delta hf(x) = f(x + h) - f(x - h)$
   c) $\Delta hf(x) = f(x) - f(x + h)$ d) $\Delta hf(x) = f(x + h) + f(x - h)$

3) The ratio between the longest side and the shortest side of mesh is called
   a) mesh orthogonality b) mesh skewness
   c) mesh aspect ratio d) mesh smoothness

4) The mesh requires the blocking as input called
   a) Structured mesh b) Unstructured mesh
   c) Dirichlet mesh d) None of these

5) A process in which flow in boundary layer can no longer stay attached to the surface and separates from the surface is called
   a) force separation b) boundary separation
   c) flow separation d) surface separation

6) The method in which the boundary occupied by the fluid is divided into a surface mesh is
   a) Finite volume method b) Finite element method
   c) Boundary element method d) Spectral element method

P.T.O.

7) Skewness is equal to
   a) (optimal cell size – cell size)/cell size
   b) (optimal cell size – cell size)/optimal cell size
   c) (cell size – optimal cell size)/optimal cell size
   d) (optimal cell size – cell size)
8) The forces which act directly on surface of fluid element called
   a) fluid forces b) body forces c) direct forces d) none of the above
9) Meshing is
   a) Localization process b) Merging process
   c) Discretization process d) None of these
10) Finite difference method is
   a) exact solution method b) approximate solution method
   c) unique solution method d) none of these
11) Truncation error becomes zero as mesh spacing tends to
   a) maximum b) minimum c) zero d) none of these
12) When a direct computation of the dependent variables can be made in terms of known quantities, the computation is said to be
   a) implicit b) explicit c) unique d) dependent
13) When Mach number > 0.3, the flow is
   a) Incompressible
   b) Compressible
   c) Either compressible or incompressible
   d) None of these
14) Representation of finite difference derivative is based on
   a) Taylor series expansion b) Newton's 2^{nd} law
   c) Frederick law d) None of these
15) In turbulent flow, inertial forces
   a) are greater than viscous forces b) are lesser than viscous forces
   c) are equal to viscous forces d) none of these
16) The difference between the exact solution to the mathematical model and the discretized equations used to approximate it is called
   a) modeling error b) discretization error
   c) convergence error d) none of these
17) The greater will be the rate of convergence
   a) better will be the mesh quality b) worst will be the mesh quality
   c) medium will be the mesh quality d) none of these
18) The ratio of momentum diffusivity and thermal diffusivity is called
   a) Reynolds number b) Mach number
   c) Ruark number d) Prandtl number
19) The numerical method for solving the differential equations by approximating them with difference equations is called
   a) finite volume b) finite difference
   c) finite element d) none of these
20) The test used to check accuracy of solution is called
   a) grid independence test b) solution test
   c) optimal test d) aspect test

SLR-EP – 454

Seat No.	

B.E. (Mech.) (Part – II) (New) Examination, 2016
COMPUTATIONAL FLUID DYNAMICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

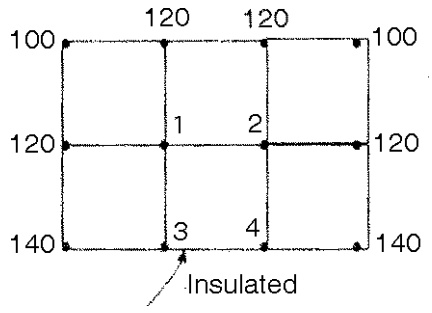
Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Assume*** *suitable data if necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) ***Use*** *of non-programmable calculator is* ***allowed****.*

SECTION – I

2. a) Explain the steps involved in CFD. **7**
   b) List out the advantages of CFD. **6**
   c) Derive an expression for three dimensional momentum equation in X-direction. **7**

3. a) Derive an expression for unsteady one dimensional heat conduction equation. **7**
   b) Explain four basic rules of a finite control volume. **7**
   c) What is FDM ? **6**

4. a) Explain Explicit and Implicit Schemes of a unsteady ID heat conduction equation. **7**
   b) Write a short notes on Grid Independence Test. **6**
   c) Consider steady two dimensional heat transfer in a long solid bar of a rectangular cross section is given in the fig. The measured temperatures at selected points of the outer surfaces are as shown. The thermal conductivity of the body K = 20 W/M °C and there is no heat generation. Using the FDM with a mesh size of $\Delta x = \Delta y = 1$ cm, determine the temperatures at the indicated points in the medium. **7**



SECTION – II

5. a) Explain the Relaxation Technique. **6**
   b) Write short note on simple algorithm steps of Patankar and Spalding. **7**
   c) Explain different plots of computer graphics. **7**

6. a) Explain the FVM for steady two dimensional convection and diffusion. **6**
   b) Explain the FVM for one dimensional steady state diffusion. **7**
   c) Write short note on Stream function and Vorticity method. **7**

7. a) Explain the effect of turbulence fluctuations on properties of the mean flow. **7**
   b) What is turbulence ? Explain K-ω turbulence Models. **6**
   c) Consider transient heat conduction in a plane wall with variable heat generation and constant thermal conductivity. The nodal network of the medium consists of nodes 0, 1, 2, 3 and 4 with a uniform nodal spacing of Δx. The wall is initially at specified temperature. Using the energy balance approach, obtain the explicit finite formulation of the boundary nodes for case of uniform heat flux q_o at the left boundary (node 0) and convection at the right boundary (node 4) with a convection coefficient of h and ambient temperature of T_∞. **7**

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Seat No.	

Set R

B.E. (Mech.) (Part – II) (New) Examination, 2016
COMPUTATIONAL FLUID DYNAMICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Assume*** *suitable data if necessary.*
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 : 20

1. Choose the correct answer : **(1×20=20)**

1) The difference between the exact solution to the mathematical model and the discretized equations used to approximate it is called
   a) modeling error b) discretization error
   c) convergence error d) none of these

2) The greater will be the rate of convergence
   a) better will be the mesh quality b) worst will be the mesh quality
   c) medium will be the mesh quality d) none of these

3) The ratio of momentum diffusivity and thermal diffusivity is called
   a) Reynolds number b) Mach number
   c) Ruark number d) Prandtl number

4) The numerical method for solving the differential equations by approximating them with difference equations is called
   a) finite volume b) finite difference
   c) finite element d) none of these

5) The test used to check accuracy of solution is called
   a) grid independence test b) solution test
   c) optimal test d) aspect test

6) The meshes which only requires the element size on the lines and surfaces that define the geometry as input
   a) Structured mesh b) Unstructured mesh
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7) Formula of forward differencing is
   a) $\Delta hf(x) = f(x + h) - f(x)$ b) $2\Delta hf(x) = f(x + h) - f(x - h)$
   c) $\Delta hf(x) = f(x) - f(x + h)$ d) $\Delta hf(x) = f(x + h) + f(x - h)$

8) The ratio between the longest side and the shortest side of mesh is called
   a) mesh orthogonality b) mesh skewness
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9) The mesh requires the blocking as input called
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14) Meshing is
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   c) Discretization process d) None of these
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   d) None of these
19) Representation of finite difference derivative is based on
   a) Taylor series expansion b) Newton's 2^{nd} law
   c) Frederick law d) None of these
20) In turbulent flow, inertial forces
   a) are greater than viscous forces b) are lesser than viscous forces
   c) are equal to viscous forces d) none of these

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SLR-EP – 454

Seat No.	

B.E. (Mech.) (Part – II) (New) Examination, 2016
COMPUTATIONAL FLUID DYNAMICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Assume*** *suitable data if necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
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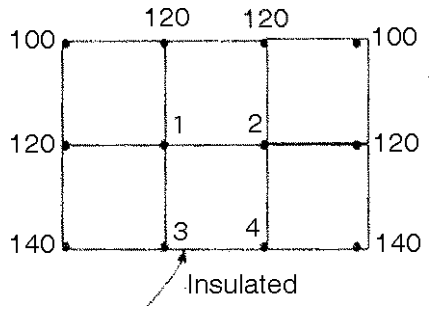
SECTION – I

2. a) Explain the steps involved in CFD. **7**
   b) List out the advantages of CFD. **6**
   c) Derive an expression for three dimensional momentum equation in X-direction. **7**

3. a) Derive an expression for unsteady one dimensional heat conduction equation. **7**
   b) Explain four basic rules of a finite control volume. **7**
   c) What is FDM ? **6**

4. a) Explain Explicit and Implicit Schemes of a unsteady ID heat conduction equation. **7**
   b) Write a short notes on Grid Independence Test. **6**
   c) Consider steady two dimensional heat transfer in a long solid bar of a rectangular cross section is given in the fig. The measured temperatures at selected points of the outer surfaces are as shown. The thermal conductivity of the body K = 20 W/M °C and there is no heat generation. Using the FDM with a mesh size of $\Delta x = \Delta y = 1$ cm, determine the temperatures at the indicated points in the medium. **7**



SECTION – II

5. a) Explain the Relaxation Technique. **6**
   b) Write short note on simple algorithm steps of Patankar and Spalding. **7**
   c) Explain different plots of computer graphics. **7**

6. a) Explain the FVM for steady two dimensional convection and diffusion. **6**
   b) Explain the FVM for one dimensional steady state diffusion. **7**
   c) Write short note on Stream function and Vorticity method. **7**

7. a) Explain the effect of turbulence fluctuations on properties of the mean flow. **7**
   b) What is turbulence ? Explain K-ω turbulence Models. **6**
   c) Consider transient heat conduction in a plane wall with variable heat generation and constant thermal conductivity. The nodal network of the medium consists of nodes 0, 1, 2, 3 and 4 with a uniform nodal spacing of Δx. The wall is initially at specified temperature. Using the energy balance approach, obtain the explicit finite formulation of the boundary nodes for case of uniform heat flux q_o at the left boundary (node 0) and convection at the right boundary (node 4) with a convection coefficient of h and ambient temperature of T_∞. **7**

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SLR-EP – 454

Seat No.	

Set S

B.E. (Mech.) (Part – II) (New) Examination, 2016
COMPUTATIONAL FLUID DYNAMICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) **Assume** suitable data if necessary.*
*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 : 20

1. Choose the correct answer : **(1×20=20)**

1) Truncation error becomes zero as mesh spacing tends to
a) maximum b) minimum c) zero d) none of these

2) When a direct computation of the dependent variables can be made in terms of known quantities, the computation is said to be
a) implicit b) explicit c) unique d) dependent

3) When Mach number > 0.3, the flow is
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4) Representation of finite difference derivative is based on
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5) In turbulent flow, inertial forces
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6) The difference between the exact solution to the mathematical model and the discretized equations used to approximate it is called
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7) The greater will be the rate of convergence
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P.T.O.

8) The ratio of momentum diffusivity and thermal diffusivity is called
   a) Reynolds number b) Mach number
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9) The numerical method for solving the differential equations by approximating them with difference equations is called
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10) The test used to check accuracy of solution is called
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17) Skewness is equal to
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19) Meshing is
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20) Finite difference method is
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SLR-EP – 454

Seat No.	

B.E. (Mech.) (Part – II) (New) Examination, 2016
COMPUTATIONAL FLUID DYNAMICS (Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Max. Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Assume*** *suitable data if necessary.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) ***Use*** *of non-programmable calculator is* ***allowed****.*

SECTION – I

2. a) Explain the steps involved in CFD. **7**
   b) List out the advantages of CFD. **6**
   c) Derive an expression for three dimensional momentum equation in X-direction. **7**

3. a) Derive an expression for unsteady one dimensional heat conduction equation. **7**
   b) Explain four basic rules of a finite control volume. **7**
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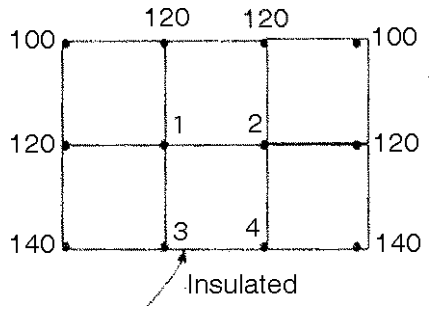
4. a) Explain Explicit and Implicit Schemes of a unsteady ID heat conduction equation. **7**
   b) Write a short notes on Grid Independence Test. **6**
   c) Consider steady two dimensional heat transfer in a long solid bar of a rectangular cross section is given in the fig. The measured temperatures at selected points of the outer surfaces are as shown. The thermal conductivity of the body K = 20 W/M °C and there is no heat generation. Using the FDM with a mesh size of $\Delta x = \Delta y = 1$ cm, determine the temperatures at the indicated points in the medium. **7**



SECTION – II

5. a) Explain the Relaxation Technique. **6**
   b) Write short note on simple algorithm steps of Patankar and Spalding. **7**
   c) Explain different plots of computer graphics. **7**

6. a) Explain the FVM for steady two dimensional convection and diffusion. **6**
   b) Explain the FVM for one dimensional steady state diffusion. **7**
   c) Write short note on Stream function and Vorticity method. **7**

7. a) Explain the effect of turbulence fluctuations on properties of the mean flow. **7**
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   c) Consider transient heat conduction in a plane wall with variable heat generation and constant thermal conductivity. The nodal network of the medium consists of nodes 0, 1, 2, 3 and 4 with a uniform nodal spacing of Δx. The wall is initially at specified temperature. Using the energy balance approach, obtain the explicit finite formulation of the boundary nodes for case of uniform heat flux q_o at the left boundary (node 0) and convection at the right boundary (node 4) with a convection coefficient of h and ambient temperature of T_∞. **7**

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SLR-EP – 455

Seat No.	

Set **P**

B.E. (Mechanical) (Part – II) (New) Examination, 2016
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 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.***
*3) Figures to the **right** indicate **full** marks.*
*4) Make suitable assumptions **wherever** necessary and state them, **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) The "Father of Scientific Management" is **1**
   a) Henry Ford b) Fredrick W. Taylor
   c) Michael Schumacher d) Eli Whitney

2) Productivity increases when **1**
   a) inputs decrease while outputs remain the same
   b) output decrease while inputs remain the same
   c) inputs and outputs increase proportionately
   d) inputs increase while outputs remain the same

3) The person who introduced standardized, interchangeable parts was **1**
   a) Eli Whitney b) Hentry Ford
   c) W. Edwards Deming d) Adam Smith

4) What is meant by Kaizen ? **1**
   a) card signal b) to avoid inadvertent errors
   c) change for better quality d) none of the above

5) Which of the following is NOT a time-series model ? **1**
   a) naive approach b) linear regression
   c) moving averages d) exponential smoothing

6) Which one the following is focused to reduce the incidence of failures in the plant or equipment to avoid the associated costs ? **1**
   a) Preventive maintenance b) Predictive maintenance
   c) Reactive maintenance d) Total productive maintenance

P.T.O.

7) Match the pairs **4**

a) Technical skills	i) Ability to work effectively with other persons
b) Human skills	ii) Ability to recognize significant elements in a situation
c) Conceptual skills	iii) Ability to solve problems in ways that will benefit the enterprise
d) Design skills	iv) Pertaining to knowledge and proficiency in activities

8) Dispatching authorizes the start of production operations by **2**

i) Release of material and components from stores to first process
ii) Release of material from process to process
iii) Issue of drawings instruction sheets

Which of the following is (are) true ?

a) Only i b) Only ii c) i and ii d) i, ii and iii

9) Measurement has revealed the following information on an operations system. Design capacity was 84 units per hour, planned losses were 12 units per hour, and actual output was 65 units per hour. What were the utilisation and efficiency of the operation respectively ? **2**

a) 77% and 90% b) 78% and 90% c) 68% and 83% d) 90% and 77%

10) Given an actual demand of 59, a previous forecast of 64, and an alpha of 3, what would the forecast for the next period be using simple exponential smoothing ? **2**

a) 36.9 b) 57.5 c) 60.5 d) 62.5 e) 65.5

11) The general exponential smoothing equation is **2**

a) $F_t = F_{t-1} + \alpha\ (D_{t-1} - F_{t-1})$ b) $F_t = F_{t-1} - \alpha\ (D_{t-1} + F_{t-1})$
c) $F_t = \alpha\ .D_{t-1} + (1 - \alpha\ ).\ F_{t-1}$ d) $F_t = \alpha\ .D_{t-1} - (1 + \alpha\ ).\ F_{t-1}$

12) Which of the following are benefits of the Value Engineering ? **2**

a) Cost Reduction
b) Robust Design
c) Improvement in functions of the product
d) Design for quality

SLR-EP – 455

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Solve **any three** questions from **each** Section.*
*2) Que. **2** and **6** are **compulsory**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Make suitable assumptions **wherever** necessary and state them **clearly**.*
*5) Draw **neat** diagram **wherever** necessary.*

SECTION – I

2. a) Define POM and discuss its objectives. **6**

   b) Write a short note on : **8**

      i) Historic evolution of production and operation management.

      ii) Scope of an organization.

3. a) What is need of forecasting in production management ? State the different techniques used for it. **5**

   b) Following data gives the information of export of an item by a company during the various years. Fit the straight line and forecast for the year 2010 and 2011. **8**

Year :	2001	2002	2003	2004	2005	2006	2007	2008	2009
No.of items (000) :	13	20	20	28	30	32	33	38	43

4. a) Explain importance of capacity planning in production management and list the factors affecting effective capacity of an organization. **8**

   b) Enumerate the factors which initiate replacement decision. **5**

5. a) Define the term "production planning and control" and discuss its functions. **5**

   b) There are seven jobs which are to be processed on Machines M_1 and M_2 in order of M_1 M_2. Processing Times in hours are given below :

Job :	A	B	C	D	E	F	G
Machine M_1 :	6	24	30	12	20	22	18
Machine M_2 :	16	20	20	13	24	2	6

   Find the optimal sequence and total elapsed time. Also compute idle time on Machines M_2. **8**

SECTION – II

6. Write a short note on **(any three)** : **12**
   a) MRP
   b) TPM
   c) JIT
   d) Six sigma.

7. a) ABC Corporation has got a demand for particular part at 10,000 units per year. The cost per unit is 2 Rs. and it costs 36 Rs. to place an order and to process and delivery. The inventory carrying cost is estimated at 9% average inventory investment.

   Determine :
   i) EOQ
   ii) Optimum number of orders to be placed per annum.
   iii) Min. total cost of inventory per annum. **8**

   b) Explain Inventory concept and discuss its objectives. **6**

8. a) Discuss various types of maintenance with its merits and demerits. **8**

   b) 'Maintenance of Machines in an industry is not a waste of time and money only'. Justify the sentence. **6**

9. a) What is value engineering and value analysis ? Why it is necessary to do the value analysis of an product ? **6**

   b) Explain value analysis procedure in details with one example. **4**

   c) Write a short note on 'advance manufacturing systems' in production management. **4**

Set P

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SLR-EP – 455

Seat No.	

Set Q

B.E. (Mechanical) (Part – II) (New) Examination, 2016
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 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.***
*3) Figures to the **right** indicate **full** marks.*
*4) Make suitable assumptions **wherever** necessary and state them, **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) Match the pairs **4**

a) Technical skills	i) Ability to work effectively with other persons
b) Human skills	ii) Ability to recognize significant elements in a situation
c) Conceptual skills	iii) Ability to solve problems in ways that will benefit the enterprise
d) Design skills	iv) Pertaining to knowledge and proficiency in activities

2) Dispatching authorizes the start of production operations by **2**

i) Release of material and components from stores to first process
ii) Release of material from process to process
iii) Issue of drawings instruction sheets

Which of the following is (are) true ?

a) Only i b) Only ii c) i and ii d) i, ii and iii

3) Measurement has revealed the following information on an operations system. Design capacity was 84 units per hour, planned losses were 12 units per hour, and actual output was 65 units per hour. What were the utilisation and efficiency of the operation respectively ? **2**

a) 77% and 90% b) 78% and 90% c) 68% and 83% d) 90% and 77%

4) Given an actual demand of 59, a previous forecast of 64, and an alpha of 3, what would the forecast for the next period be using simple exponential smoothing ? **2**

a) 36.9 b) 57.5 c) 60.5 d) 62.5 e) 65.5

5) The general exponential smoothing equation is **2**

a) $F_t = F_{t-1} + \alpha\ (D_{t-1} - F_{t-1})$ b) $F_t = F_{t-1} - \alpha\ (D_{t-1} + F_{t-1})$
c) $F_t = \alpha . D_{t-1} + (1 - \alpha)\ . F_{t-1}$ d) $F_t = \alpha . D_{t-1} - (1 + \alpha)\ . F_{t-1}$

P.T.O.

6) Which of the following are benefits of the Value Engineering ? **2**
   a) Cost Reduction
   b) Robust Design
   c) Improvement in functions of the product
   d) Design for quality

7) The "Father of Scientific Management" is **1**
   a) Henry Ford
   b) Fredrick W. Taylor
   c) Michael Schumacher
   d) Eli Whitney

8) Productivity increases when **1**
   a) inputs decrease while outputs remain the same
   b) output decrease while inputs remain the same
   c) inputs and outputs increase proportionately
   d) inputs increase while outputs remain the same

9) The person who introduced standardized, interchangeable parts was **1**
   a) Eli Whitney
   b) Hentry Ford
   c) W. Edwards Deming
   d) Adam Smith

10) What is meant by Kaizen ? **1**
   a) card signal
   b) to avoid inadvertent errors
   c) change for better quality
   d) none of the above

11) Which of the following is NOT a time-series model ? **1**
   a) naive approach
   b) linear regression
   c) moving averages
   d) exponential smoothing

12) Which one the following is focused to reduce the incidence of failures in the plant or equipment to avoid the associated costs ? **1**
   a) Preventive maintenance
   b) Predictive maintenance
   c) Reactive maintenance
   d) Total productive maintenance

SLR-EP – 455

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Solve **any three** questions from **each** Section.*
*2) Que. **2** and **6** are **compulsory**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Make suitable assumptions **wherever** necessary and state them **clearly**.*
*5) Draw **neat** diagram **wherever** necessary.*

SECTION – I

2. a) Define POM and discuss its objectives. **6**

   b) Write a short note on : **8**

      i) Historic evolution of production and operation management.

      ii) Scope of an organization.

3. a) What is need of forecasting in production management ? State the different techniques used for it. **5**

   b) Following data gives the information of export of an item by a company during the various years. Fit the straight line and forecast for the year 2010 and 2011. **8**

Year :	2001	2002	2003	2004	2005	2006	2007	2008	2009
No.of items (000) :	13	20	20	28	30	32	33	38	43

4. a) Explain importance of capacity planning in production management and list the factors affecting effective capacity of an organization. **8**

   b) Enumerate the factors which initiate replacement decision. **5**

5. a) Define the term "production planning and control" and discuss its functions. **5**

   b) There are seven jobs which are to be processed on Machines M_1 and M_2 in order of M_1 M_2. Processing Times in hours are given below :

Job :	A	B	C	D	E	F	G
Machine M_1 :	6	24	30	12	20	22	18
Machine M_2 :	16	20	20	13	24	2	6

   Find the optimal sequence and total elapsed time. Also compute idle time on Machines M_2. **8**

SECTION – II

6. Write a short note on **(any three)** : **12**
   a) MRP
   b) TPM
   c) JIT
   d) Six sigma.

7. a) ABC Corporation has got a demand for particular part at 10,000 units per year. The cost per unit is 2 Rs. and it costs 36 Rs. to place an order and to process and delivery. The inventory carrying cost is estimated at 9% average inventory investment.

   Determine :
   i) EOQ
   ii) Optimum number of orders to be placed per annum.
   iii) Min. total cost of inventory per annum. **8**

   b) Explain Inventory concept and discuss its objectives. **6**

8. a) Discuss various types of maintenance with its merits and demerits. **8**

   b) 'Maintenance of Machines in an industry is not a waste of time and money only'. Justify the sentence. **6**

9. a) What is value engineering and value analysis ? Why it is necessary to do the value analysis of an product ? **6**

   b) Explain value analysis procedure in details with one example. **4**

   c) Write a short note on 'advance manufacturing systems' in production management. **4**

Set Q

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SLR-EP – 455

Seat No.	

Set R

B.E. (Mechanical) (Part – II) (New) Examination, 2016
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 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.***
*3) Figures to the **right** indicate **full** marks.*
*4) Make suitable assumptions **wherever** necessary and state them, **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) Dispatching authorizes the start of production operations by **2**
   i) Release of material and components from stores to first process
   ii) Release of material from process to process
   iii) Issue of drawings instruction sheets

   Which of the following is (are) true ?
   a) Only i b) Only ii c) i and ii d) i, ii and iii

2) Measurement has revealed the following information on an operations system. Design capacity was 84 units per hour, planned losses were 12 units per hour, and actual output was 65 units per hour. What were the utilisation and efficiency of the operation respectively ? **2**
   a) 77% and 90% b) 78% and 90% c) 68% and 83% d) 90% and 77%

3) Given an actual demand of 59, a previous forecast of 64, and an alpha of 3, what would the forecast for the next period be using simple exponential smoothing ? **2**
   a) 36.9 b) 57.5 c) 60.5 d) 62.5 e) 65.5

4) The general exponential smoothing equation is **2**
   a) $F_t = F_{t-1} + \alpha\ (D_{t-1} - F_{t-1})$ b) $F_t = F_{t-1} - \alpha\ (D_{t-1} + F_{t-1})$
   c) $F_t = \alpha . D_{t-1} + (1 - \alpha) . F_{t-1}$ d) $F_t = \alpha . D_{t-1} - (1 + \alpha) . F_{t-1}$

5) Which of the following are benefits of the Value Engineering ? **2**
   a) Cost Reduction
   b) Robust Design
   c) Improvement in functions of the product
   d) Design for quality

P.T.O.

6) The "Father of Scientific Management" is **1**
   a) Henry Ford
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7) Productivity increases when **1**
   a) inputs decrease while outputs remain the same
   b) output decrease while inputs remain the same
   c) inputs and outputs increase proportionately
   d) inputs increase while outputs remain the same

8) The person who introduced standardized, interchangeable parts was **1**
   a) Eli Whitney
   b) Hentry Ford
   c) W. Edwards Deming
   d) Adam Smith

9) What is meant by Kaizen ? **1**
   a) card signal
   b) to avoid inadvertent errors
   c) change for better quality
   d) none of the above

10) Which of the following is NOT a time-series model ? **1**
   a) naive approach
   b) linear regression
   c) moving averages
   d) exponential smoothing

11) Which one the following is focused to reduce the incidence of failures in the plant or equipment to avoid the associated costs ? **1**
   a) Preventive maintenance
   b) Predictive maintenance
   c) Reactive maintenance
   d) Total productive maintenance

12) Match the pairs **4**

a) Technical skills	i) Ability to work effectively with other persons
b) Human skills	ii) Ability to recognize significant elements in a situation
c) Conceptual skills	iii) Ability to solve problems in ways that will benefit the enterprise
d) Design skills	iv) Pertaining to knowledge and proficiency in activities

SLR-EP – 455

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Solve **any three** questions from **each** Section.*
*2) Que. **2** and **6** are **compulsory**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Make suitable assumptions **wherever** necessary and state them **clearly**.*
*5) Draw **neat** diagram **wherever** necessary.*

SECTION – I

2. a) Define POM and discuss its objectives. **6**

   b) Write a short note on : **8**

      i) Historic evolution of production and operation management.

      ii) Scope of an organization.

3. a) What is need of forecasting in production management ? State the different techniques used for it. **5**

   b) Following data gives the information of export of an item by a company during the various years. Fit the straight line and forecast for the year 2010 and 2011. **8**

Year :	2001	2002	2003	2004	2005	2006	2007	2008	2009
No.of items (000) :	13	20	20	28	30	32	33	38	43

4. a) Explain importance of capacity planning in production management and list the factors affecting effective capacity of an organization. **8**

   b) Enumerate the factors which initiate replacement decision. **5**

5. a) Define the term "production planning and control" and discuss its functions. **5**

   b) There are seven jobs which are to be processed on Machines M_1 and M_2 in order of M_1 M_2. Processing Times in hours are given below :

Job :	A	B	C	D	E	F	G
Machine M_1 :	6	24	30	12	20	22	18
Machine M_2 :	16	20	20	13	24	2	6

   Find the optimal sequence and total elapsed time. Also compute idle time on Machines M_2. **8**

SECTION – II

6. Write a short note on **(any three)** : **12**
   a) MRP
   b) TPM
   c) JIT
   d) Six sigma.

7. a) ABC Corporation has got a demand for particular part at 10,000 units per year. The cost per unit is 2 Rs. and it costs 36 Rs. to place an order and to process and delivery. The inventory carrying cost is estimated at 9% average inventory investment.

   Determine :
   i) EOQ
   ii) Optimum number of orders to be placed per annum.
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   b) Explain Inventory concept and discuss its objectives. **6**

8. a) Discuss various types of maintenance with its merits and demerits. **8**

   b) 'Maintenance of Machines in an industry is not a waste of time and money only'. Justify the sentence. **6**

9. a) What is value engineering and value analysis ? Why it is necessary to do the value analysis of an product ? **6**

   b) Explain value analysis procedure in details with one example. **4**

   c) Write a short note on 'advance manufacturing systems' in production management. **4**

Set R

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SLR-EP – 455

Seat No.	

Set S

B.E. (Mechanical) (Part – II) (New) Examination, 2016
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 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.***
*3) Figures to the **right** indicate **full** marks.*
*4) Make suitable assumptions **wherever** necessary and state them, **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) The person who introduced standardized, interchangeable parts was **1**
   a) Eli Whitney b) Hentry Ford
   c) W. Edwards Deming d) Adam Smith

2) What is meant by Kaizen ? **1**
   a) card signal b) to avoid inadvertent errors
   c) change for better quality d) none of the above

3) Which of the following is NOT a time-series model ? **1**
   a) naive approach b) linear regression
   c) moving averages d) exponential smoothing

4) Which one the following is focused to reduce the incidence of failures in the plant or equipment to avoid the associated costs ? **1**
   a) Preventive maintenance b) Predictive maintenance
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5) The "Father of Scientific Management" is **1**
   a) Henry Ford b) Fredrick W. Taylor
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   a) inputs decrease while outputs remain the same
   b) output decrease while inputs remain the same
   c) inputs and outputs increase proportionately
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P.T.O.

7) The general exponential smoothing equation is **2**

a) $F_t = F_{t-1} + \alpha\ (D_{t-1} - F_{t-1})$ b) $F_t = F_{t-1} - \alpha\ (D_{t-1} + F_{t-1})$

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a) Cost Reduction
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Which of the following is (are) true ?

a) Only i b) Only ii c) i and ii d) i, ii and iii

10) Measurement has revealed the following information on an operations system. Design capacity was 84 units per hour, planned losses were 12 units per hour, and actual output was 65 units per hour. What were the utilisation and efficiency of the operation respectively ? **2**

a) 77% and 90% b) 78% and 90% c) 68% and 83% d) 90% and 77%

11) Given an actual demand of 59, a previous forecast of 64, and an alpha of 3, what would the forecast for the next period be using simple exponential smoothing ? **2**

a) 36.9 b) 57.5 c) 60.5 d) 62.5 e) 65.5

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b) Human skills	ii) Ability to recognize significant elements in a situation
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SLR-EP – 455

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Wednesday, 23-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Solve **any three** questions from **each** Section.*
*2) Que. **2** and **6** are **compulsory**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Make suitable assumptions **wherever** necessary and state them **clearly**.*
*5) Draw **neat** diagram **wherever** necessary.*

SECTION – I

2. a) Define POM and discuss its objectives. **6**

   b) Write a short note on : **8**

      i) Historic evolution of production and operation management.

      ii) Scope of an organization.

3. a) What is need of forecasting in production management ? State the different techniques used for it. **5**

   b) Following data gives the information of export of an item by a company during the various years. Fit the straight line and forecast for the year 2010 and 2011. **8**

Year :	2001	2002	2003	2004	2005	2006	2007	2008	2009
No.of items (000) :	13	20	20	28	30	32	33	38	43

4. a) Explain importance of capacity planning in production management and list the factors affecting effective capacity of an organization. **8**

   b) Enumerate the factors which initiate replacement decision. **5**

5. a) Define the term "production planning and control" and discuss its functions. **5**

   b) There are seven jobs which are to be processed on Machines M_1 and M_2 in order of M_1 M_2. Processing Times in hours are given below :

Job :	A	B	C	D	E	F	G
Machine M_1 :	6	24	30	12	20	22	18
Machine M_2 :	16	20	20	13	24	2	6

   Find the optimal sequence and total elapsed time. Also compute idle time on Machines M_2. **8**

SECTION – II

6. Write a short note on **(any three)** : **12**
   a) MRP
   b) TPM
   c) JIT
   d) Six sigma.

7. a) ABC Corporation has got a demand for particular part at 10,000 units per year. The cost per unit is 2 Rs. and it costs 36 Rs. to place an order and to process and delivery. The inventory carrying cost is estimated at 9% average inventory investment.

   Determine :
   i) EOQ
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8. a) Discuss various types of maintenance with its merits and demerits. **8**

   b) 'Maintenance of Machines in an industry is not a waste of time and money only'. Justify the sentence. **6**

9. a) What is value engineering and value analysis ? Why it is necessary to do the value analysis of an product ? **6**

   b) Explain value analysis procedure in details with one example. **4**

   c) Write a short note on 'advance manufacturing systems' in production management. **4**

Set S

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SLR-EP – 457

Seat No.	

Set **P**

B.E. (Part – II) (Mechanical) (New) Examination, 2016
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) *Make suitable assumptions, if necessary and mention them* ***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.***
6) *Use of non-programmable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) A perfect seeding gives
   i) Correct amount of seed per unit area
   ii) Correct depth at which seed is placed in the soil
   iii) Correct spacing between row-to-row and plant-to-plant
   a) Only i b) Only ii c) i and iii d) All of the above

2) Seed drill is equipment is used for
   a) Harvesting b) Ploughing c) Sowing d) Threshing

3) Seed metering mechanism is mainly used for
   a) Supporting the parts of seed drill b) Opening the furrows
   c) Covering the soil on the seed d) Delivers the seeds at selected rate

4) Interculture equipments are
   1) Cultivator 2) Weeders 3) Rotary hoe 4) Thresher
   a) Only 1 b) 1, 2 and 3 c) Only 2 d) All of above

5) The angle made by a disc of disc plough with the direction of motion is known as
   a) Tilt angle b) Plough angle c) Disc angle d) None of these

6) The operation performed to open up any cultivated land with a view to prepare seedbed for growing crops is termed as
   a) Secondary tillage b) Primary tillage
   c) Pulverization d) Harvesting

7) Function of star wheel of reaper
   a) Cutting the crops b) Guiding the crops toward the cutter bar
   c) Provide supports to the crops d) Blocking the crops

8) Winnowing device of thresher is
   a) Providing Feeding action
   b) Produces air blast which blow the chaff
   c) A handling unit
   d) None of the above

9) Separating Sieves is used for
   a) Separating Chaff from grain
   b) Rotating the winnowing unit
   c) Providing Cutting action
   d) None of the above

10) Plant protection equipment's are
   a) Harvester
   b) Thresher
   c) Harvester and Thresher
   d) Duster

11) Components of Mould Board plough are
   a) Share, Land side, Frog
   b) Share, Disc scraper, Standard
   c) Land side, Frog, Disc scraper
   d) Frog, Disc scraper, Standard

12) In Mould Board plough function of Gauge wheel is
   a) To joint the jointer to the frame
   b) To provide sharing action
   c) To control depth of ploughing
   d) To prevent weed to stick with share

13) Single Action Disc harrow having
   a) Two gangs are placed end to end
   b) Two gangs are placed one behind the other
   c) There is no gang
   d) Three gangs are placed one behind the other

14) Conoweeder is generally used in
   a) Wet land area b) Dry land area c) Desert area d) Stony area

15) Junior hoe is primarily used for
   a) Breaking clods
   b) Weeding
   c) Seed bed preparation
   d) None of the above

16) In Hydraulic nozzle, decrease in pressure
   a) Decreases droplet size
   b) Increases droplet size
   c) First decrease and then increase droplet size
   d) Does not depend upon droplet size

17) _____ is a machine used to cut the herbage crop and leave them in swath.
   a) Pitman b) Mower c) Rotavator d) Seed drill

18) _____ transmit the reciprocating motion to the knife head of mower.
   a) Pitman b) Differential c) Star wheel d) Crop divider

19) _____ is a tool which breaks the ground at greater depth, will break the hard pan and will not pulverize the surface soil as much as other tools.
   a) Sub-soiler b) Plough c) Harrow d) Rotavator

20) _____ is the main purpose of puddling.
   a) To reduce leaching of water
   b) To reduce transpiration
   c) To reduce evaporation
   d) None of the above

SLR-EP – 457

Seat No.	

B.E. (Part – II) (Mechanical) (New) Examination, 2016
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *i) Answer **any two** questions from **each** Section.*
*ii) Figures to the **right** indicate **full** marks.*
*iii) Make suitable assumptions if necessary and state it **clearly**.*
*iv) **Neat** diagrams must be drawn **whenever** necessary.*

SECTION – I

2. Solve the following :

a) Explain Present status of farm mechanisation. **7**

b) Explain construction of Mould Board plough. **6**

c) Describe construction and working of Disc plough. **7**

3. Solve the following :

a) Write a short note on : **7**
   1) Rotavators.
   2) Subsoiler.
   3) Paddypuddler.

b) Explain how to select Disc harrow. **7**

c) Write a short note on Force acting on disc harrow and their analysis. **6**

4. Solve the following :

a) Write a short note on Special tillage Equipment's. **6**

b) What is meant by tillage ? What is the objective tillage ? **7**

c) Explain with neat sketch methods of planting. **7**

SECTION – II

5. Solve the following :

   a) Explain construction and working of seed cum fertilizer drill. **7**

   b) A fluted feed seed drill has 8 furrow openers of single disc type. The furrow openers are spaced 25 cm apart and the main drive wheel has a diameter of 120 cm. How many turns of main drive wheel would occur when the seed drill has covered one hector of area. **6**

   c) What are different types of Weeders ? Explain in brief. **7**

6. Solve the following :

   a) Explain construction and working principle of Stirrup pump or Bucket type sprayer. **7**

   b) Explain construction and working principle of Thresher. **7**

   c) What is meant by Duster ? Enlist the different types of duster. Explain any one type of duster. **6**

7. Solve the following :

   a) Explain construction and working principle of Combine Harvester. **6**

   b) Explain construction and working principle of Tractor operated reaper. **7**

   c) Write a short note on furrow opening unit. **7**

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SLR-EP – 457

Seat No.	

Set Q

B.E. (Part – II) (Mechanical) (New) Examination, 2016
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) *Make suitable assumptions, if necessary and mention them* ***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.***
6) *Use of non-programmable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) In Hydraulic nozzle, decrease in pressure
   a) Decreases droplet size
   b) Increases droplet size
   c) First decrease and then increase droplet size
   d) Does not depend upon droplet size

2) _____ is a machine used to cut the herbage crop and leave them in swath.
   a) Pitman b) Mower c) Rotavator d) Seed drill

3) _____ transmit the reciprocating motion to the knife head of mower.
   a) Pitman b) Differential c) Star wheel d) Crop divider

4) _____ is a tool which breaks the ground at greater depth, will break the hard pan and will not pulverize the surface soil as much as other tools.
   a) Sub-soiler b) Plough c) Harrow d) Rotavator

5) _____ is the main purpose of puddling.
   a) To reduce leaching of water b) To reduce transpiration
   c) To reduce evaporation d) None of the above

6) A perfect seeding gives
   i) Correct amount of seed per unit area
   ii) Correct depth at which seed is placed in the soil
   iii) Correct spacing between row-to-row and plant-to-plant
   a) Only i b) Only ii c) i and iii d) All of the above

7) Seed drill is equipment is used for
   a) Harvesting b) Ploughing c) Sowing d) Threshing

P.T.O.

8) Seed metering mechanism is mainly used for
   a) Supporting the parts of seed drill
   b) Opening the furrows
   c) Covering the soil on the seed
   d) Delivers the seeds at selected rate

9) Interculture equipments are
   1) Cultivator 2) Weeders 3) Rotary hoe 4) Thresher
   a) Only 1 b) 1, 2 and 3 c) Only 2 d) All of above

10) The angle made by a disc of disc plough with the direction of motion is known as
   a) Tilt angle b) Plough angle c) Disc angle d) None of these

11) The operation performed to open up any cultivated land with a view to prepare seedbed for growing crops is termed as
   a) Secondary tillage
   b) Primary tillage
   c) Pulverization
   d) Harvesting

12) Function of star wheel of reaper
   a) Cutting the crops
   b) Guiding the crops toward the cutter bar
   c) Provide supports to the crops
   d) Blocking the crops

13) Winnowing device of thresher is
   a) Providing Feeding action
   b) Produces air blast which blow the chaff
   c) A handling unit
   d) None of the above

14) Separating Sieves is used for
   a) Separating Chaff from grain
   b) Rotating the winnowing unit
   c) Providing Cutting action
   d) None of the above

15) Plant protection equipment's are
   a) Harvester
   b) Thresher
   c) Harvester and Thresher
   d) Duster

16) Components of Mould Board plough are
   a) Share, Land side, Frog
   b) Share, Disc scraper, Standard
   c) Land side, Frog, Disc scraper
   d) Frog, Disc scraper, Standard

17) In Mould Board plough function of Gauge wheel is
   a) To joint the jointer to the frame
   b) To provide sharing action
   c) To control depth of ploughing
   d) To prevent weed to stick with share

18) Single Action Disc harrow having
   a) Two gangs are placed end to end
   b) Two gangs are placed one behind the other
   c) There is no gang
   d) Three gangs are placed one behind the other

19) Conoweeder is generally used in
   a) Wet land area b) Dry land area c) Desert area d) Stony area

20) Junior hoe is primarily used for
   a) Breaking clods
   b) Weeding
   c) Seed bed preparation
   d) None of the above

SLR-EP – 457

Seat No.	

B.E. (Part – II) (Mechanical) (New) Examination, 2016
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *i) Answer **any two** questions from **each** Section.*
*ii) Figures to the **right** indicate **full** marks.*
*iii) Make suitable assumptions if necessary and state it **clearly**.*
*iv) **Neat** diagrams must be drawn **whenever** necessary.*

SECTION – I

2. Solve the following :

a) Explain Present status of farm mechanisation. **7**

b) Explain construction of Mould Board plough. **6**

c) Describe construction and working of Disc plough. **7**

3. Solve the following :

a) Write a short note on : **7**
   1) Rotavators.
   2) Subsoiler.
   3) Paddypuddler.

b) Explain how to select Disc harrow. **7**

c) Write a short note on Force acting on disc harrow and their analysis. **6**

4. Solve the following :

a) Write a short note on Special tillage Equipment's. **6**

b) What is meant by tillage ? What is the objective tillage ? **7**

c) Explain with neat sketch methods of planting. **7**

SECTION – II

5. Solve the following :

   a) Explain construction and working of seed cum fertilizer drill. **7**

   b) A fluted feed seed drill has 8 furrow openers of single disc type. The furrow openers are spaced 25 cm apart and the main drive wheel has a diameter of 120 cm. How many turns of main drive wheel would occur when the seed drill has covered one hector of area. **6**

   c) What are different types of Weeders ? Explain in brief. **7**

6. Solve the following :

   a) Explain construction and working principle of Stirrup pump or Bucket type sprayer. **7**

   b) Explain construction and working principle of Thresher. **7**

   c) What is meant by Duster ? Enlist the different types of duster. Explain any one type of duster. **6**

7. Solve the following :

   a) Explain construction and working principle of Combine Harvester. **6**

   b) Explain construction and working principle of Tractor operated reaper. **7**

   c) Write a short note on furrow opening unit. **7**

SLR-EP – 457

Seat No.	

Set **R**

B.E. (Part – II) (Mechanical) (New) Examination, 2016
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
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6) *Use of non-programmable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Components of Mould Board plough are
   a) Share, Land side, Frog
   b) Share, Disc scraper, Standard
   c) Land side, Frog, Disc scraper
   d) Frog, Disc scraper, Standard

2) In Mould Board plough function of Gauge wheel is
   a) To joint the jointer to the frame
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3) Single Action Disc harrow having
   a) Two gangs are placed end to end
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   d) None of the above

6) In Hydraulic nozzle, decrease in pressure
   a) Decreases droplet size
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   c) First decrease and then increase droplet size
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P.T.O.

7) _____ is a machine used to cut the herbage crop and leave them in swath.
a) Pitman b) Mower c) Rotavator d) Seed drill

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i) Correct amount of seed per unit area
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1) Cultivator 2) Weeders 3) Rotary hoe 4) Thresher
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a) Cutting the crops b) Guiding the crops toward the cutter bar
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18) Winnowing device of thresher is
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SLR-EP – 457

Seat No.	

B.E. (Part – II) (Mechanical) (New) Examination, 2016
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80
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SECTION – I

2. Solve the following :

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a) Write a short note on : **7**
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b) Explain how to select Disc harrow. **7**

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4. Solve the following :

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b) What is meant by tillage ? What is the objective tillage ? **7**

c) Explain with neat sketch methods of planting. **7**

SECTION – II

5. Solve the following :
   a) Explain construction and working of seed cum fertilizer drill. **7**
   b) A fluted feed seed drill has 8 furrow openers of single disc type. The furrow openers are spaced 25 cm apart and the main drive wheel has a diameter of 120 cm. How many turns of main drive wheel would occur when the seed drill has covered one hector of area. **6**
   c) What are different types of Weeders ? Explain in brief. **7**

6. Solve the following :
   a) Explain construction and working principle of Stirrup pump or Bucket type sprayer. **7**
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7. Solve the following :
   a) Explain construction and working principle of Combine Harvester. **6**
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   c) Write a short note on furrow opening unit. **7**

_____

SLR-EP – 457

Seat No.	

Set S

B.E. (Part – II) (Mechanical) (New) Examination, 2016
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Max. Marks : 100
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

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P.T.O.

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   a) Only 1 b) 1, 2 and 3 c) Only 2 d) All of above

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   a) Tilt angle b) Plough angle c) Disc angle d) None of these

_____

SLR-EP – 457

Seat No.	

B.E. (Part – II) (Mechanical) (New) Examination, 2016
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *i) Answer **any two** questions from **each** Section.*
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*iii) Make suitable assumptions if necessary and state it **clearly**.*
*iv) **Neat** diagrams must be drawn **whenever** necessary.*

SECTION – I

2. Solve the following :

a) Explain Present status of farm mechanisation. **7**

b) Explain construction of Mould Board plough. **6**

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3. Solve the following :

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SECTION – II

5. Solve the following :

   a) Explain construction and working of seed cum fertilizer drill. **7**

   b) A fluted feed seed drill has 8 furrow openers of single disc type. The furrow openers are spaced 25 cm apart and the main drive wheel has a diameter of 120 cm. How many turns of main drive wheel would occur when the seed drill has covered one hector of area. **6**

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6. Solve the following :

   a) Explain construction and working principle of Stirrup pump or Bucket type sprayer. **7**

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   c) What is meant by Duster ? Enlist the different types of duster. Explain any one type of duster. **6**

7. Solve the following :

   a) Explain construction and working principle of Combine Harvester. **6**

   b) Explain construction and working principle of Tractor operated reaper. **7**

   c) Write a short note on furrow opening unit. **7**

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SLR-EP – 458

Seat No.	

Set **P**

B.E. (Mechanical) (Part – II) (New) Examination, 2016
Elective – II : PLASTIC ENGINEERING

Day and Date : Thursday, 24-11-2016 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.***
3) Assume suitable data ***whenever*** *necessary and state it clearly.*
4) Attempt ***any 3*** *questions from* ***Q2, Q3, Q4, Q5*** *and* ***3*** *questions from to* ***Q6, Q7, Q8, Q9****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) In case of processability testing, MI stands for
   a) Moment of Inertia b) Melt Index
   c) Malleability Index d) None of above

2) Epoxy resin is example of _____ plastics.
   a) Thermoplastics b) Elastomers
   c) Thermosetting d) None of above

3) Polymers can be very _____ to chemicals.
   a) Resistant b) Similar c) Opposite d) None of above

4) Compression molding process is one of the _____ cost molding method as compare to injection molding.
   a) High b) Medium c) Low d) None of these

5) Transfer molding process combines the principle of _____ and transfer of polymer charge.
   a) Injection b) Compression c) Blow d) Rotation

6) _____ welding is less dependent than other welding methods on the properties of the materials being welded.
   a) Thermal b) Heated tool
   c) Induction heating d) All of the above

7) Which of the welding process is used for thermoplastics ?
   a) Hot gas welding b) Induction heating
   c) Heated tool d) All of the above

P.T.O.

8) What should be the draft for polyethylene material ?
a) 1/2° b) 1/4° c) 1/8° d) 1/3°

9) What should be the draft for Nylon material ?
a) 0 – 1/4° b) 0 – 1/8° c) 0 – 1/2° d) 0 – 1/3°

10) The rib thickness should be between _____ of wall thickness.
a) 30% and 40% b) 40% and 60%
c) 50% and 60% d) 60% and 80%

11) The properties of the polymer will also depend on the _____ available for cooling.
a) Colour b) Rate
c) Both colour and rate d) None of above

12) It is the _____ operation that sets the shape of thermoplastics.
a) Heating b) Cutting c) Grinding d) Cooling

13) In Injection molding Melt temperatures are of the order of _____ for low-density polymers materials.
a) 160 – 190°C b) 120 – 170°C
c) 110 – 160°C d) 100 – 150°C

14) Plasticizers are considered _____ solvents.
a) Volatile b) Non-volatile c) Both a & b d) None of these

15) A biodegradable polymer should
a) Contained hydrophilic group b) Contain hydrophobic
c) Group contain only C-C d) Contain aromatic group

16) An example of biodegradable polymer is
a) PHBV b) PVC
c) Polyethylene d) Polyacetylene

17) A Biodegradable polymer is one which
a) Can be synthesized by biological route
b) Is degradable by action of microorganism
c) Is not degradable by action of microorganism
d) None of these

18) In _____ welding method, the workpieces to be joined are irradiated with a steam of neutrons.
a) Infrared b) Nuclear
c) Hot gas d) Heated tool

19) In compression molding, for phenolic materials suitable pressure range is _____ kg/cm^2.
a) 100 to 158 b) 158 to 211 c) 211 to 258 d) 250 to 300

20) Bulk factor is the ratio of volume of loose plastic powder to the
a) Actual cavity volume b) Volume of the molding
c) Volume of loose plastic powder d) None of these

_____

Set P

SLR-EP – 458

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
Elective – II : PLASTIC ENGINEERING

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Assume suitable data **whenever** necessary and state it clearly.*
*2) Attempt **any 3** questions from **Q2, Q3, Q4, Q5** and **3** questions from to **Q6, Q7, Q8, Q9**.*

SECTION – I

2. A) Explain the testing methods for plastics. **7**
   B) Write a note on additives in plastics. **6**

3. A) Explain the Calendaring method for plastics. **7**
   B) Write a note on Welding for plastics. **6**

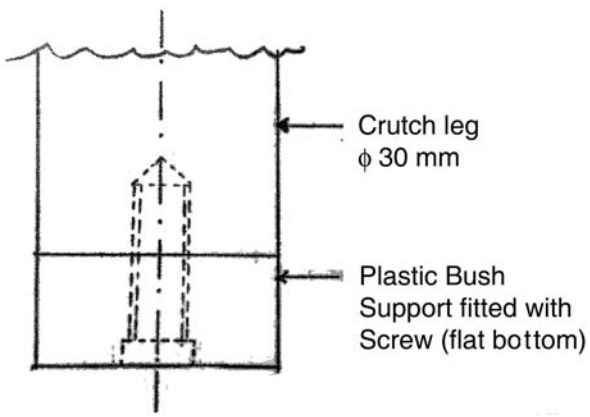
4. A) Explain with a neat sketch a Extrusion Moulding Process for plastics. **7**
   B) Explain the Hot Tool Welding for plastic along with its advantages and applications. **6**

5. A) Discuss on "Coring and Undercuts" as a key area in moulded plastic part design. **6**
   B) Plastic Part Design : **8**

   Design the plastic part for the assembly. A Crutch of a Weight 4 Kg. having a leg support require plastic bottom support bush to restrict scratches, noise, skidding etc. Pipe of leg is Dia. 30 mm. & bush is fitted with screw (Dia. 5 mm) to its bottom flat end as shown in Fig.

   Suggests suitable manufacturing methods for plastic part. Assume suitable mould material, plastic part material, and its necessary relative quantitative data. Draw a sketch of final part design.

Sketch:-. Q5B



SECTION – II

6. a) With neat sketch explain transfer moulding process with advantages limitations and application. **7**

   b) Design a compression mould for a machine component shown in Fig. 6.b which is made up of phenol formaldehyde, thermoset plastic. Take bulk factor = 3, Compression pressure = 180 kg./cm^2, density 2g/cm^3. **7**

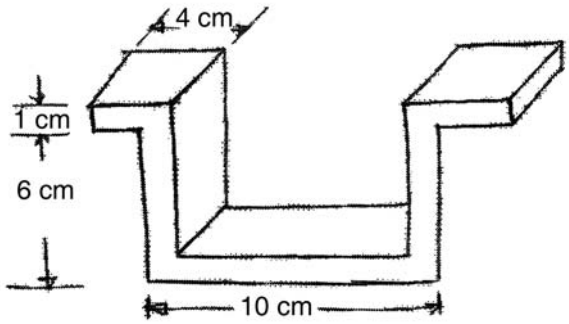


Fig. 6.b.

7. a) Explain in detail hot runner system used in injection mould die. **7**

   b) Differentiate between two plate and three plate mould for injection moulding process with figure. **6**

8. a) Explain any one type of cooling of plastic injection moulding. **4**

   b) A plastic material with temperature 90°C is injected to a mould with flow rate of 100 kg/hr. 8. If latent heat of fusion is 140 kJ/kg. Find out the temperature of water to be supplied for cooling system if 20000 kJ heat is removed per hour (Cp = 1.67 kJ/kgK). **5**

   c) What are biodegradable plastics ? **4**

9. Write short note on :

   a) Ingates used in injection moulding process. **4**

   b) Polymer degradation. **4**

   c) Advanced plastics used in sports. **5**

SLR-EP – 458

Seat No.	

Set **Q**

B.E. (Mechanical) (Part – II) (New) Examination, 2016
Elective – II : PLASTIC ENGINEERING

Day and Date : Thursday, 24-11-2016 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.***
3) Assume suitable data ***whenever*** *necessary and state it clearly.*
4) Attempt ***any 3*** *questions from* ***Q2, Q3, Q4, Q5*** *and* ***3*** *questions from to* ***Q6, Q7, Q8, Q9****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) An example of biodegradable polymer is
   a) PHBV b) PVC
   c) Polyethylene d) Polyacetylene

2) A Biodegradable polymer is one which
   a) Can be synthesized by biological route
   b) Is degradable by action of microorganism
   c) Is not degradable by action of microorganism
   d) None of these

3) In _____ welding method, the workpieces to be joined are irradiated with a steam of neutrons.
   a) Infrared b) Nuclear
   c) Hot gas d) Heated tool

4) In compression molding, for phenolic materials suitable pressure range is _____ kg/cm^2.
   a) 100 to 158 b) 158 to 211 c) 211 to 258 d) 250 to 300

5) Bulk factor is the ratio of volume of loose plastic powder to the
   a) Actual cavity volume b) Volume of the molding
   c) Volume of loose plastic powder d) None of these

6) In case of processability testing, MI stands for
   a) Moment of Inertia b) Melt Index
   c) Malleability Index d) None of above

7) Epoxy resin is example of _____ plastics.
   a) Thermoplastics b) Elastomers
   c) Thermosetting d) None of above

P.T.O.

8) Polymers can be very _____ to chemicals.
a) Resistant b) Similar c) Opposite d) None of above

9) Compression molding process is one of the _____ cost molding method as compare to injection molding.
a) High b) Medium c) Low d) None of these

10) Transfer molding process combines the principle of _____ and transfer of polymer charge.
a) Injection b) Compression c) Blow d) Rotation

11) _____ welding is less dependent than other welding methods on the properties of the materials being welded.
a) Thermal b) Heated tool
c) Induction heating d) All of the above

12) Which of the welding process is used for thermoplastics ?
a) Hot gas welding b) Induction heating
c) Heated tool d) All of the above

13) What should be the draft for polyethylene material ?
a) 1/2° b) 1/4° c) 1/8° d) 1/3°

14) What should be the draft for Nylon material ?
a) 0 – 1/4° b) 0 – 1/8° c) 0 – 1/2° d) 0 – 1/3°

15) The rib thickness should be between _____ of wall thickness.
a) 30% and 40% b) 40% and 60%
c) 50% and 60% d) 60% and 80%

16) The properties of the polymer will also depend on the _____ available for cooling.
a) Colour b) Rate
c) Both colour and rate d) None of above

17) It is the _____ operation that sets the shape of thermoplastics.
a) Heating b) Cutting c) Grinding d) Cooling

18) In Injection molding Melt temperatures are of the order of _____ for low-density polymers materials.
a) 160 – 190°C b) 120 – 170°C
c) 110 – 160°C d) 100 – 150°C

19) Plasticizers are considered _____ solvents.
a) Volatile b) Non-volatile c) Both a & b d) None of these

20) A biodegradable polymer should
a) Contained hydrophilic group b) Contain hydrophobic
c) Group contain only C-C d) Contain aromatic group

_____

SLR-EP – 458

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
Elective – II : PLASTIC ENGINEERING

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Assume suitable data* ***whenever*** *necessary and state it clearly.*
2) Attempt ***any 3*** *questions from* ***Q2, Q3, Q4, Q5*** *and* ***3*** *questions from to* ***Q6, Q7, Q8, Q9****.*

SECTION – I

2. A) Explain the testing methods for plastics. **7**
   B) Write a note on additives in plastics. **6**

3. A) Explain the Calendaring method for plastics. **7**
   B) Write a note on Welding for plastics. **6**

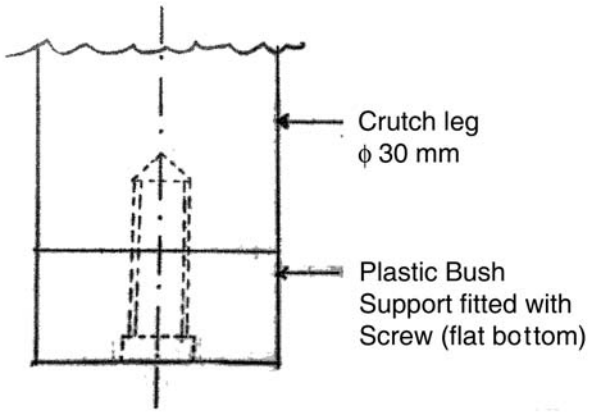
4. A) Explain with a neat sketch a Extrusion Moulding Process for plastics. **7**
   B) Explain the Hot Tool Welding for plastic along with its advantages and applications. **6**

5. A) Discuss on “Coring and Undercuts” as a key area in moulded plastic part design. **6**
   B) Plastic Part Design : **8**

   Design the plastic part for the assembly. A Crutch of a Weight 4 Kg. having a leg support require plastic bottom support bush to restrict scratches, noise, skidding etc. Pipe of leg is Dia. 30 mm. & bush is fitted with screw (Dia. 5 mm) to its bottom flat end as shown in Fig.

   Suggests suitable manufacturing methods for plastic part. Assume suitable mould material, plastic part material, and its necessary relative quantitative data. Draw a sketch of final part design.

Sketch:-. Q5B



SECTION – II

6. a) With neat sketch explain transfer moulding process with advantages limitations and application. **7**

   b) Design a compression mould for a machine component shown in Fig. 6.b which is made up of phenol formaldehyde, thermoset plastic. Take bulk factor = 3, Compression pressure = 180 kg./cm^2, density 2g/cm^3. **7**

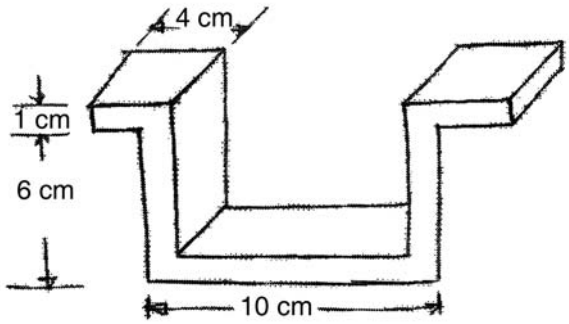


Fig. 6.b.

7. a) Explain in detail hot runner system used in injection mould die. **7**

   b) Differentiate between two plate and three plate mould for injection moulding process with figure. **6**

8. a) Explain any one type of cooling of plastic injection moulding. **4**

   b) A plastic material with temperature 90°C is injected to a mould with flow rate of 100 kg/hr. 8. If latent heat of fusion is 140 kJ/kg. Find out the temperature of water to be supplied for cooling system if 20000 kJ heat is removed per hour (Cp = 1.67 kJ/kgK). **5**

   c) What are biodegradable plastics ? **4**

9. Write short note on :

   a) Ingates used in injection moulding process. **4**

   b) Polymer degradation. **4**

   c) Advanced plastics used in sports. **5**

SLR-EP – 458

Seat No.	

Set R

B.E. (Mechanical) (Part – II) (New) Examination, 2016
Elective – II : PLASTIC ENGINEERING

Day and Date : Thursday, 24-11-2016 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.***
3) Assume suitable data ***whenever*** *necessary and state it clearly.*
4) Attempt ***any 3*** *questions from* ***Q2, Q3, Q4, Q5*** *and* ***3*** *questions from to* ***Q6, Q7, Q8, Q9****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The properties of the polymer will also depend on the _____ available for cooling.
   a) Colour b) Rate
   c) Both colour and rate d) None of above

2) It is the _____ operation that sets the shape of thermoplastics.
   a) Heating b) Cutting c) Grinding d) Cooling

3) In Injection molding Melt temperatures are of the order of _____ for low-density polymers materials.
   a) 160 – 190°C b) 120 – 170°C
   c) 110 – 160°C d) 100 – 150°C

4) Plasticizers are considered _____ solvents.
   a) Volatile b) Non-volatile c) Both a & b d) None of these

5) A biodegradable polymer should
   a) Contained hydrophilic group b) Contain hydrophobic
   c) Group contain only C-C d) Contain aromatic group

6) An example of biodegradable polymer is
   a) PHBV b) PVC
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7) A Biodegradable polymer is one which
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P.T.O.

8) In _____ welding method, the workpieces to be joined are irradiated with a steam of neutrons.
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20) The rib thickness should be between _____ of wall thickness.
   a) 30% and 40% b) 40% and 60%
   c) 50% and 60% d) 60% and 80%

_____

SLR-EP – 458

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
Elective – II : PLASTIC ENGINEERING

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Assume suitable data* ***whenever*** *necessary and state it clearly.*
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SECTION – I

2. A) Explain the testing methods for plastics. **7**
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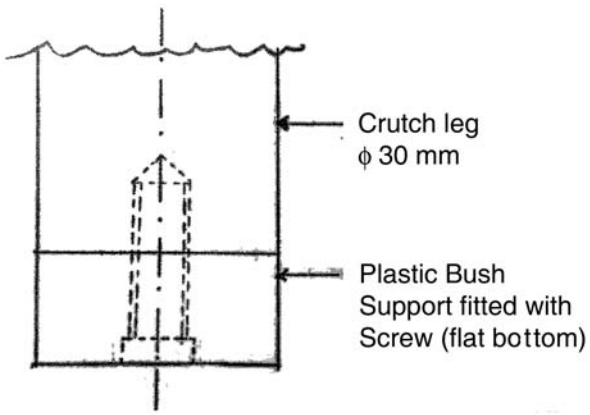
5. A) Discuss on “Coring and Undercuts” as a key area in moulded plastic part design. **6**
   B) Plastic Part Design : **8**

   Design the plastic part for the assembly. A Crutch of a Weight 4 Kg. having a leg support require plastic bottom support bush to restrict scratches, noise, skidding etc. Pipe of leg is Dia. 30 mm. & bush is fitted with screw (Dia. 5 mm) to its bottom flat end as shown in Fig.

   Suggests suitable manufacturing methods for plastic part. Assume suitable mould material, plastic part material, and its necessary relative quantitative data. Draw a sketch of final part design.

Sketch:-. Q5B



Set R

SECTION – II

6. a) With neat sketch explain transfer moulding process with advantages limitations and application. **7**

   b) Design a compression mould for a machine component shown in Fig. 6.b which is made up of phenol formaldehyde, thermoset plastic. Take bulk factor = 3, Compression pressure = 180 kg./cm^2, density 2g/cm^3. **7**

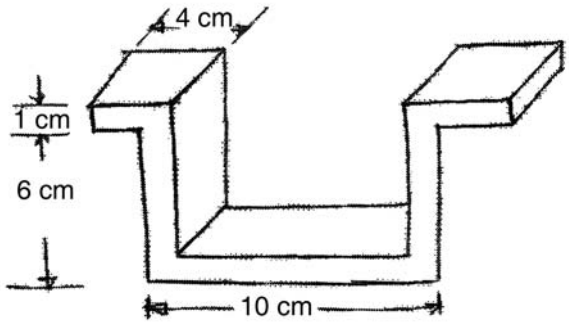


Fig. 6.b.

7. a) Explain in detail hot runner system used in injection mould die. **7**

   b) Differentiate between two plate and three plate mould for injection moulding process with figure. **6**

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   b) A plastic material with temperature 90°C is injected to a mould with flow rate of 100 kg/hr. 8. If latent heat of fusion is 140 kJ/kg. Find out the temperature of water to be supplied for cooling system if 20000 kJ heat is removed per hour (Cp = 1.67 kJ/kgK). **5**

   c) What are biodegradable plastics ? **4**

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   a) Ingates used in injection moulding process. **4**

   b) Polymer degradation. **4**

   c) Advanced plastics used in sports. **5**

SLR-EP – 458

Seat No.	

Set **S**

B.E. (Mechanical) (Part – II) (New) Examination, 2016
Elective – II : PLASTIC ENGINEERING

Day and Date : Thursday, 24-11-2016 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.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) _____ welding is less dependent than other welding methods on the properties of the materials being welded.
   a) Thermal b) Heated tool
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2) Which of the welding process is used for thermoplastics ?
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3) What should be the draft for polyethylene material ?
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P.T.O.

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20) Transfer molding process combines the principle of _____ and transfer of polymer charge.
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_____

SLR-EP – 458

Seat No.	

B.E. (Mechanical) (Part – II) (New) Examination, 2016
Elective – II : PLASTIC ENGINEERING

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Assume suitable data* ***whenever*** *necessary and state it clearly.*
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SECTION – I

2. A) Explain the testing methods for plastics. **7**
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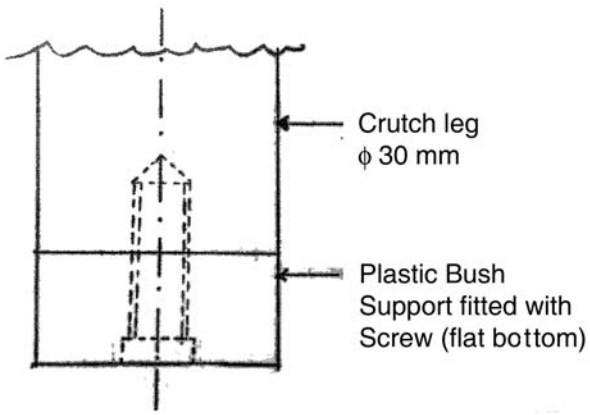

SECTION – II

6. a) With neat sketch explain transfer moulding process with advantages limitations and application. **7**

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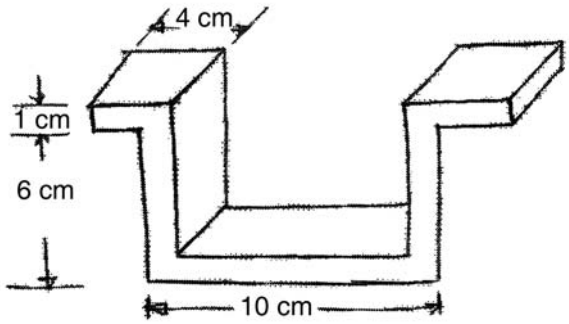

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9. Write short note on :

   a) Ingates used in injection moulding process. **4**

   b) Polymer degradation. **4**

   c) Advanced plastics used in sports. **5**

SLR-EP – 459

Seat No.	

Set **P**

B.E. (Mechanical) (Part – II) Examination, 2016
Elective – II : ECONOMICS FOR ENGINEERS (New)

Day and Date : Thursday, 24-11-2016 Total 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) **No negative** or partial marking.*
*3) Attempt **any three** questions from **each** Section.*
*4) Draw the graph **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 : 20

1. Choose the correct answer : **(1×20=20)**

1) Which is the following is NOT an economic activity ?
   a) Painting for self use
   b) Maintenance of Public Park by local administration
   c) Painting for commercial use
   d) Running an academic school

2) If supply and demand both shift outward, but demand shift outward more than supply, the equilibrium price
   a) Will increase and quantity will increase
   b) Will increase and quantity will decrease
   c) Will decrease and quantity will decrease
   d) Will decrease and quantity will increase

3) An improvement in technology would shift
   a) The demand curve inward
   b) The demand curve outward
   c) The supply curve inward
   d) The supply curve outward

4) The price of ford automobiles increases and the price of Chevrolets remain constant, the demand for Chevrolets will
   a) Increase
   b) Decrease
   c) Decrease then increase
   d) Increase then decrease

5) If the price of sandwich rises from Rs. 12 per piece to Rs. 18 per piece, as a result of which the daily sales decrease from 750 to 400 per day. The price elasticity if demand can be estimated as
   a) 0.93 b) 0.79 c) 1.65 d) 0.57

6) Bread and butter have _____
   a) Negative cross price elasticity of demand
   b) Positive cross elasticity of demand
   c) Positive income elasticity of demand
   d) Negative income elasticity of demand

7) Law of returns of scale applies when
   a) All cost are partly fixed and partly variable
   b) All input cost are fixed
   c) All inputs cost are variable
   d) None

P.T.O.

8) Total Product is maximum when
   a) MP = 0 b) MP is increasing c) MP is decreasing d) MP is constant

9) The shape of a short run total product curve reflects the operation of
   a) Law of diminishing marginal utility b) Law of diminishing returns
   c) Law of returns to scale d) Law of demand

10) When a proportionate change in input combination causes the same proportionate change in output, the returns to scale is said to exhibit
   a) Increasing returns b) Decreasing returns
   c) Constant returns d) Negative returns

11) Average revenue is
   a) Total revenue divided by the number of units sold
   b) Revenue earned by all the units of the output
   c) Revenue earned by the average sized firm in the industry
   d) Net addition made to the total revenue by selling one more unit of a commodity

12) The negative sloped part of long run average cost curve of a firm is due to
   a) Increase in production due to specialization and division of labour
   b) Diseconomies of scale
   c) Diminishing returns to scale
   d) Marginal utility theory

13) _____ is a listing of the flows of cash into and out of the business or project.
   a) Balance sheet b) Cash flow statement
   c) Working capital statement d) None of these

14) _____ is inevitable in a business organization when undertaking projects.
   a) Profit maximization b) Risk
   c) Wealth maximization d) None of these

15) _____ is the tangible fixed asset of the company.
   a) Plant and Machinery b) Goodwill c) Patent d) Royalty

16) Cash from _____ activities are included in cash flow statement.
   a) Operating activities b) Financial activities
   c) Investment activities d) All of the above

17) _____ is a form of economic analysis that compares the relative cost and effects of two or more course of action.
   a) Cost benefit analysis b) Cost effectiveness analysis
   c) Risk management d) Cash flow analysis

18) There are _____ phases in project life cycle.
   a) Three b) Seven c) Eight d) Four

19) _____ is the first step in project risk management.
   a) Risk identification b) Risk quantification
   c) Risk response d) Risk monitoring and control

20) _____ is the first phase in project life cycle stages.
   a) Planning b) Initiation c) Execution d) None of these

_____

SLR-EP – 459

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2016
Elective – II : ECONOMICS FOR ENGINEERS (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1)* ***No negative*** *or partial marking.*
2) Attempt ***any three*** *questions from* ***each*** *Section.*
3) Draw the graph ***wherever*** *necessary.*

SECTION – I

2. The table below provides cost and revenue information of a firm supplying a commodity in a competitive market. The technology of the firm is such that AC and MC curves are U-shaped. Complete the table and answer following questions :

a) Determine Break-Even Quantity

b) Quantity at which MC is minimum. **13**

Q	TFC	TVC	TC	MC	AC	P	TR	Profit
0	1000	0	1000		NA	200		–1000
1	1000	181	1181		1181	200		–981
2	1000	328	1328		664	200		–928
3	1000	447	1447		482	200		–847
4	1000	544	1544		386	200		–744
5	1000	625	1625		325	200		–625
6	1000	696	1696		283	200		–496
7	1000	763	1763		252	200		–363
8	1000	832	1832		229	200		–232
9	1000	909	1909		212	200		–109
10	1000	1000	2000		200	200		0
11	1000	1111	2111		192	200		89
12	1000	1248	2248		187	200		152
13	1000	1417	2417		186	200		183
14	1000	1624	2624		187	200		176
15	1000	1875	2875		192	200		125

3. What is engineering economics ? Discuss scope of engineering economics. **14**

4. a) Write short note on law of demand. **6**

   b) Write detail note on factors of production. **7**

5. Define economics of scale; discuss various types of economics of scale. **13**

SECTION – II

6. a) Discuss how economic life of an asset is determined. **7**

   b) Explain types of replacement problems. **6**

7. a) Explain factors considered for project selection. **7**

   b) Short note on make of buy decision. **6**

8. a) Short note on cost effectiveness analysis. **7**

   b) Short note on resource management. **6**

9. a) Discuss design selection for a product. **6**

   b) Discuss the effects of inflation. **8**

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SLR-EP – 459

Seat No.	

Set **Q**

B.E. (Mechanical) (Part – II) Examination, 2016
Elective – II : ECONOMICS FOR ENGINEERS (New)

Day and Date : Thursday, 24-11-2016 Total 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) ***No negative*** *or partial marking.*
3) Attempt ***any three*** *questions from* ***each*** *Section.*
4) Draw the graph ***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 : 20

1. Choose the correct answer : **(1×20=20)**

1) Cash from _____ activities are included in cash flow statement.
   a) Operating activities b) Financial activities
   c) Investment activities d) All of the above

2) _____ is a form of economic analysis that compares the relative cost and effects of two or more course of action.
   a) Cost benefit analysis b) Cost effectiveness analysis
   c) Risk management d) Cash flow analysis

3) There are _____ phases in project life cycle.
   a) Three b) Seven c) Eight d) Four

4) _____ is the first step in project risk management.
   a) Risk identification b) Risk quantification
   c) Risk response d) Risk monitoring and control

5) _____ is the first phase in project life cycle stages.
   a) Planning b) Initiation c) Execution d) None of these

6) Which is the following is NOT an economic activity ?
   a) Painting for self use
   b) Maintenance of Public Park by local administration
   c) Painting for commercial use
   d) Running an academic school

7) If supply and demand both shift outward, but demand shift outward more than supply, the equilibrium price
   a) Will increase and quantity will increase b) Will increase and quantity will decrease
   c) Will decrease and quantity will decrease d) Will decrease and quantity will increase

8) An improvement in technology would shift
   a) The demand curve inward b) The demand curve outward
   c) The supply curve inward d) The supply curve outward

P.T.O.

9) The price of ford automobiles increases and the price of Chevrolets remain constant, the demand for Chevrolets will
   a) Increase b) Decrease
   c) Decrease then increase d) Increase then decrease

10) If the price of sandwich rises from Rs. 12 per piece to Rs. 18 per piece, as a result of which the daily sales decrease from 750 to 400 per day. The price elasticity if demand can be estimated as
   a) 0.93 b) 0.79 c) 1.65 d) 0.57

11) Bread and butter have _____
   a) Negative cross price elasticity of demand b) Positive cross elasticity of demand
   c) Positive income elasticity of demand d) Negative income elasticity of demand

12) Law of returns of scale applies when
   a) All cost are partly fixed and partly variable b) All input cost are fixed
   c) All inputs cost are variable d) None

13) Total Product is maximum when
   a) MP = 0 b) MP is increasing c) MP is decreasing d) MP is constant

14) The shape of a short run total product curve reflects the operation of
   a) Law of diminishing marginal utility b) Law of diminishing returns
   c) Law of returns to scale d) Law of demand

15) When a proportionate change in input combination causes the same proportionate change in output, the returns to scale is said to exhibit
   a) Increasing returns b) Decreasing returns
   c) Constant returns d) Negative returns

16) Average revenue is
   a) Total revenue divided by the number of units sold
   b) Revenue earned by all the units of the output
   c) Revenue earned by the average sized firm in the industry
   d) Net addition made to the total revenue by selling one more unit of a commodity

17) The negative sloped part of long run average cost curve of a firm is due to
   a) Increase in production due to specialization and division of labour
   b) Diseconomies of scale
   c) Diminishing returns to scale
   d) Marginal utility theory

18) _____ is a listing of the flows of cash into and out of the business or project.
   a) Balance sheet b) Cash flow statement
   c) Working capital statement d) None of these

19) _____ is inevitable in a business organization when undertaking projects.
   a) Profit maximization b) Risk
   c) Wealth maximization d) None of these

20) _____ is the tangible fixed asset of the company.
   a) Plant and Machinery b) Goodwill c) Patent d) Royalty

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SLR-EP – 459

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2016
Elective – II : ECONOMICS FOR ENGINEERS (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1)* ***No negative*** *or partial marking.*
2) Attempt ***any three*** *questions from* ***each*** *Section.*
3) Draw the graph ***wherever*** *necessary.*

SECTION – I

2. The table below provides cost and revenue information of a firm supplying a commodity in a competitive market. The technology of the firm is such that AC and MC curves are U-shaped. Complete the table and answer following questions :

a) Determine Break-Even Quantity

b) Quantity at which MC is minimum. **13**

Q	TFC	TVC	TC	MC	AC	P	TR	Profit
0	1000	0	1000		NA	200		–1000
1	1000	181	1181		1181	200		–981
2	1000	328	1328		664	200		–928
3	1000	447	1447		482	200		–847
4	1000	544	1544		386	200		–744
5	1000	625	1625		325	200		–625
6	1000	696	1696		283	200		–496
7	1000	763	1763		252	200		–363
8	1000	832	1832		229	200		–232
9	1000	909	1909		212	200		–109
10	1000	1000	2000		200	200		0
11	1000	1111	2111		192	200		89
12	1000	1248	2248		187	200		152
13	1000	1417	2417		186	200		183
14	1000	1624	2624		187	200		176
15	1000	1875	2875		192	200		125

3. What is engineering economics ? Discuss scope of engineering economics. **14**

4. a) Write short note on law of demand. **6**

   b) Write detail note on factors of production. **7**

5. Define economics of scale; discuss various types of economics of scale. **13**

SECTION – II

6. a) Discuss how economic life of an asset is determined. **7**

   b) Explain types of replacement problems. **6**

7. a) Explain factors considered for project selection. **7**

   b) Short note on make of buy decision. **6**

8. a) Short note on cost effectiveness analysis. **7**

   b) Short note on resource management. **6**

9. a) Discuss design selection for a product. **6**

   b) Discuss the effects of inflation. **8**

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SLR-EP – 459

Seat No.	

Set **R**

B.E. (Mechanical) (Part – II) Examination, 2016
Elective – II : ECONOMICS FOR ENGINEERS (New)

Day and Date : Thursday, 24-11-2016 Total 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) ***No negative*** *or partial marking.*
3) Attempt ***any three*** *questions from* ***each*** *Section.*
4) Draw the graph ***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 : 20

1. Choose the correct answer : **(1×20=20)**

1) Average revenue is
   a) Total revenue divided by the number of units sold
   b) Revenue earned by all the units of the output
   c) Revenue earned by the average sized firm in the industry
   d) Net addition made to the total revenue by selling one more unit of a commodity

2) The negative sloped part of long run average cost curve of a firm is due to
   a) Increase in production due to specialization and division of labour
   b) Diseconomies of scale
   c) Diminishing returns to scale
   d) Marginal utility theory

3) _____ is a listing of the flows of cash into and out of the business or project.
   a) Balance sheet b) Cash flow statement
   c) Working capital statement d) None of these

4) _____ is inevitable in a business organization when undertaking projects.
   a) Profit maximization b) Risk
   c) Wealth maximization d) None of these

5) _____ is the tangible fixed asset of the company.
   a) Plant and Machinery b) Goodwill c) Patent d) Royalty

6) Cash from _____ activities are included in cash flow statement.
   a) Operating activities b) Financial activities
   c) Investment activities d) All of the above

7) _____ is a form of economic analysis that compares the relative cost and effects of two or more course of action.
   a) Cost benefit analysis b) Cost effectiveness analysis
   c) Risk management d) Cash flow analysis

P.T.O.

8) There are _____ phases in project life cycle.
   a) Three b) Seven c) Eight d) Four

9) _____ is the first step in project risk management.
   a) Risk identification b) Risk quantification
   c) Risk response d) Risk monitoring and control

10) _____ is the first phase in project life cycle stages.
   a) Planning b) Initiation c) Execution d) None of these

11) Which is the following is NOT an economic activity ?
   a) Painting for self use
   b) Maintenance of Public Park by local administration
   c) Painting for commercial use
   d) Running an academic school

12) If supply and demand both shift outward, but demand shift outward more than supply, the equilibrium price
   a) Will increase and quantity will increase b) Will increase and quantity will decrease
   c) Will decrease and quantity will decrease d) Will decrease and quantity will increase

13) An improvement in technology would shift
   a) The demand curve inward b) The demand curve outward
   c) The supply curve inward d) The supply curve outward

14) The price of ford automobiles increases and the price of Chevrolets remain constant, the demand for Chevrolets will
   a) Increase b) Decrease
   c) Decrease then increase d) Increase then decrease

15) If the price of sandwich rises from Rs. 12 per piece to Rs. 18 per piece, as a result of which the daily sales decrease from 750 to 400 per day. The price elasticity if demand can be estimated as
   a) 0.93 b) 0.79 c) 1.65 d) 0.57

16) Bread and butter have _____
   a) Negative cross price elasticity of demand b) Positive cross elasticity of demand
   c) Positive income elasticity of demand d) Negative income elasticity of demand

17) Law of returns of scale applies when
   a) All cost are partly fixed and partly variable b) All input cost are fixed
   c) All inputs cost are variable d) None

18) Total Product is maximum when
   a) MP = 0 b) MP is increasing c) MP is decreasing d) MP is constant

19) The shape of a short run total product curve reflects the operation of
   a) Law of diminishing marginal utility b) Law of diminishing returns
   c) Law of returns to scale d) Law of demand

20) When a proportionate change in input combination causes the same proportionate change in output, the returns to scale is said to exhibit
   a) Increasing returns b) Decreasing returns
   c) Constant returns d) Negative returns

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Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2016
Elective – II : ECONOMICS FOR ENGINEERS (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1)* ***No negative*** *or partial marking.*
2) Attempt ***any three*** *questions from* ***each*** *Section.*
3) Draw the graph ***wherever*** *necessary.*

SECTION – I

2. The table below provides cost and revenue information of a firm supplying a commodity in a competitive market. The technology of the firm is such that AC and MC curves are U-shaped. Complete the table and answer following questions :

a) Determine Break-Even Quantity

b) Quantity at which MC is minimum. **13**

Q	TFC	TVC	TC	MC	AC	P	TR	Profit
0	1000	0	1000		NA	200		–1000
1	1000	181	1181		1181	200		–981
2	1000	328	1328		664	200		–928
3	1000	447	1447		482	200		–847
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7	1000	763	1763		252	200		–363
8	1000	832	1832		229	200		–232
9	1000	909	1909		212	200		–109
10	1000	1000	2000		200	200		0
11	1000	1111	2111		192	200		89
12	1000	1248	2248		187	200		152
13	1000	1417	2417		186	200		183
14	1000	1624	2624		187	200		176
15	1000	1875	2875		192	200		125

3. What is engineering economics ? Discuss scope of engineering economics. **14**

4. a) Write short note on law of demand. **6**

   b) Write detail note on factors of production. **7**

5. Define economics of scale; discuss various types of economics of scale. **13**

SECTION – II

6. a) Discuss how economic life of an asset is determined. **7**

   b) Explain types of replacement problems. **6**

7. a) Explain factors considered for project selection. **7**

   b) Short note on make of buy decision. **6**

8. a) Short note on cost effectiveness analysis. **7**

   b) Short note on resource management. **6**

9. a) Discuss design selection for a product. **6**

   b) Discuss the effects of inflation. **8**

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SLR-EP – 459

Seat No.	

Set **S**

B.E. (Mechanical) (Part – II) Examination, 2016
Elective – II : ECONOMICS FOR ENGINEERS (New)

Day and Date : Thursday, 24-11-2016 Total 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.*
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4) Draw the graph ***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 : 20

1. Choose the correct answer : **(1×20=20)**

1) Bread and butter have _____
   a) Negative cross price elasticity of demand
   b) Positive cross elasticity of demand
   c) Positive income elasticity of demand
   d) Negative income elasticity of demand

2) Law of returns of scale applies when
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   b) Law of diminishing returns
   c) Law of returns to scale
   d) Law of demand

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20) If the price of sandwich rises from Rs. 12 per piece to Rs. 18 per piece, as a result of which the daily sales decrease from 750 to 400 per day. The price elasticity if demand can be estimated as
   a) 0.93 b) 0.79 c) 1.65 d) 0.57

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SLR-EP – 459

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2016
Elective – II : ECONOMICS FOR ENGINEERS (New)

Day and Date : Thursday, 24-11-2016 Marks : 80
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Instructions : *1)* ***No negative*** *or partial marking.*
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SECTION – I

2. The table below provides cost and revenue information of a firm supplying a commodity in a competitive market. The technology of the firm is such that AC and MC curves are U-shaped. Complete the table and answer following questions :

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12	1000	1248	2248		187	200		152
13	1000	1417	2417		186	200		183
14	1000	1624	2624		187	200		176
15	1000	1875	2875		192	200		125

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SECTION – II

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7. a) Explain factors considered for project selection. **7**

   b) Short note on make of buy decision. **6**

8. a) Short note on cost effectiveness analysis. **7**

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9. a) Discuss design selection for a product. **6**

   b) Discuss the effects of inflation. **8**

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