# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 **ENGINEERING MATHEMATICS - I**

Day & Date: Friday, 06-12-2019 Time: 10:00 AM To 01:00 PM

**Duration: 30 Minutes** 

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Figures to the right indicate full marks.
- 3) Use of Non programmable calculator is allowed.

## **MCQ/Objective Type Questions**

### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1)	The real part of $[\sin(x) + i\cos(x)]^5$ a) $\cos(5x)$ c) $\sin(5x)$	= b) d)	$-\sin(5x) - \cos(5x)$
2)	$\sin h^{-1} \frac{3}{4} = $ a) $\log 1$ c) $\log 3$	b) d)	log 2
3)	$log(1 + i) = \$ a) $log 2 + i$	b)	$\frac{1}{2}\log 2 - i\frac{\pi}{4}$
	c) $\frac{1}{2}\log 2 + i\frac{\pi}{4}$	d)	$\log 2 + i\frac{\pi}{4}^4$
4)	If $y = \log x$ the $y_n = $ a) $(-1)^n (n)!$	b)	$(-1)^n(n-1)!$
	c) $\frac{(-1)^{n-1}(n)!}{x^{n+1}}$	d)	$\frac{(-1)^{n-1}(n-1)!}{x^n}$
5)	If $y = 2^{x} x$ the $y_n = \_$ . a) $2^{x} [(\log 2)^{n} + n(\log 2)^{n-3}]$ c) $2^{x} [(\log 2)^{n} + n(\log 2)^{n-1}]$	b) d)	$2^{x}[(\log 2)^{n} + (\log 2)^{n-3}]$ $2^{x}[(\log 2)^{n} + (\log 2)^{n-3}]$
6)	If $L = \lim_{x \to 0} \frac{x - \sin x}{x^3}$ then $L = \_$		
	a) $\frac{1}{6}$	b)	6
	c) $\frac{-1}{6}$	d)	0
7)	The expansion of log $(1 + x^2) = $		
	a) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$	b)	$-x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \dots$
	c) $-x^2 - \frac{x^4}{2} - \frac{x^6}{3} - \frac{x^8}{4} - \dots$	d)	$x^2 - \frac{x^{\overline{4}}}{2} + \frac{x^{\overline{6}}}{3} - \frac{x^{\overline{8}}}{4} + \dots$

Seat No.

# SLR-FM-1

Max. Marks: 70



Marks: 14

2)  $n^{-3}$ ]  $2)^{n-1}$ 

....

Set 8) If Rank of matrix  $[A]_{3\times 3}$  is 2, then the value of |A| =\_\_\_\_\_. a) 1 b) 0 c) 2 d) -1 The system 3x + 4y - 2z = 4, 6x + 8y - 4z = 10 will have \_\_\_\_\_. 9) a) Unique solution b) No solution c) Infinite Solution d) Infinite solution with two independent parameters If zero is one of the eigen value of the matrix A then A is \_\_\_\_\_ 10) a) Singular Non singular b) c) Symmetric d) Non symmetric If  $u = e^{xy^2z^3}$  then  $\frac{\partial u}{\partial z} =$  \_\_\_\_\_. a)  $e^{xy^2z^3}xy^2z^3$ c)  $e^{xy^2z^3}3xy^2z^2$ 11) b)  $e^{xy^2z^3}y^2z^3$ d)  $e^{xy^2z^3}2xyz^3$ If g(x, y, z) = 0 then the value of  $\frac{\partial z}{\partial x} =$ 12) b)  $\frac{\frac{\partial y}{\partial x}}{\frac{\partial x}{\partial g}}$  $\frac{\partial x}{\partial g}$  $\frac{\partial z}{\partial q}$ a) c)  $-\frac{\frac{\partial g}{\partial y}}{\frac{\partial g}{\partial g}}$ d)  $-\frac{\frac{\partial g}{\partial x}}{\frac{\partial g}{\partial g}}$ дz Consider the following terms. 13) I) II' - 1 = 0 $J\left(\frac{u,v}{x,v}\right) \cdot J\left(\frac{x,y}{u,v}\right) - 1 = 0$ II) a) Both I and II are true b) I is true, II is false Both I and II are false c) Il is true, I is false d) 14) Which of the following is the relative error for u?  $1 + \frac{\delta u}{u}$ a)  $1 - \frac{\delta u}{dt}$ b) u

c)  $\frac{\delta u}{u}$  d)  $\frac{u}{\delta u}$ 

SLR-FM-1

Seat No.			Set	Ρ
		F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2 ENGINEERING MATHEMATICS - I	019	
Day & Time:	& Dat : 10:0	te: Friday, 06-12-2019 00 AM To 01:00 PM	Max. Mark	s: 56
Instru	uctio	<ul> <li>ans: 1) All questions are compulsory.</li> <li>2) Figures to the right indicate full marks.</li> <li>3) Use of Non – programmable calculator is allowed.</li> </ul>		
		Section – I		
Q.2	Atte a)	Find the nth derivative of $y = \frac{x-1}{x+1} + x^2 \sin x \cos x$ .		09
	b)	Simplify $\left(\frac{1+\cos\theta+i\sin\theta}{1+\cos\theta-i\sin\theta}\right)^{1000}$ .		
	c)	If $x = y(1 + y^2)$ Prove that $y = x - x^3 + 3x^5 +$		
	d)	Prove that $\tan h^{-1}x = \sin h^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$ .		
	e)	Expand $x^5 - 5x^4 + 6x^3 - 7x^2 + 8x - 9$ in power of $(x - 1)$ .		
Q.3	Atte	empt any three questions from the following.		09
	a)	Prove that $\sin^{-1}(3x - 4x^3) = 3\left[x + \frac{x^3}{6} + \frac{3x^5}{40} + \cdots\right]$ .		
	b)	Solve $x^5 = 1 + i$ .		
	C)	Separate into real and imaginary parts $\sin^{-1}\left(\frac{3i}{4}\right)$ .		
	d) e)	Expand $log(1 + e^x)$ in powers of x up to $x^2$ . Find the nth derivative of $y = e^{-x} \cdot x \cdot \cos x$ .		
Q.4	Atte	empt any two questions from the following.		10
	aj	$\frac{1}{d - \frac{1}{d - \frac$		
		$\varphi = \frac{1}{2}\log \cot \alpha/2$		
		$2\theta = n\pi + \frac{\pi}{2} + \alpha$		
	b)	If $\sin^{-1}\left(\frac{y}{b}\right) = \log\left(\frac{x}{n}\right)^n$ then prove that		
	c)	$x^{-}y_{n+2} + (2n+1)xy_{n+1} + 2n^{-}y_n = 0$ Evaluate the limits.		
		a) $\lim_{x \to 0} \left[ \frac{1}{2x} - \frac{1}{x(e^{\pi x} + 1)} \right]$		
		b) $\lim_{x \to 0} \left[ \frac{a^x + b^x + c^x}{3} \right]^{1/x}$		

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### Section - II

#### Q.5 Attempt any three questions from the following.

- Find the rank of the matrix by reducing it to Normal form. a)
  - $\begin{pmatrix} 3 & 2 & 1 & 4 \\ -1 & 3 & 2 & 2 \\ 2 & 5 & 3 & 6 \\ & & & 10 \end{pmatrix}$
- If 120 is divided into three numbers such that sum of their product taken at b) a time is maximum, find the numbers.
- If  $u = x^3 \sin^{-1} \left[ \frac{y}{x} \right] + y^4 \tan^{-1} \left[ \frac{y}{x} \right]$  then find the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ . c)
- Examine the vector for Linear Dependence and Independence. d) [1,1,1], [1,2,3], [2,3,8]
- Find the approximate value of  $[(0.98)^2 + (2.01)^3 + (1.94)^2]^{1/2}$ e)

#### Attempt any three questions from the following. Q.6

- Solve the equations. a)
- x + y z + s = 0, x y + 2z s = 0, 3x + y + s = 0
- b)
- If  $x = \frac{1}{2}(u^2 v^2)$ , y = uv and z = w find  $\frac{\partial(x,y,z)}{\partial(u,v,w)}$ If  $u = \log\left[\frac{x^3 + y^3}{x^2 + y^2}\right]$  then Prove that  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -1$ c)
- If  $u = e^{x^2 + y^2 + z^2}$  find the value of  $\frac{\partial^3 u}{\partial x \partial y \partial z}$ d)
- e) Verify Cayley Hamilton Theorem for A where

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{pmatrix}$$

#### Q.7 Attempt any two questions from the following.

Find the Eigen Values and Eigen Vector for the largest Eigen Value for a) (2 -1 1)

$$A = \begin{pmatrix} 1 & 2 & 1 \\ 1 & -1 & 2 \end{pmatrix}$$

- b) Find the stationary value xy(1 - x - y)
- If u = lx + my and v = ly mx and z is function of u, v then prove that. C)  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 u}{\partial v^2} = (l^2 + m^2) \left[ \frac{\partial^2 z}{\partial p^2} + \frac{\partial^2 q}{\partial v^2} \right]$

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SLR-FM-1

Set

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Seat No.						Set	Q
	F.	E. (Part – I) El	) (Old) (CBC NGINEERIN(	S) Exami G MATHE	ination Nov/Dec- MATICS - I	2019	
Day & Time:	Date: F 10:00 A	riday, 06-12-2 M To 01:00 P	2019 'M			Max. Marks	s: 70
Instru	ctions:	1) Q. No. 1 is book. 2) Figures to	compulsory a	nd should b ate full mark	e solved in first 30 m	ninutes in ans	wer
		3) Use of Nor	n – programma ICO/Objecti	able calcula	tor is allowed.		
Duratio	on: 30 N	linutes		ve Type	200310113	Mark	s: 14
Q.1 (	Choose	the correct	alternatives fr	om the op	tions and rewrite th	e sentence.	14
	1) lf a) c)	Rank of matri 1 2	x [A] <sub>3×3</sub> is 2, th	ien the valu b) d)	ue of   <i>A</i>  = 0 -1		
	2) Tr a) b) c) d)	ne system 3 <i>x</i> Unique solu No solution Infinite Solu Infinite solu	+ 4y - 2z = 4, ution ution ition with two ir	6x + 8y - 4ndependent	4z = 10 will have parameters		
3	3) lf : a) c)	zero is one of Singular Symmetric	the eigen valu	e of the ma b) d)	trix A then A is Non singular Non symmetric	<u>     .</u> .	
2	4) If ( a) c)	$u = e^{xy^2z^3} the$ $e^{xy^2z^3}xy^2z^3$ $e^{xy^2z^3}3xy^2z^3$	$\frac{\partial u}{\partial z} = \underline{\qquad}$	 b) d)	$e^{xy^2z^3}y^2z^3$ $e^{xy^2z^3}2xyz^3$		
Ę	5) If	g(x, y, z) = 0	then the value	of $\frac{\partial z}{\partial x} = $			
	a)	$\frac{\partial x}{\partial g} \\ \frac{\partial z}{\partial g} \\ \frac{\partial z}{\partial g} \\ \frac{\partial q}{\partial g} $		ox b)	$\frac{\frac{\partial y}{\partial x}}{\frac{\partial x}{\partial g}}$		
	c)	$-\frac{\frac{\partial g}{\partial y}}{\frac{\partial g}{\partial z}}$		d)	$-\frac{\frac{\partial g}{\partial x}}{\frac{\partial g}{\partial z}}$		
(	6) Ca I) II)	consider the fo JJ' - 1 = 0 $J\left(\frac{u, v}{r, v}\right) J\left(\frac{u, v}{r, v}\right)$	Howing terms. $\left(\frac{x, y}{y, y}\right) - 1 = 0$				
	a) c)	Both I and I II is true, I i	Il are true s false	b) d)	I is true, II is false Both I and II are fal	se	

SLR-FM-1 Set Q

7)	Which of the following is the relative	error	for u?
	a) $1 - \frac{\delta u}{\eta}$	b)	$1 + \frac{\delta u}{v}$
	c) $\frac{\delta u}{u}$	d)	$\frac{u}{\delta u}$
8)	The real part of $[\sin(x) + i\cos(x)]^5 =$	=	
	a) $cos(5x)$ c) $sin(5x)$	b) d)	$-\sin(5x)$ $-\cos(5x)$
9)	$\sin h^{-1} \frac{3}{4} =$		
	a) log 1	b)	log 2
	c) log 3	d)	log 4
10)	$\log(1+i) = $ a) $\log 2 + i$	b)	$\frac{1}{2}\log 2 - i\frac{\pi}{4}$
	c) $\frac{1}{2}\log 2 + i\frac{\pi}{4}$	d)	$\log 2 + i\frac{\pi}{4}$
11)	If $y = \log x$ the $y_n = $ a) $(-1)^n (n)!$	b)	$(-1)^n(n-1)!$
	c) $\frac{\binom{x^n}{(-1)^{n-1}(n)!}}{x^{n+1}}$	d)	$\frac{(-1)^{n-1}(n-1)!}{x^n}$
12)	If $y = 2^{x}x$ the $y_n = $	<b>۲</b>	$2^{n} [(1 - 2)^{n} + (1 - 2)^{n-3}]$
	a) $2^{x}[(\log 2)^{n} + n(\log 2)^{n-1}]$ c) $2^{x}[(\log 2)^{n} + n(\log 2)^{n-1}]$	d)	$2^{x} [(\log 2)^{n} + (\log 2)^{n-3}]$ $2^{x} [(\log 2)^{n} + (\log 2)^{n-1}]$
13)	If $L = \lim_{x \to 0} \frac{x - \sin x}{x^3}$ then $L = \_$	·	
	a) $\frac{1}{6}$	b)	6
	c) $\frac{-1}{6}$	d)	0
14)	The expansion of log $(1 + x^2) = $		
	a) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$	b)	$-x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \dots$
	c) $-x^2 - \frac{x^4}{2} - \frac{x^6}{3} - \frac{x^8}{4} - \dots$	d)	$x^2 - \frac{x^{\overline{4}}}{2} + \frac{x^{\overline{6}}}{3} - \frac{x^{\overline{8}}}{4} + \dots$

Seat No.	:		Set	Q
		F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2 ENGINEERING MATHEMATICS - I	019	
Day & Time:	& Dat : 10:0	te: Friday, 06-12-2019 00 AM To 01:00 PM	Max. Marks	: 56
Instru	uctio	<ul> <li>ans: 1) All questions are compulsory.</li> <li>2) Figures to the right indicate full marks.</li> <li>3) Use of Non – programmable calculator is allowed.</li> </ul>		
		Section – I		
Q.2	Atte a)	Find the nth derivative of $y = \frac{x-1}{x+1} + x^2 \sin x \cos x$ .		09
	b)	Simplify $\left(\frac{1+\cos\theta+i\sin\theta}{1+\cos\theta-i\sin\theta}\right)^{1000}$ .		
	c)	If $x = y(1 + y^2)$ Prove that $y = x - x^3 + 3x^5 +$		
	d)	Prove that $\tan h^{-1}x = \sin h^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$ .		
	e)	Expand $x^5 - 5x^4 + 6x^3 - 7x^2 + 8x - 9$ in power of $(x - 1)$ .		
Q.3	Atte	empt any three questions from the following.		09
	a)	Prove that $\sin^{-1}(3x - 4x^3) = 3\left[x + \frac{x^3}{6} + \frac{3x^5}{40} + \cdots\right]$ .		
	b)	Solve $x^5 = 1 + i$ .		
	C)	Separate into real and imaginary parts $\sin^{-1}\left(\frac{3l}{4}\right)$ .		
	d) e)	Expand $log(1 + e^x)$ in powers of x up to $x^2$ . Find the nth derivative of $y = e^{-x} \cdot x \cdot \cos x$ .		
Q.4	Atte a)	empt any two questions from the following. If $tan(\theta + i\phi) = tan \alpha + i sec \alpha$ prove that		10
		$\phi = \frac{1}{2}\log\cot\alpha/2$		
		and <sup>7</sup>		
		$2\theta = n\pi + \frac{\pi}{2} + \alpha$		
	b)	If $\sin^{-1}\left(\frac{y}{b}\right) = \log\left(\frac{x}{n}\right)^n$ then prove that		
	c)	$x^2 y_{n+2} + (2n+1)xy_{n+1} + 2n^2 y_n = 0$ Evaluate the limits		
	0)	a) $\lim_{x \to 0} \left[ \frac{1}{2x} - \frac{1}{x(e^{\pi x} + 1)} \right]$		
		b) $\lim_{x \to 0} \left[ \frac{a^x + b^x + c^x}{3} \right]^{1/x}$		

### Section - II

#### Q.5 Attempt any three questions from the following.

- Find the rank of the matrix by reducing it to Normal form. a)
  - $\begin{pmatrix} 3 & 2 & 1 & 4 \\ -1 & 3 & 2 & 2 \\ 2 & 5 & 3 & 6 \\ & & & 10 \end{pmatrix}$
- If 120 is divided into three numbers such that sum of their product taken at b) a time is maximum, find the numbers.
- If  $u = x^3 \sin^{-1} \left[ \frac{y}{x} \right] + y^4 \tan^{-1} \left[ \frac{y}{x} \right]$  then find the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ . c)
- Examine the vector for Linear Dependence and Independence. d) [1,1,1], [1,2,3], [2,3,8]
- Find the approximate value of  $[(0.98)^2 + (2.01)^3 + (1.94)^2]^{1/2}$ e)

#### Attempt any three questions from the following. Q.6

- Solve the equations. a)
- x + y z + s = 0, x y + 2z s = 0, 3x + y + s = 0
- b)
- If  $x = \frac{1}{2}(u^2 v^2)$ , y = uv and z = w find  $\frac{\partial(x,y,z)}{\partial(u,v,w)}$ If  $u = \log\left[\frac{x^3 + y^3}{x^2 + y^2}\right]$  then Prove that  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -1$ c)
- If  $u = e^{x^2 + y^2 + z^2}$  find the value of  $\frac{\partial^3 u}{\partial x \partial y \partial z}$ d)
- e) Verify Cayley Hamilton Theorem for A where

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{pmatrix}$$

#### Q.7 Attempt any two questions from the following.

Find the Eigen Values and Eigen Vector for the largest Eigen Value for a) (2 -1 1)

$$A = \begin{pmatrix} 1 & 2 & 1 \\ 1 & -1 & 2 \end{pmatrix}$$

- Find the stationary value xy(1 x y)b)
- If u = lx + my and v = ly mx and z is function of u, v then prove that. C)  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 u}{\partial v^2} = (l^2 + m^2) \left[ \frac{\partial^2 z}{\partial p^2} + \frac{\partial^2 q}{\partial v^2} \right]$

09

SLR-FM-1

Set

10

# Set F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019

**ENGINEERING MATHEMATICS - I** 

Day & Date: Friday, 06-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Figures to the right indicate full marks.
- Use of Non programmable calculator is allowed.

## MCQ/Objective Type Questions

## **Duration: 30 Minutes**

### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 1)

- If  $y = 2^{x}x$  the  $y_{n} =$ \_\_\_\_\_\_. a)  $2^{x}[(\log 2)^{n} + n(\log 2)^{n-3}]$  b)  $2^{x}[(\log 2)^{n} + (\log 2)^{n-3}]$ c)  $2^{x}[(\log 2)^{n} + n(\log 2)^{n-1}]$  d)  $2^{x}[(\log 2)^{n} + (\log 2)^{n-1}]$ If  $L = \lim_{x \to 0} \frac{x - \sin x}{x^3}$  then L =\_\_\_\_\_ 2) a)  $\frac{1}{6}$ b) 6 c)  $\frac{-1}{6}$ d) 0 The expansion of log  $(1 + x^2) =$ \_\_\_\_\_. a)  $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$  b)  $-x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \dots$ c)  $-x^2 - \frac{x^4}{2} - \frac{x^6}{3} - \frac{x^8}{4} - \dots$  d)  $x^2 - \frac{x^4}{2} + \frac{x^6}{3} - \frac{x^8}{4} + \dots$ 3) If Rank of matrix  $[A]_{3\times 3}$  is 2, then the value of |A|= \_\_\_\_\_. 4) a) 1 b) 0 c) 2 d) -1 The system 3x + 4y - 2z = 4, 6x + 8y - 4z = 10 will have \_\_\_\_\_. 5) Unique solution a) b) No solution Infinite Solution c) d) Infinite solution with two independent parameters If zero is one of the eigen value of the matrix A then A is \_\_\_\_\_. 6) a) Singular b) Non singular c) Symmetric d) Non symmetric 7) If  $u = e^{xy^2z^3}$  then  $\frac{\partial u}{\partial z} =$  \_\_\_\_\_. b)  $e^{xy^2z^3}y^2z^3$ d)  $e^{xy^2z^3}2xyz^3$ a)  $e^{xy^2z^3}xy^2z^3$ 
  - c)  $e^{xy^2z^3}3xv^2z^2$

Seat No.



Max. Marks: 70

R



SLR-FM-1 Set R

are false

8)	lf g	$f(x, y, z) = 0$ then the value of $\frac{\partial z}{\partial x}$	=	
	a)	$\frac{\partial x}{\partial g}$	b)	$\frac{\partial y}{\partial x}$
	α,	$\frac{\partial z}{\partial g}$	2)	$\frac{\partial x}{\partial g}$
	c)	$-\frac{\frac{\partial g}{\partial y}}{\frac{\partial g}{\partial z}}$	d)	$-\frac{\frac{\partial g}{\partial x}}{\frac{\partial g}{\partial z}}$
9)	Co I)	nsider the following terms. $JJ^{'} - 1 = 0$		
	II)	$J\left(\frac{u,v}{x,y}\right) \cdot J\left(\frac{x,y}{u,y}\right) - 1 = 0$		
	a) c)	Both I and II are true II is true, I is false	b) d)	I is true, II is false Both I and II are fa
10)	Wh	ich of the following is the relative	error	for u?
	a)	$1 - \frac{\delta u}{u}$	b)	$1 + \frac{\delta u}{u}$
	c)	$\frac{\delta u}{u}$	d)	$\frac{u}{\delta u}$
11)	The	e real part of $[\sin(x) + i\cos(x)]^5$ :	=	•
	a) c)	$\cos(5x)$ $\sin(5x)$	b) d)	$-\sin(5x)$ $-\cos(5x)$
12)	sin	$h^{-1}\frac{3}{4} = $		
	a)	log 1	b)	log 2
	C)	log 3	d)	log 4
13)	log a)	$(1+i) = \underline{\qquad}.$ $\log 2 + i$	b)	$\frac{1}{2}\log 2 - i\frac{\pi}{4}$
	c)	$\frac{1}{2}\log 2 + i\frac{\pi}{4}$	d)	$\log 2 + i\frac{\pi}{4}$
14)	lf y a)	$= \log x \text{ the } y_n = \underline{\qquad}.$	b)	$\frac{(-1)^n(n-1)!}{n}$
	c)	$\frac{(-1)^{n-1}(n)!}{x^{n+1}}$	d)	$\frac{(-1)^{n-1}(n-1)!}{x^n}$

Seat No.	:		Set	R
		F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2 ENGINEERING MATHEMATICS - I	019	
Day & Time:	& Dat : 10:(	te: Friday, 06-12-2019 00 AM To 01:00 PM	Max. Marks	56 3:
Instru	uctio	<ul> <li>ans: 1) All questions are compulsory.</li> <li>2) Figures to the right indicate full marks.</li> <li>3) Use of Non – programmable calculator is allowed.</li> </ul>		
		Section – I		
Q.2	Atte a)	Find the nth derivative of $y = \frac{x-1}{x+1} + x^2 \sin x \cos x$ .		09
	b)	Simplify $\left(\frac{1+\cos \theta+i \sin \theta}{1+\cos \theta-i \sin \theta}\right)^{1000}$ .		
	c)	If $x = y(1 + y^2)$ Prove that $y = x - x^3 + 3x^5 +$		
	d)	Prove that $\tan h^{-1}x = \sin h^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$ .		
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Q.3	Atte	empt any three questions from the following.		09
	a)	Prove that $\sin^{-1}(3x - 4x^3) = 3\left[x + \frac{x^3}{6} + \frac{3x^5}{40} + \cdots\right]$ .		
	b)	Solve $x^5 = 1 + i$ .		
	C)	Separate into real and imaginary parts $\sin^{-1}\left(\frac{3}{4}\right)$ .		
	d) e)	Expand $\log(1 + e^x)$ in powers of x up to $x^2$ . Find the nth derivative of $y = e^{-x} \cdot x \cdot \cos x$ .		
Q.4	Atte	empt any two questions from the following.		10
	a)	If $tan(\theta + i\phi) = tan \alpha + i \sec \alpha$ prove that		
		$\phi = \frac{1}{2}\log \cot \alpha/2$		
		and π		
	_	$2\theta = n\pi + \frac{1}{2} + \alpha$		
	b)	If $\sin^{-1}\left(\frac{y}{b}\right) = \log\left(\frac{x}{n}\right)^n$ then prove that		
	c)	$x^2 y_{n+2} + (2n+1)xy_{n+1} + 2n^2 y_n = 0$ Evaluate the limits		
	C)	a) $\lim_{x \to 0} \left[ \frac{1}{2x} - \frac{1}{x(e^{\pi x} + 1)} \right]$		
		b) $\lim_{x \to 0} \left[ \frac{a^x + b^x + c^x}{3} \right]^{1/x}$		

Page **11** of **16** 

### Section - II

### Q.5 Attempt any three questions from the following.

- Find the rank of the matrix by reducing it to Normal form. a)
  - $\begin{pmatrix} 3 & 2 & 1 & 4 \\ -1 & 3 & 2 & 2 \\ 2 & 5 & 3 & 6 \\ & & & 10 \end{pmatrix}$
- If 120 is divided into three numbers such that sum of their product taken at b) a time is maximum, find the numbers.
- If  $u = x^3 \sin^{-1} \left[ \frac{y}{x} \right] + y^4 \tan^{-1} \left[ \frac{y}{x} \right]$  then find the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ . c)
- Examine the vector for Linear Dependence and Independence. d) [1,1,1], [1,2,3], [2,3,8]
- Find the approximate value of  $[(0.98)^2 + (2.01)^3 + (1.94)^2]^{1/2}$ e)

### Attempt any three questions from the following. Q.6

- Solve the equations. a)
- x + y z + s = 0, x y + 2z s = 0, 3x + y + s = 0
- b)
- If  $x = \frac{1}{2}(u^2 v^2)$ , y = uv and z = w find  $\frac{\partial(x,y,z)}{\partial(u,v,w)}$ If  $u = \log\left[\frac{x^3 + y^3}{x^2 + y^2}\right]$  then Prove that  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -1$ c)
- d) If  $u = e^{x^2 + y^2 + z^2}$  find the value of  $\frac{\partial^3 u}{\partial x \partial y \partial z}$
- e) Verify Cayley Hamilton Theorem for A where

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{pmatrix}$$

### Q.7 Attempt any two questions from the following.

Find the Eigen Values and Eigen Vector for the largest Eigen Value for a) (2 -1 1)

$$A = \begin{pmatrix} 1 & 2 & 1 \\ 1 & -1 & 2 \end{pmatrix}$$

- b) Find the stationary value xy(1 - x - y)
- If u = lx + my and v = ly mx and z is function of u, v then prove that. C)  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 u}{\partial v^2} = (l^2 + m^2) \left[ \frac{\partial^2 z}{\partial p^2} + \frac{\partial^2 q}{\partial v^2} \right]$

09

SLR-FM-1

Set

10

Time	e: 10:0	0 AM To 01:00 PM			
Instr	uctio	<b>ns:</b> 1) Q. No. 1 is compuls book.	ory and should b	e solved in first 30 mir	nutes in
		<ol> <li>2) Figures to the right</li> <li>3) Use of Non – program</li> </ol>	indicate full mark ammable calcula	s. tor is allowed.	
		MCQ/Ob	jective Type (	Questions	
Dura	tion: 3	30 Minutes			Μ
Q.1	<b>Cho</b> 1)	ose the correct alternative If zero is one of the eiger a) Singular c) Symmetric	<b>/es from the opt</b> n value of the ma b) d)	trix A then A is Non singular	senten
	2)	If $u = e^{xy^2z^3}$ then $\frac{\partial u}{\partial z} =$ a) $e^{xy^2z^3}xy^2z^3$ c) $e^{xy^2z^3}3xy^2z^2$	  b) d)	$e^{xy^2z^3}y^2z^3$ $e^{xy^2z^3}2xyz^3$	
	3)	If $g(x, y, z) = 0$ then the v a) $\frac{\frac{\partial x}{\partial g}}{\frac{\partial z}{\partial z}}$	value of $\frac{\partial z}{\partial x} = $ b)	$\frac{\frac{\partial y}{\partial x}}{\frac{\partial x}{\partial x}}$	
		c) $-\frac{\frac{\partial g}{\partial y}}{\frac{\partial g}{\partial z}}$	d)	$\frac{\partial g}{\partial g} - \frac{\frac{\partial g}{\partial x}}{\frac{\partial g}{\partial z}}$	
	4)	Consider the following te I) $JJ' - 1 = 0$ II) $J\left(\frac{u,v}{x,y}\right) \cdot J\left(\frac{x,y}{u,v}\right) - 1$	rms. = 0		

Inst answer

**ENGINÉERING MATHEMATICS - I** 

5)

Day & Date: Friday, 06-12-2019

Seat

No.

#### Q.1 ce. 14

- a) Both I and II are true b) c) II is true, I is false
  - I is true, II is false
  - Both I and II are false d)
- Which of the following is the relative error for u?
- δu δи b) a) 1+ 1 и и  $\frac{u}{\delta u}$ δи c) d) и
- The real part of  $[\sin(x) + i\cos(x)]^5 =$ \_\_\_\_\_ 6) a)  $\cos(5x)$ b)  $-\sin(5x)$ c)  $\sin(5x)$ d)  $-\cos(5x)$

# SLR-FM-1



Max. Marks: 70

Set

larks: 14

SLR-FM-1 Set S

7) 
$$\sin h^{-1} \frac{3}{4} =$$
.  
a)  $\log 1$  b)  $\log 2$   
c)  $\log 3$  d)  $\log 4$   
8)  $\log(1+i) =$ .  
a)  $\log 2 + i$  b)  $\frac{1}{2}\log 2 - i\frac{\pi}{4}$   
c)  $\frac{1}{2}\log 2 + i\frac{\pi}{4}$  d)  $\log 2 + i\frac{\pi}{4}$   
9) If  $y = \log x$  the  $y_n =$ .  
a)  $\frac{(-1)^n(n)!}{x^n}$  b)  $\frac{(-1)^n(n-1)!}{x^n}$   
c)  $\frac{(-1)^{n-1}(n)!}{x^{n+1}}$  d)  $\frac{(-1)^{n-1}(n-1)!}{x^n}$   
10) If  $y = 2^x x$  the  $y_n =$ .  
a)  $2^x [(\log 2)^n + n(\log 2)^{n-3}]$  b)  $2^x [(\log 2)^n + (\log 2)^{n-3}]$   
c)  $2^x [(\log 2)^n + n(\log 2)^{n-1}]$  d)  $2^x [(\log 2)^n + (\log 2)^{n-3}]$   
c)  $2^x [(\log 2)^n + n(\log 2)^{n-1}]$  d)  $2^x [(\log 2)^n + (\log 2)^{n-1}]$   
11) If  $L = \lim_{x \to 0} \frac{x - \sin x}{x^3}$  then  $L =$ .  
a)  $\frac{1}{6}$  b)  $6$   
c)  $\frac{-1}{6}$  d)  $0$   
12) The expansion of  $\log (1 + x^2) =$ .  
a)  $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$  b)  $-x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \dots$   
c)  $-x^2 - \frac{x^4}{2} - \frac{x^6}{3} - \frac{x^8}{4} - \dots$  d)  $x^2 - \frac{x^4}{2} + \frac{x^6}{3} - \frac{x^4}{4} + \dots$   
13) If Rank of matrix  $[A]_{3\times3}$  is 2, then the value of  $|A| =$ .  
a)  $1$  b)  $0$   
c)  $2$  d)  $-1$   
14) The system  $3x + 4y - 2z = 4$ ,  $6x + 8y - 4z = 10$  will have .....  
a) Unique solution  
b) No solution

c) Infinite Solution

d) Infinite solution with two independent parameters

Seat No.			Set	S
		F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2 ENGINEERING MATHEMATICS - I	019	
Day & Time:	& Da : 10:	te: Friday, 06-12-2019 00 AM To 01:00 PM	Max. Marks	: 56
Instru	uctio	<ul> <li>ons: 1) All questions are compulsory.</li> <li>2) Figures to the right indicate full marks.</li> <li>3) Use of Non – programmable calculator is allowed.</li> </ul>		
		Section – I		
Q.2	Atte a)	empt any three questions from the following. Find the nth derivative of $y = \frac{x-1}{x+1} + x^2 \sin x \cos x$ .		09
	b)	Simplify $\left(\frac{1+\cos\theta+i\sin\theta}{1+\cos\theta-i\sin\theta}\right)^{1000}$ .		
	c)	If $x = y(1 + y^2)$ Prove that $y = x - x^3 + 3x^5 +$		
	d)	Prove that $\tan h^{-1}x = \sin h^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$ .		
	e)	Expand $x^5 - 5x^4 + 6x^3 - 7x^2 + 8x - 9$ in power of $(x - 1)$ .		
Q.3	Att	empt any three questions from the following.		09
	a)	Prove that $\sin^{-1}(3x - 4x^3) = 3\left[x + \frac{x^3}{6} + \frac{3x^5}{40} + \cdots\right]$ .		
	b)	Solve $x^5 = 1 + i$ .		
	C)	Separate into real and imaginary parts $\sin^{-1}\left(\frac{3i}{4}\right)$ .		
	d) e)	Expand $\log(1 + e^x)$ in powers of x up to $x^2$ . Find the nth derivative of $y = e^{-x} \cdot x \cdot \cos x$ .		
Q.4	Att	empt any two questions from the following.		10
	a)	If $tan(\theta + i\phi) = tan \alpha + i \sec \alpha$ prove that		
		$\phi = \frac{1}{2}\log\cot\alpha/2$		
		and $\pi$		
		$2\theta = n\pi + \frac{\pi}{2} + \alpha$		
	b)	If $\sin^{-1}\left(\frac{y}{b}\right) = \log\left(\frac{x}{n}\right)^n$ then prove that		
	c)	$x^2 y_{n+2} + (2n+1)xy_{n+1} + 2n^2 y_n = 0$ Evaluate the limits		
	0)	a) $\lim_{x \to 0} \left[ \frac{1}{2x} - \frac{1}{x(e^{\pi x} + 1)} \right]$		
		b) $\lim_{x \to 0} \left[ \frac{a^x + b^x + c^x}{3} \right]^{1/x}$		

### Section - II

#### Q.5 Attempt any three questions from the following.

- Find the rank of the matrix by reducing it to Normal form. a)
  - $\begin{pmatrix} 3 & 2 & 1 & 4 \\ -1 & 3 & 2 & 2 \\ 2 & 5 & 3 & 6 \\ & & & 10 \end{pmatrix}$
- If 120 is divided into three numbers such that sum of their product taken at b) a time is maximum, find the numbers.
- If  $u = x^3 \sin^{-1} \left[ \frac{y}{x} \right] + y^4 \tan^{-1} \left[ \frac{y}{x} \right]$  then find the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ . c)
- Examine the vector for Linear Dependence and Independence. d) [1,1,1], [1,2,3], [2,3,8]
- Find the approximate value of  $[(0.98)^2 + (2.01)^3 + (1.94)^2]^{1/2}$ e)

#### Q.6 Attempt any three questions from the following.

- Solve the equations. a)
- x + y z + s = 0, x y + 2z s = 0, 3x + y + s = 0
- b)
- If  $x = \frac{1}{2}(u^2 v^2)$ , y = uv and z = w find  $\frac{\partial(x,y,z)}{\partial(u,v,w)}$ If  $u = \log\left[\frac{x^3 + y^3}{x^2 + y^2}\right]$  then Prove that  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -1$ c)
- If  $u = e^{x^2 + y^2 + z^2}$  find the value of  $\frac{\partial^3 u}{\partial x \partial y \partial z}$ d)
- e) Verify Cayley Hamilton Theorem for A where

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{pmatrix}$$

#### Q.7 Attempt any two questions from the following.

Find the Eigen Values and Eigen Vector for the largest Eigen Value for a) (2 -1 1)

$$A = \begin{pmatrix} 1 & 2 & 1 \\ 1 & -1 & 2 \end{pmatrix}$$

- b) Find the stationary value xy(1 - x - y)
- If u = lx + my and v = ly mx and z is function of u, v then prove that. C)  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 u}{\partial v^2} = (l^2 + m^2) \left[ \frac{\partial^2 z}{\partial p^2} + \frac{\partial^2 q}{\partial v^2} \right]$

09

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Set

Max. Marks: 70

Seat	
No.	

## F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 **APPLIED MECHANICS**

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

## MCQ/Objective Type Questions

**Duration: 30 Minutes** 

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- Composition of forces is nothing but \_\_\_\_ 1)
  - a) splitting of forces
  - c) both a & b are correct
- finding resultant forces b)
- none of these d)
- 2) 1 Kg force is equal to \_\_\_\_\_. a) 7.5 N 8.91 N b)
  - c) 9.81 N d) 8.55 N
- Angle made by resultant of normal reaction and frictional force with 3) vertical is called as \_\_\_\_\_.
  - a) angle of friction
    - c) both a & b

- b) angle of repose d) cone of friction
- 4) A couple produces \_\_\_\_\_. a) translatory motion
- rotational motion b)
- c) both translation & rotation d) no motion
- A framed structure of triangular shape is \_\_\_\_ 5)
  - a) perfect imperfect b) c) deficient d) redundant
- The geometrical center of lamina through which all area is supposed to 6) be acting is called as .
  - a) center of gravity b) center of mass
  - c) center of inertia d) centroid
- The M.I of a triangular section of base (b) & height (h) about on axis 7) through it's base is given as \_\_\_\_
  - bh<sup>3</sup>/18 a)  $bh^{3}/12$ b) c) bh<sup>3</sup>/36
    - bh<sup>3</sup>/64 d)

Marks: 14

# Set P

- If gravitational acceleration at any place is doubled then weight of body will be \_\_\_\_\_.
  - a) g/2 b) g
  - c)  $\sqrt{2g}$  d) 2g
- 9) In a rectilinear motion all the particles in body \_\_\_\_\_.
  - a) have same displacement b) have some velocity
  - c) have some acceleration d) all of these
- 10) D'Alembert's principle correlates \_\_\_\_\_
  - a) force, mass, velocity, and displacement
  - b) force, mass, and acceleration
  - c) force, time, mass and velocity
  - d) mass and velocity

## 11) Angular momentum is the product of \_\_\_\_\_.

- a) mass moment of inertia x angular velocity
- b) mass moment of inertia x angular acceleration
- c) mass normal of inertia x angular displacement
- d) none of these
- 12) The time rate of doing work is known as \_\_\_\_\_.
  - a) potential energy b) kinetic energy
  - c) rotational energy d) power
- 13) The bodies which regains their size and shape after impact are called \_\_\_\_\_.
  - a) plastic bodies
  - c) elastic bodies
- b) rigid bodiesd) partially plastic bodied
- 14) Impulse is measured in \_\_\_\_\_.
  - a) N-sec
    - c) N/ sec<sup>2</sup>

- b) N/sec
- d) N

F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019
APPLIED MECHANICS

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

Seat

No.

## **Instructions:** 1) All questions are compulsory.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

### Section – I

## Q.2 Attempt any four of the following questions.

- a) State and prove the Varignon's theorem.
- **b**) State and prove the Lami's theorem
- c) Enlist different types of supports and explain any two with neat sketches.
- d) Explain the concept of free body diagram with neat sketch.
- e) What are the different types of trusses explain any two with neat sketches.
- f) State and prove parallel axis theorem.

## Q.3 Attempt any two of the following questions.

a) Determine the resultant of the four forces acting tangentially to a circle of radius3m as shown in fig 1 below. Also determine location of resultant from center of circle.



12

16

SLR-FM-2

Set P

Max. Marks: 56

**b)** Find out forces in all members CD, DE, BD and AD of a truss as shown in fig.2 below



c) Find the moment of inertia of the section shown in fig. (3) About thecentroidal axis XX perpendicular to the web.





### Q.4 Attempt any four of the following questions.

- a) Derive the three equations of linear motion for a body moving with constant acceleration 'a'
- **b)** What is mean by relative velocity? Explain it with example.
- c) State and explain D' Alembert's principle of linear motion.
- d) Derive the equation of trajectory of a projectile.
- e) State and derive principle of work energy for linear motion
- f) State and explain principle of conservation of energy.

12

SLR-FM-2

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# Set P

## Q.5 Attempt any two of the following questions.

- a) A stone is dropped into a well is heard to strike the water after 6 seconds. Find depth of well, if the velocity of sound is 350 m/sec.
- **b)** Two bodies of weight 60 N and 40 N are connected to the two ends of alight inextensible string. The string is passing over a smooth pulley. Determine:
  - i) Acceleration of the system
  - ii) Tension in the string.
  - Use D' Alembert's principle
- c) A car moving on a straight level road skidded for a total distance of 60meters after the breaks were applied. Determine the speed of the car, just before the breaks were applied, if the co-efficient of friction between the car tyres and the road is 0.4. take  $g = 9.81 \text{ m/sec}^2$

Set

Max. Marks: 70

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Seat	
No.	

## F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 **APPLIED MECHANICS**

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

## MCQ/Objective Type Questions

**Duration: 30 Minutes** 

1)

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

b)

d)

- If gravitational acceleration at any place is doubled then weight of body will be
  - a) g/2
  - b) g c) √2g d) 2g
- 2) In a rectilinear motion all the particles in body .
  - a) have same displacement
  - c) have some acceleration
- D'Alembert's principle correlates \_ 3)
  - a) force, mass, velocity, and displacement
  - b) force, mass, and acceleration
  - c) force, time, mass and velocity
  - d) mass and velocity
- Angular momentum is the product of \_\_\_\_\_. 4)
  - a) mass moment of inertia x angular velocity
  - b) mass moment of inertia x angular acceleration
  - c) mass normal of inertia x angular displacement
  - d) none of these

### The time rate of doing work is known as \_\_\_\_\_ 5)

- a) potential energy b) kinetic energy
- c) rotational energy d) power
- The bodies which regains their size and shape after impact are called \_\_\_\_\_. 6)
  - a) plastic bodies

- rigid bodies b)
- c) elastic bodies d)
  - partially plastic bodied

have some velocity

all of these

Marks: 14

Set Q 7) Impulse is measured in \_\_\_\_\_. a) N-sec b) N /sec c) N/  $sec^2$ d) Ν Composition of forces is nothing but 8) a) splitting of forces finding resultant forces b) none of these c) both a & b are correct d) 1 Kg force is equal to \_\_\_\_\_. 9) a) 7.5 N b) 8.91 N c) 9.81 N d) 8.55 N Angle made by resultant of normal reaction and frictional force with 10) vertical is called as \_\_\_\_\_. a) angle of friction b) angle of repose c) both a & b cone of friction d) 11) A couple produces \_\_\_\_\_. a) translatory motion rotational motion b) c) both translation & rotation d) no motion A framed structure of triangular shape is 12) a) perfect imperfect b) c) deficient d) redundant The geometrical center of lamina through which all area is supposed to 13) be acting is called as \_\_\_\_\_. a) center of gravity b) center of mass c) center of inertia d) centroid The M.I of a triangular section of base (b) & height (h) about on axis 14) through it's base is given as \_\_\_\_\_. bh<sup>3</sup>/18 b) a)  $bh^{3}/12$ c)  $bh^{3}/36$ bh<sup>3</sup>/64 d)

SLR-FM-2

F.E. (Part – I)	(Old) (CBCS) I	Examination	Nov/Dec-2019
	APPLIED M	ECHANICS	

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

## **Instructions:** 1) All questions are compulsory.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

## Section – I

## Q.2 Attempt any four of the following questions.

- a) State and prove the Varignon's theorem.
- **b**) State and prove the Lami's theorem
- c) Enlist different types of supports and explain any two with neat sketches.
- d) Explain the concept of free body diagram with neat sketch.
- e) What are the different types of trusses explain any two with neat sketches.
- f) State and prove parallel axis theorem.

## Q.3 Attempt any two of the following questions.

a) Determine the resultant of the four forces acting tangentially to a circle of radius3m as shown in fig 1 below. Also determine location of resultant from center of circle.



12

16

SLR-FM-2

Max. Marks: 56

Set Q

Seat No. **b)** Find out forces in all members CD, DE, BD and AD of a truss as shown in fig.2 below



c) Find the moment of inertia of the section shown in fig. (3) About thecentroidal axis XX perpendicular to the web.





### Q.4 Attempt any four of the following questions.

- a) Derive the three equations of linear motion for a body moving with constant acceleration 'a'
- **b)** What is mean by relative velocity? Explain it with example.
- c) State and explain D' Alembert's principle of linear motion.
- d) Derive the equation of trajectory of a projectile.
- e) State and derive principle of work energy for linear motion
- f) State and explain principle of conservation of energy.

12

SLR-FM-2

Set Q

# Set Q

## Q.5 Attempt any two of the following questions.

- a) A stone is dropped into a well is heard to strike the water after 6 seconds. Find depth of well, if the velocity of sound is 350 m/sec.
- **b)** Two bodies of weight 60 N and 40 N are connected to the two ends of alight inextensible string. The string is passing over a smooth pulley. Determine:
  - i) Acceleration of the system
  - ii) Tension in the string.
  - Use D' Alembert's principle
- c) A car moving on a straight level road skidded for a total distance of 60meters after the breaks were applied. Determine the speed of the car, just before the breaks were applied, if the co-efficient of friction between the car tyres and the road is 0.4. take  $g = 9.81 \text{ m/sec}^2$

Set

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## F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 APPLIED MECHANICS

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

Instructions:	1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in
	answer book.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

## MCQ/Objective Type Questions

**Duration: 30 Minutes** 

## Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) A framed structure of triangular shape is \_\_\_\_\_.
  - a) perfect b) imperfect
  - c) deficient d) redundant
- The geometrical center of lamina through which all area is supposed to be acting is called as \_\_\_\_\_.
  - a) center of gravity b) center of mass
  - c) center of inertia d) centroid
- 3) The M.I of a triangular section of base (b) & height (h) about on axis through it's base is given as \_\_\_\_\_.
  - a)  $bh^{3}/12$  b)  $bh^{3}/18$
  - c)  $bh^{3}/36$  d)  $bh^{3}/64$
- If gravitational acceleration at any place is doubled then weight of body will be \_\_\_\_\_.
  - a) g/2 b) g
  - c) √2g d) 2g
- 5) In a rectilinear motion all the particles in body \_\_\_\_\_.
  - a) have same displacement b) have some velocity
  - c) have some acceleration d) all of these
- 6) D'Alembert's principle correlates \_\_\_\_\_
  - a) force, mass, velocity, and displacement
  - b) force, mass, and acceleration
  - c) force, time, mass and velocity
  - d) mass and velocity

Max. Marks: 70

Marks: 14

				Set	R
7)	Ang a) b) c) d)	gular momentum is the product of mass moment of inertia x angula mass moment of inertia x angula mass normal of inertia x angular none of these	ar velo ar acc displ	 ocity eleration acement	
8)	The a) c)	e time rate of doing work is knowr potential energy rotational energy	n as _ b) d)	kinetic energy power	
9)	The a) c)	bodies which regains their size a plastic bodies elastic bodies	and sl b) d)	hape after impact are called rigid bodies partially plastic bodied	
10)	lmp a) c)	oulse is measured in N – sec N/ sec <sup>2</sup>	b) d)	N /sec N	
11)	Cor a) c)	nposition of forces is nothing but splitting of forces both a & b are correct	b) d)	 finding resultant forces none of these	
12)	1 K a) c)	g force is equal to 7.5 N 9.81 N	b) d)	8.91 N 8.55 N	
13)	Ang vert a) c)	gle made by resultant of normal re tical is called as angle of friction both a & b	eactio b) d)	n and frictional force with angle of repose cone of friction	
14)	A c a)	ouple produces translatory motion	b)	rotational motion	

- c) both translation & rotation
- d) no motion

F.E. (Part – I) (Old) (CBCS)	Examination Nov/Dec-2019			
APPLIED MECHANICS				

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

Seat

No.

## **Instructions:** 1) All questions are compulsory.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

### Section – I

### Attempt any four of the following questions. Q.2

- State and prove the Varignon's theorem. a)
- b) State and prove the Lami's theorem
- Enlist different types of supports and explain any two with neat sketches. c)
- Explain the concept of free body diagram with neat sketch. d)
- e) What are the different types of trusses explain any two with neat sketches.
- State and prove parallel axis theorem. f)

### Attempt any two of the following questions. Q.3

Determine the resultant of the four forces acting tangentially to a circle of a) radius3m as shown in fig 1 below. Also determine location of resultant from center of circle.



12

Set

Max. Marks: 56

SLR-FM-2

**b)** Find out forces in all members CD, DE, BD and AD of a truss as shown in fig.2 below



c) Find the moment of inertia of the section shown in fig. (3) About thecentroidal axis XX perpendicular to the web.





### Q.4 Attempt any four of the following questions.

- a) Derive the three equations of linear motion for a body moving with constant acceleration 'a'
- **b)** What is mean by relative velocity? Explain it with example.
- c) State and explain D' Alembert's principle of linear motion.
- d) Derive the equation of trajectory of a projectile.
- e) State and derive principle of work energy for linear motion
- f) State and explain principle of conservation of energy.

12

SLR-FM-2

Set

R

# Set R

## Q.5 Attempt any two of the following questions.

- a) A stone is dropped into a well is heard to strike the water after 6 seconds. Find depth of well, if the velocity of sound is 350 m/sec.
- **b)** Two bodies of weight 60 N and 40 N are connected to the two ends of alight inextensible string. The string is passing over a smooth pulley. Determine:
  - i) Acceleration of the system
  - ii) Tension in the string.
  - Use D' Alembert's principle
- c) A car moving on a straight level road skidded for a total distance of 60meters after the breaks were applied. Determine the speed of the car, just before the breaks were applied, if the co-efficient of friction between the car tyres and the road is 0.4. take  $g = 9.81 \text{ m/sec}^2$

Set

Max. Marks: 70

S

Seat	
No.	

## F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 **APPLIED MECHANICS**

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

## MCQ/Objective Type Questions

**Duration: 30 Minutes** 

5)

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- D'Alembert's principle correlates 1)
  - a) force, mass, velocity, and displacement
  - b) force, mass, and acceleration
  - c) force, time, mass and velocity
  - d) mass and velocity

### 2) Angular momentum is the product of .

- a) mass moment of inertia x angular velocity
- b) mass moment of inertia x angular acceleration
- c) mass normal of inertia x angular displacement
- d) none of these
- The time rate of doing work is known as \_ 3)
  - a) potential energy kinetic energy b)
  - c) rotational energy d) power

### 4) The bodies which regains their size and shape after impact are called \_\_\_\_\_.

- a) plastic bodies rigid bodies b)
- c) elastic bodies d)
  - partially plastic bodied
- Impulse is measured in \_\_\_\_\_. a) N-sec N /sec b)
  - c) N/  $\sec^2$ d) Ν
- Composition of forces is nothing but 6)
  - a) splitting of forces
- finding resultant forces b) d)
- c) both a & b are correct
- none of these

Marks: 14

Set S 7) 1 Kg force is equal to \_\_\_\_\_. a) 7.5 N b) 8.91 N c) 9.81 N d) 8.55 N Angle made by resultant of normal reaction and frictional force with 8) vertical is called as \_\_\_\_\_. a) angle of friction b) angle of repose c) both a & b cone of friction d) A couple produces \_\_\_\_\_. 9) a) translatory motion b) rotational motion c) both translation & rotation d) no motion 10) A framed structure of triangular shape is \_\_\_\_ a) perfect imperfect b) c) deficient d) redundant 11) The geometrical center of lamina through which all area is supposed to be acting is called as \_\_\_\_\_. a) center of gravity b) center of mass c) center of inertia d) centroid The M.I of a triangular section of base (b) & height (h) about on axis 12) through it's base is given as bh<sup>3</sup>/18 a) bh<sup>3</sup>/12 b) c) bh<sup>3</sup>/36 d) bh<sup>3</sup>/64 If gravitational acceleration at any place is doubled then weight of body 13) will be \_\_\_\_\_. a) g/2 b) g c) √2g d) 2q In a rectilinear motion all the particles in body \_\_\_\_\_. 14) a) have same displacement

- c) have some acceleration
- b) have some velocity

SLR-FM-2

d) all of these

F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-201	19
APPLIED MECHANICS	

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

## **Instructions:** 1) All questions are compulsory.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

### Section – I

## Q.2 Attempt any four of the following questions.

- a) State and prove the Varignon's theorem.
- **b)** State and prove the Lami's theorem
- c) Enlist different types of supports and explain any two with neat sketches.
- d) Explain the concept of free body diagram with neat sketch.
- e) What are the different types of trusses explain any two with neat sketches.
- f) State and prove parallel axis theorem.

## Q.3 Attempt any two of the following questions.

a) Determine the resultant of the four forces acting tangentially to a circle of radius3m as shown in fig 1 below. Also determine location of resultant from center of circle.



16

12

Max. Marks: 56

SLR-FM-2

Set





**b)** Find out forces in all members CD, DE, BD and AD of a truss as shown in fig.2 below



c) Find the moment of inertia of the section shown in fig. (3) About thecentroidal axis XX perpendicular to the web.





### Q.4 Attempt any four of the following questions.

- a) Derive the three equations of linear motion for a body moving with constant acceleration 'a'
- **b)** What is mean by relative velocity? Explain it with example.
- c) State and explain D' Alembert's principle of linear motion.
- d) Derive the equation of trajectory of a projectile.
- e) State and derive principle of work energy for linear motion
- f) State and explain principle of conservation of energy.

# Set S

## Q.5 Attempt any two of the following questions.

- a) A stone is dropped into a well is heard to strike the water after 6 seconds. Find depth of well, if the velocity of sound is 350 m/sec.
- **b)** Two bodies of weight 60 N and 40 N are connected to the two ends of alight inextensible string. The string is passing over a smooth pulley. Determine:
  - i) Acceleration of the system
  - ii) Tension in the string.
  - Use D' Alembert's principle
- c) A car moving on a straight level road skidded for a total distance of 60meters after the breaks were applied. Determine the speed of the car, just before the breaks were applied, if the co-efficient of friction between the car tyres and the road is 0.4. take  $g = 9.81 \text{ m/sec}^2$
# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 BASIC ELECTRICAL ENGINEERING

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

**Duration: 30 Minutes** 

Seat

No.

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

- 2) Assume suitable data if necessary and mention it clearly.
- 3) Figures to the right indicate full marks.

#### MCQ/Objective Type Questions

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- If a network does not contain any energy source is called as \_\_\_\_\_
  - a) Bilateral network

c) Active network

- b) Unilateral networkd) Passive network
- 2) How much of unit of electric energy consumed in operating ten 50 watt bulbs for 5 hours per day for December 2006? \_\_\_\_\_ units.
  a) 80 b) 77
  - c) 77.5 d) 100

#### 3) Joule's law of electrical heating is given by \_\_\_\_\_

- a)  $H = I^2 Rt/J$ b) H = IRt/Jc)  $H = I^2 R/tJ$ d)  $H = I^2 I/Rt$
- A 25 W, 220V bulb and a 100 W. 220V bulb are joined in parallel and connected to 220V supply. Which bulb will glow more brightly?
   a) 25 W bulb
  - b) 100 W bulb
  - c) Bothwill glow with same brightness
  - d) Neither bulb will glow
- 5) The value of magnetic field strength required to wipe out the residual flux density is called as \_\_\_\_\_.
  - a) Retentivity b) Demagnetization
  - c) Coercive force d) Hysteresis loop
- 6) If a sinusoidal wave has a frequency of 50Hz with 15 A rms value. Which of the following equations represent this wave?
  - a) 15 sin 50 t b) 30 sin 314 t
  - c) 42.42 sin 314 t d) 21.21 sin 314 t
- 7) Average value of full cycle of symmetrical AC waveform is \_\_\_\_\_.
  - a) one b) 0.637
  - c) zero d) 0.707
- The impedance of purely capacitive circuit is given by \_\_\_\_\_.
  - a)  $z = R jX_c$ b)  $z = R + jX_c$ c)  $z = -jX_c$ d) z = R

SLR-FM-3



Max. Marks: 70

Marks: 14

			Set P
9)	The average power in R-L series cit	rcuit is	s given by
	a) V <sub>rms</sub> I <sub>rms</sub> cosφ c) Zero	b) d)	V <sub>rms</sub> I <sub>rms</sub> V <sub>rms</sub> I <sub>rms</sub> sinφ
10)	Three identical resistances connect three resistances are connected in power consumed will be	ed in delta a	star consume 4000w. If these across the same supply, the
	a) 4000W c) 8000W	b) d)	6000W 12000W
11)	For a balanced three phase system a) √3 V <sub>ph</sub> I <sub>ph</sub> cos Ø c) √3 V <sub>L</sub> I <sub>L</sub> cos Ø	the to b) d)	otal power consumed is given by V <sub>ph</sub> I <sub>ph</sub> cos Ø 3 V <sub>L</sub> I <sub>L</sub> cos Ø
12)	The emf induced in a transformer d a) Frequency c) Maximum flux	epenc b) d)	ls upon Number of turns All the above
13)	A 2000/200V, 20 KVA ideal transfor The number of primary turns is a) 440	rmer h  b)	660
14)	C) 550 When the load is removed the moto	d) vr that	330 will rup at the highest speed is
14)	the	n inai	will full at the highest speed is
	a) Shunt	b)	Series
	c) Cumulative compound	d)	Differentially compound

- c) Cumulative compound
- Differentially compound

Set

Seat	
No.	

## F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 BASIC ELECTRICAL ENGINEERING

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

#### Section – I

#### Q.2 Answer any four.

- a) A tungsten lamp filament has a temperature of 2050°c and a resistance of 500Ω when taking normal working current. Calculate the resistance of the filament when it has a temperature of 25°C. Temperature coefficient at 0°c is 0.005/°C.
- **b)** Define following terms:
  - 1) Cycle
  - 2) Time period
  - 3) Frequency
- c) Phase difference Define- MMF, magnetic flux density, magnetic field strength, reluctance.

4

d) Derive an expression for rms value of an AC quantity.

B

**e)** Find  $R_{AB}$  in the circuit, given in fig



a) Calculate the equivalent resistance between the terminals A and B in the network shown in figure below. All resistances are in ohm



NN 20Mm 10 C Max. Marks: 56

16

- b) A flux density of 1.2 T is required in 3 mm air gap of an electromagnet wound with 500 turns of wire and having an iron path of 125 cm. calculate the current required, assuming  $\mu_r$ = 1000 for iron and neglect leakage & fringing.
- c) Three voltages are represented by  $e_1 = 20 \sin(\omega t)$ ;  $e_2 = 30 \sin(\omega t \pi/4)$  $e_3 = 40\cos(\omega t + \pi/6)$  volts act together in a circuit. Find an expression for the resultant voltage. Draw phasor diagram for  $(e_1+e_2+e_3)$

#### Section – II

#### Q.4 Attempt any four.

- a) Explain resonance is R-L-C series circuit.
- **b)** An inductor coil connected to a supply of 250V, 50Hz and takes a current of 5A.The coil dissipates 750W. Calculate
  - 1) Power Factor
  - 2) Resistance of the coil
  - 3) Inductance of the coil.
- c) Derive the relation between line and phase voltages & currents in balanced delta connected 3-phase load.
- d) Derive an expression for induced emf in a transformer in terms of frequency, maximum flux and the number of turns on the winding.
- e) A single phase, 50Hz transformer has 1000 primary turns and 400 secondary turns. The net cross-sectional area of the core is 60 cm<sup>2</sup>. If the primary induced EMF is 1250V, Find
  - 1) Maximum flux density in the core
  - 2) emf induced in the secondary

#### Q.5 Attempt any two.

- a) A 40 KVA single phase transformer has iron loss of 450W. The full load copper loss is 850 watts. Calculate
  - 1) Efficiency at full load, 0.8 lagging p.f
  - 2) KVA supplied at maximum efficiency
  - 3) Maximum efficiency at 0.8 lagging p.f
- **b)** Discuss the different types of DC motor with suitable circuit diagram, voltage equation and applications.
- c) A choking coil and a pure resistor are connected in series across a supply of 230 V, 50 Hz. The voltage drop across the resistor is 100 V and that across the choking coil is 150 V. Find voltage drop across the inductance and resistance of the choking coil. Find resistance & Inductance if current is 1 A.

# SLR-FM-3



16

# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 BASIC ELECTRICAL ENGINEERING

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

**Duration: 30 Minutes** 

Seat

No.

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

- 2) Assume suitable data if necessary and mention it clearly.
- 3) Figures to the right indicate full marks.

#### MCQ/Objective Type Questions

# Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14 1) The impedance of purely capacitive circuit is given by .

Th	e impedance of purely ca	ipacitive circuit is given t	ру
a)	$z = R - jX_c$	b) $z = R +$	jX <sub>c</sub>
C)	$z = -jX_c$	d) $z = R$	

#### 2) The average power in R-L series circuit is given by \_\_\_\_\_.

a)	V <sub>rms</sub> I <sub>rms</sub> cosφ	b) \	/ <sub>rms</sub> I <sub>rms</sub>

- c) Zero d) V<sub>rms</sub>I<sub>rms</sub>sinφ
- Three identical resistances connected in star consume 4000w. If these three resistances are connected in delta across the same supply, the power consumed will be \_\_\_\_\_.
  - a) 4000W b) 6000W
  - c) 8000W d) 12000W
- 4) For a balanced three phase system the total power consumed is given by \_\_\_\_\_.
  - a)  $\sqrt{3} V_{ph} I_{ph} \cos \phi$  b)  $V_{ph} I_{ph} \cos \phi$
  - c)  $\sqrt{3} V_{L} I_{L} \cos \phi$  d)  $3 V_{L} I_{L} \cos \phi$
- 5) The emf induced in a transformer depends upon \_\_\_\_\_
  - a) Frequency b) Number of turns
  - c) Maximum flux d) All the above
- 6) A 2000/200V, 20 KVA ideal transformer has 66 turns in the secondary. The number of primary turns is \_\_\_\_\_.
  - a) 440 b) 660 c) 550 d) 330
- 7) When the load is removed the motor that will run at the highest speed is the \_\_\_\_\_.
  - a) Shunt b) Series
  - c) Cumulative compound d) Differentially compound
- If a network does not contain any energy source is called as \_\_\_\_\_
  - a) Bilateral networkb) Unilateral networkc) Active networkd) Passive network
- 9) How much of unit of electric energy consumed in operating ten 50 watt bulbs for 5 hours per day for December 2006? \_\_\_\_\_ units.
  - a) 80 b) 77 c) 77.5 d) 100

SLR-FM-3

Max. Marks: 70



Marks: 14

- у.
- ive Type Questi

SLR-FM-3 Set Q

- 10) Joule's law of electrical heating is given by \_\_\_\_\_.
  - a)  $H = I^2 Rt/J$  b) H = IRt/J
  - c)  $H = I^2 R / t J$  d)  $H = I^2 J / R t$
- 11) A 25 W, 220V bulb and a 100 W. 220V bulb are joined in parallel and connected to 220V supply. Which bulb will glow more brightly?
  - a) 25 W bulb
  - b) 100 W bulb

c) Coercive force

- c) Bothwill glow with same brightness
- d) Neither bulb will glow
- 12) The value of magnetic field strength required to wipe out the residual flux density is called as \_\_\_\_\_.
  - a) Retentivity b)
    - b) Demagnetizationd) Hysteresis loop
- 13) If a sinusoidal wave has a frequency of 50Hz with 15 A rms value. Which of the following equations represent this wave?
  - a) 15 sin 50 t

- b) 30 sin 314 t
- c) 42.42 sin 314 t d) 21.21 sin 314 t
- 14) Average value of full cycle of symmetrical AC waveform is \_\_\_\_\_.
  - a) one
  - c) zero

- b) 0.637
- d) 0.707

Set

Seat	
No.	

## F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 BASIC ELECTRICAL ENGINEERING

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

#### Section – I

#### Q.2 Answer any four.

- a) A tungsten lamp filament has a temperature of 2050°c and a resistance of 500Ω when taking normal working current. Calculate the resistance of the filament when it has a temperature of 25°C. Temperature coefficient at 0°c is 0.005/°C.
- **b)** Define following terms:
  - 1) Cycle
  - 2) Time period
  - 3) Frequency
- c) Phase difference Define- MMF, magnetic flux density, magnetic field strength, reluctance.

4

SA

d) Derive an expression for rms value of an AC quantity.

B

**e)** Find  $R_{AB}$  in the circuit, given in fig



a) Calculate the equivalent resistance between the terminals A and B in the network shown in figure below. All resistances are in ohm



10

Max. Marks: 56

16

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Page 8 of 16

- b) A flux density of 1.2 T is required in 3 mm air gap of an electromagnet wound with 500 turns of wire and having an iron path of 125 cm. calculate the current required, assuming  $\mu_r$ = 1000 for iron and neglect leakage & fringing.
- c) Three voltages are represented by  $e_1 = 20 \sin(\omega t)$ ;  $e_2 = 30 \sin(\omega t \pi/4)$  $e_3 = 40\cos(\omega t + \pi/6)$  volts act together in a circuit. Find an expression for the resultant voltage. Draw phasor diagram for  $(e_1+e_2+e_3)$

#### Section – II

#### Q.4 Attempt any four.

- a) Explain resonance is R-L-C series circuit.
- **b)** An inductor coil connected to a supply of 250V, 50Hz and takes a current of 5A.The coil dissipates 750W. Calculate
  - 1) Power Factor
  - 2) Resistance of the coil
  - 3) Inductance of the coil.
- c) Derive the relation between line and phase voltages & currents in balanced delta connected 3-phase load.
- d) Derive an expression for induced emf in a transformer in terms of frequency, maximum flux and the number of turns on the winding.
- e) A single phase, 50Hz transformer has 1000 primary turns and 400 secondary turns. The net cross-sectional area of the core is 60 cm<sup>2</sup>. If the primary induced EMF is 1250V, Find
  - 1) Maximum flux density in the core
  - 2) emf induced in the secondary

#### Q.5 Attempt any two.

- a) A 40 KVA single phase transformer has iron loss of 450W. The full load copper loss is 850 watts. Calculate
  - 1) Efficiency at full load, 0.8 lagging p.f
  - 2) KVA supplied at maximum efficiency
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- **b)** Discuss the different types of DC motor with suitable circuit diagram, voltage equation and applications.
- c) A choking coil and a pure resistor are connected in series across a supply of 230 V, 50 Hz. The voltage drop across the resistor is 100 V and that across the choking coil is 150 V. Find voltage drop across the inductance and resistance of the choking coil. Find resistance & Inductance if current is 1 A.

SLR-FM-3



16

# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 BASIC ELECTRICAL ENGINEERING

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

**Duration: 30 Minutes** 

Seat

No.

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

- 2) Assume suitable data if necessary and mention it clearly.
- 3) Figures to the right indicate full marks.

#### MCQ/Objective Type Questions

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- The value of magnetic field strength required to wipe out the residual flux density is called as \_\_\_\_\_.
  - a) Retentivityc) Coercive force

- b) Demagnetizationd) Hysteresis loop
- 2) If a sinusoidal wave has a frequency of 50Hz with 15 A rms value. Which of the following equations represent this wave?
  - a) 15 sin 50 t c) 42.42 sin 314 t d) 21.21 sin 314 t
- 3) Average value of full cycle of symmetrical AC waveform is \_\_\_\_\_.
  - a) one b) 0.637
  - c) zero d) 0.707
- 4) The impedance of purely capacitive circuit is given by \_\_\_\_\_. a)  $z = R - iX_c$  b)  $z = R + iX_c$ 
  - a)  $z = R jX_c$  b) c)  $z = -jX_c$  d)
  - c)  $z = -jX_c$  d) z = RThe average power in **P**-L series circuit is given by
- 5) The average power in R-L series circuit is given by \_\_\_\_\_.
  - a) V<sub>rms</sub> I<sub>rms</sub>cosφ b) V<sub>rms</sub> I<sub>rms</sub> c) Zero d) V<sub>rms</sub> I<sub>rms</sub>sinφ
- 6) Three identical resistances connected in star consume 4000w. If these three resistances are connected in delta across the same supply, the power consumed will be \_\_\_\_\_.
  - a) 4000W b) 6000W c) 8000W d) 12000W
- 7) For a balanced three phase system the total power consumed is given by \_\_\_\_\_.
  - a)  $\sqrt{3} V_{ph} I_{ph} \cos \phi$  b)  $V_{ph} I_{ph} \cos \phi$ 
    - c)  $\sqrt{3} V_L I_L \cos \phi$  d)  $3 V_L I_L \cos \phi$
- 8) The emf induced in a transformer depends upon \_\_\_\_\_.
  - a) Frequencyb) Number of turnsc) Maximum fluxd) All the above
- 9) A 2000/200V, 20 KVA ideal transformer has 66 turns in the secondary. The number of primary turns is \_\_\_\_\_.
  - a) 440 b) 660 c) 550 d) 330

SLR-FM-3 Set R

Max. Marks: 70

Marks: 14

10) When the load is removed the motor that will run at the highest speed is the \_\_\_\_\_. a) Shunt

- c) Cumulative compound
- Series b)
- d) Differentially compound

SLR-FM-3

Set

R

- 11) If a network does not contain any energy source is called as \_\_\_\_\_.
  - Bilateral network b) Unilateral network
  - c) Active network

a)

- d) Passive network
- How much of unit of electric energy consumed in operating ten 50 watt 12) bulbs for 5 hours per day for December 2006? \_\_\_\_\_ units.
  - a) 80 77 b)
  - c) 77.5 d) 100
- 13) Joule's law of electrical heating is given by .
  - a)  $H = I^2 R t / I$ b) H = IRt/I
  - c)  $H = I^2 R/t I$  $H = I^2 I/Rt$ d)
- A 25 W, 220V bulb and a 100 W. 220V bulb are joined in parallel and 14) connected to 220V supply. Which bulb will glow more brightly?
  - a) 25 W bulb
  - b) 100 W bulb
  - c) Bothwill glow with same brightness
  - d) Neither bulb will glow

Seat	
No.	
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## F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 BASIC ELECTRICAL ENGINEERING

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

#### Section – I

#### Q.2 Answer any four.

- a) A tungsten lamp filament has a temperature of  $2050^{\circ}$ c and a resistance of  $500\Omega$  when taking normal working current. Calculate the resistance of the filament when it has a temperature of  $25^{\circ}$ C. Temperature coefficient at  $0^{\circ}$ c is  $0.005/^{\circ}$ C.
- **b)** Define following terms:
  - 1) Cycle
  - 2) Time period
  - 3) Frequency
- c) Phase difference Define- MMF, magnetic flux density, magnetic field strength, reluctance.
- d) Derive an expression for rms value of an AC quantity.
- **e)** Find  $R_{AB}$  in the circuit, given in fig



a) Calculate the equivalent resistance between the terminals A and B in the network shown in figure below. All resistances are in ohm



PAR PAR B 10 C Max. Marks: 56

16



Page 12 of 16

- b) A flux density of 1.2 T is required in 3 mm air gap of an electromagnet wound with 500 turns of wire and having an iron path of 125 cm. calculate the current required, assuming  $\mu_r$ = 1000 for iron and neglect leakage & fringing.
- c) Three voltages are represented by  $e_1 = 20 \sin(\omega t)$ ;  $e_2 = 30 \sin(\omega t \pi/4)$  $e_3 = 40\cos(\omega t + \pi/6)$  volts act together in a circuit. Find an expression for the resultant voltage. Draw phasor diagram for  $(e_1+e_2+e_3)$

#### Section – II

#### Q.4 Attempt any four.

- a) Explain resonance is R-L-C series circuit.
- **b)** An inductor coil connected to a supply of 250V, 50Hz and takes a current of 5A.The coil dissipates 750W. Calculate
  - 1) Power Factor
  - 2) Resistance of the coil
  - 3) Inductance of the coil.
- c) Derive the relation between line and phase voltages & currents in balanced delta connected 3-phase load.
- d) Derive an expression for induced emf in a transformer in terms of frequency, maximum flux and the number of turns on the winding.
- e) A single phase, 50Hz transformer has 1000 primary turns and 400 secondary turns. The net cross-sectional area of the core is 60 cm<sup>2</sup>. If the primary induced EMF is 1250V, Find
  - 1) Maximum flux density in the core
  - 2) emf induced in the secondary

#### Q.5 Attempt any two.

- a) A 40 KVA single phase transformer has iron loss of 450W. The full load copper loss is 850 watts. Calculate
  - 1) Efficiency at full load, 0.8 lagging p.f
  - 2) KVA supplied at maximum efficiency
  - 3) Maximum efficiency at 0.8 lagging p.f
- **b)** Discuss the different types of DC motor with suitable circuit diagram, voltage equation and applications.
- c) A choking coil and a pure resistor are connected in series across a supply of 230 V, 50 Hz. The voltage drop across the resistor is 100 V and that across the choking coil is 150 V. Find voltage drop across the inductance and resistance of the choking coil. Find resistance & Inductance if current is 1 A.

# SLR-FM-3



16

Seat	
No.	

**Duration: 30 Minutes** 

## F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 **BASIC ELECTRICAL ENGINEERING**

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

- 2) Assume suitable data if necessary and mention it clearly.
- 3) Figures to the right indicate full marks.

## MCQ/Objective Type Questions

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

Three identical resistances connected in star consume 4000w. If these 1) three resistances are connected in delta across the same supply, the power consumed will be \_\_\_\_\_. 6000W b)

a) 4000W

- c) 8000W d) 12000W
- For a balanced three phase system the total power consumed is given by . 2)
  - a)  $\sqrt{3} V_{ph} I_{ph} \cos \emptyset$ b)  $V_{ph}I_{ph}\cos \phi$ c)  $\sqrt{3} V_L I_L \cos \phi$  $3 V_1 I_1 \cos \emptyset$ d)

#### 3) The emf induced in a transformer depends upon \_

- Frequency Number of turns a) b)
- Maximum flux d) All the above c)
- A 2000/200V, 20 KVA ideal transformer has 66 turns in the secondary. 4) The number of primary turns is
  - a) 440 b) 660 330
  - c) 550 d)
- When the load is removed the motor that will run at the highest speed is 5) the
  - a) Shunt b) Series c) Cumulative compound d) Differentially compound
- 6) If a network does not contain any energy source is called as
  - Bilateral network Unilateral network a) b)
    - c) Active network d) Passive network
- How much of unit of electric energy consumed in operating ten 50 watt 7) bulbs for 5 hours per day for December 2006? \_\_\_\_\_ units.
  - a) 80 b) 77
  - c) 77.5 d) 100
- 8) Joule's law of electrical heating is given by \_
  - a)  $H = I^2 R t / J$ H = IRt/Ib)
  - c)  $H = I^2 R/t I$ d)  $H = I^2 I/Rt$

Set

Max. Marks: 70

Marks: 14

- 9) A 25 W, 220V bulb and a 100 W. 220V bulb are joined in parallel and connected to 220V supply. Which bulb will glow more brightly?
  - 25 W bulb a)
  - b) 100 W bulb

c) Coercive force

- c) Bothwill glow with same brightness
- d) Neither bulb will glow
- 10) The value of magnetic field strength required to wipe out the residual flux density is called as \_\_\_\_\_.
  - Retentivitv b) a)
    - Demagnetization d) Hysteresis loop
- 11) If a sinusoidal wave has a frequency of 50Hz with 15 A rms value. Which of the following equations represent this wave?
  - a) 15 sin 50 t b) 30 sin 314 t
  - c) 42.42 sin 314 t d) 21.21 sin 314 t
- Average value of full cycle of symmetrical AC waveform is \_\_\_\_\_. 12)
  - a) one b) 0.637 c) zero d) 0.707
- 13) The impedance of purely capacitive circuit is given by \_\_\_\_\_.
  - a)  $z = R jX_c$ b)  $z = R + jX_c$
  - d) c)  $z = -jX_c$ z = R
- The average power in R-L series circuit is given by \_\_\_\_\_. 14)
  - a) V<sub>rms</sub> I<sub>rms</sub>cos φ b) V<sub>rms</sub>I<sub>rms</sub>
  - Zero c)

- d) V<sub>rms</sub>I<sub>rms</sub>sin¢

SLR-FM-3

Set S

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No.	

## F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 **BASIC ELECTRICAL ENGINEERING**

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

#### Section – I

#### Answer any four. Q.2

- A tungsten lamp filament has a temperature of 2050°c and a resistance of a)  $500\Omega$  when taking normal working current. Calculate the resistance of the filament when it has a temperature of 25°C. Temperature coefficient at 0°c is 0.005/°C.
- Define following terms: b)
  - 1) Cycle
  - Time period 2)
  - 3) Frequency
- Phase difference Define- MMF, magnetic flux density, magnetic field C) strength, reluctance.

4

SA

Derive an expression for rms value of an AC quantity. d)

B

Find  $R_{AB}$  in the circuit, given in fig e)



Calculate the equivalent resistance between the terminals A and B in the a) network shown in figure below. All resistances are in ohm



10

12

16

Set



Max. Marks: 56

Page 16 of 16

- b) A flux density of 1.2 T is required in 3 mm air gap of an electromagnet wound with 500 turns of wire and having an iron path of 125 cm. calculate the current required, assuming  $\mu_r$ = 1000 for iron and neglect leakage & fringing.
- c) Three voltages are represented by  $e_1 = 20 \sin (\omega t)$ ;  $e_2 = 30 \sin (\omega t \pi/4)$  $e_3 = 40\cos (\omega t + \pi/6)$  volts act together in a circuit. Find an expression for the resultant voltage. Draw phasor diagram for  $(e_1+e_2+e_3)$

#### Section – II

#### Q.4 Attempt any four.

- a) Explain resonance is R-L-C series circuit.
- **b)** An inductor coil connected to a supply of 250V, 50Hz and takes a current of 5A.The coil dissipates 750W. Calculate
  - 1) Power Factor
  - 2) Resistance of the coil
  - 3) Inductance of the coil.
- c) Derive the relation between line and phase voltages & currents in balanced delta connected 3-phase load.
- d) Derive an expression for induced emf in a transformer in terms of frequency, maximum flux and the number of turns on the winding.
- e) A single phase, 50Hz transformer has 1000 primary turns and 400 secondary turns. The net cross-sectional area of the core is 60 cm<sup>2</sup>. If the primary induced EMF is 1250V, Find
  - 1) Maximum flux density in the core
  - 2) emf induced in the secondary

#### Q.5 Attempt any two.

- a) A 40 KVA single phase transformer has iron loss of 450W. The full load copper loss is 850 watts. Calculate
  - 1) Efficiency at full load, 0.8 lagging p.f
  - 2) KVA supplied at maximum efficiency
  - 3) Maximum efficiency at 0.8 lagging p.f
- **b)** Discuss the different types of DC motor with suitable circuit diagram, voltage equation and applications.
- c) A choking coil and a pure resistor are connected in series across a supply of 230 V, 50 Hz. The voltage drop across the resistor is 100 V and that across the choking coil is 150 V. Find voltage drop across the inductance and resistance of the choking coil. Find resistance & Inductance if current is 1 A.



Set

# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 **BASIC MECHANICAL ENGINEERING**

Day & Date: Friday, 13-12-2019 Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Make suitable assumptions, if necessary and mention them clearly.
- 3) Figures to the right indicate full marks.
- 4) Use of log tables and non-programmable single memory calculator is allowed.

#### **MCQ/Objective Type Questions**

**Duration: 30 Minutes** 

Seat

No.

#### Choose the correct alternatives from the options and rewrite the sentence. Q.1 14

- During a cycle the heat transfer are given by: 120kJ, -60kJ, -48kJ, and 1) 12kJ the net work transfer the cycle is
  - 24000Nm 60000Nm a) b)
  - 12000Nm c)
- 2) In a refrigeration cycle the heat is rejected by a refrigerant in a \_\_\_\_\_.
  - a) Evaporator
  - c) Compressor d)
- 3) Area under the curve of PV diagram is
  - b) Heat Entropy a)
    - Work d) Pressure c)
- It is amount of heat required per kg of substance for phase transformation 4) - keeping temperature and pressure constant. b) Latent heat
  - Sensible heat a)
  - Specific heat c)
- According to kinetic theory of gasses \_ 5)
  - Temperature should rise during boiling a)
  - Temperature should fall during freezing b)
  - At absolute zero, there is absolutely no vibration of molecules C)
  - All of the above d)
- 6) During throttling process
  - internal energy does not change a)
  - b) pressure does not change
  - entropy does not change c)
  - enthalpy does not change d)
- For viscous discharge like oil which one pump is used? 7) Reciprocating pumps a)
  - b) Rotary-(Centrifugal) pump
  - c) gear pump d) None

SLR-FM-4



Marks: 14

Max. Marks: 70

- d) 4400Nm
- b) Condensor
  - Expansion valve

d) None of these

- 8) Draft tube is used for .
  - To increase kinetic energy water striking to turbine a)
  - To decrease pressure energy water leaving tailrace b)
  - To increase pressure energy water leaving tailrace C)
  - d) None of these
- 9) Compression ratio is \_\_\_\_\_.
  - a) total volume / swept volume
  - swept volume / total volume b)
  - swept volume / clearance volume c)
  - total volume / clearance volume d)

10) Sum of tensions when the belt is running on the pulley is \_\_\_\_\_.

- half the initial tension a)
- b) twice the initial tension
- more than twice the initial tension c)
- d) less than twice the initial tension
- 11) Which of the following is unitless?
  - a) Stress
- b) Strain
- c) Young's modulus d) Shear modulus
- In arc welding, the electric arc is produced between the work & the 12) electrode by \_\_\_\_
  - a) current flow

Both a & b

C)

c)

- b) voltage difference
- contact resistance
- d) all of these
- Which of the following filler material is used in brazing? 13)
  - Copper alloy a)
- b) lead-tin allov
- d) None of these
- 14) The process of removing material from face of work piece is called \_\_\_\_\_.
  - a) Chamfering

b) Knurling

Turning c)

d) Facing

SLR-FM-4

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### F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 BASIC MECHANICAL ENGINEERING

Day & Date: Friday, 13-12-2019

Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 2 and Q. No. 4 are shorts answer type question.

- 2) Q. 3 and Q. 5 are long answer type question.
- 3) Neat diagram must be drawn whenever necessary.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of log tables and non-programmable single memory calculator is allowed.

#### Section – I

#### Q.2 Answer any five of the following.

- a) State the limitations of First law of thermodynamics.
- b) What are the functions of following unit in thermal power plant?
  - 1) Condenser
  - 2) Economizer
  - 3) Cooling tower
  - 4) Air preheater
- c) Draw neat sketch of split air conditioner. State function of outside unit.
- d) Explain in detail Kaplan turbine.
- e) Explain working of lobe blower with neat sketch.
- f) By applying SFEE, derive an expression for velocity of fluid at the exit of nozzle.
- **g)** A closed system undergoes a thermodynamic cycle consisting of 4 processes. The following data gives the work and heat transfer for each of the process.

Process	Heat transfer in kJ/min	Work transfer in kJ/min
1 - 2	Nil	-10000
2 - 3	10000	Nil
3 - 4	-2000	14000
4 - 1	-6000	-2000

Show that the data is consistent with first law of thermodynamics and determine internal energy change for each process.

#### Q.3 Solve any one out of a) and b) and solve any two out of c) to f).

- A gas turbine was operated with a supply of 17 Kg of hot air per second with specific enthalpy of 1200KJ. The outgoing gas carries specific enthalpy of 360 KJ. The inlet and outlet velocities are 160 m/s and 50 m/s. Find the power developed by the turbine assuming heat carried away by cooling water = 2 KJ/sec.
- b) 0.2 m<sup>3</sup> of mixture of air and fuel at 1.2 bar and 60°C is compressed until its pressure becomes 12 bar according to low pV<sup>1.25</sup>= C then it is ignited at constant volume such that pressure becomes twice to that at the end of compression. Determine:
  - 1) Maximum temp
  - 2) Overall Work done

Max. Marks: 56

15

		SLR-FN	1-4
		Set	Ρ
	c)	Draw a neat sketch of steam power plant. Explain function of air-pre heater economiser and super heater.	04
	d)	How pumps are classified? Explain with the neat sketch the working centrifugal pump.	04
	e) f)	Derive an expression of work done for polytropic process. Explain in brief point function and path function with suitable examples.	04 04
		Section – II	
Q.4	Solv a) b) c)	<b>re any five out of seven.</b> Derive an expression for a thermal efficiency of Diesel cycle. Differentiate between two stroke and four stroke engine. Derive an expression for the speed ratio of a belt drive assuming thickness of belt.	15
	d)	Which are the different types of gears used in mechanical power transmission system? Explain Bevel gear and Worm and Worm wheel gear.	
	e) f) g)	Draw block diagram of lathe machine. Explain turning operation in short. Explain stepwise design process of any mechanical component. Differentiate between soldering and brazing.	
Q.5	Solv a)	<ul> <li><i>re</i> any one out of a) and b) and solve any two out of c) to f).</li> <li>An engine working on Otto cycle has total volume of a 0.45m<sup>3</sup>, pressure 1bar and temperature 27<sup>o</sup> C at the beginning of compression stroke. At the end of compression stroke the pressure is 11bar and 210KJ of heat is added at constant volume. Calculate.</li> <li>1) The pressure, temperature and volume at the salient point in the cycle 2) Work done</li> </ul>	13 05
	b)	A cross belt connects two pulleys of 50 cm and 90 cm radius. The distance between shafts is 2 m. The initial tension in the belt is 700 N. If the coefficient of friction between belt and pulley is 0.3. Find the power transmitted if the smaller pulley rotates at 800 rpm. Also calculate the length of the belt.	05
	c) d)	Sketch and describe in brief pillar drilling machine. Define factor of safety and explain the different modesof failure of mechanical components.	04 04
	e) f)	Explain with neat sketch oxyacetylene welding. Explain Aesthetic considerations in design.	04 04

## F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 **BASIC MECHANICAL ENGINEERING**

Day & Date: Friday, 13-12-2019 Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Make suitable assumptions, if necessary and mention them clearly.
- 3) Figures to the right indicate full marks.
- 4) Use of log tables and non-programmable single memory calculator is allowed.

#### MCQ/Objective Type Questions

**Duration: 30 Minutes** 

Seat No.

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- Draft tube is used for 1)
  - To increase kinetic energy water striking to turbine a)
  - To decrease pressure energy water leaving tailrace b)
  - c) To increase pressure energy water leaving tailrace
  - None of these d)

#### 2) Compression ratio is .

- a) total volume / swept volume
- swept volume / total volume b)
- swept volume / clearance volume c)
- total volume / clearance volume d)
- 3) Sum of tensions when the belt is running on the pulley is .
  - half the initial tension a)
  - b) twice the initial tension
  - more than twice the initial tension C)
  - less than twice the initial tension d)
- 4) Which of the following is unitless?
  - Stress b) Strain a) c)
    - Young's modulus d) Shear modulus
- In arc welding, the electric arc is produced between the work & the 5) electrode by
  - a) current flow
  - contact resistance C)
- b) voltage difference
- d) all of these
- Which of the following filler material is used in brazing? 6)
  - a) Copper alloy b) lead-tin alloy
  - c) Both a & b d) None of these
- The process of removing material from face of work piece is called . 7)
  - Chamfering a) Turning

c)

b) Knurling d) Facing



Marks: 14

 During a cycle the heat transfer are given by: 120kJ, -60kJ, -48kJ, and 12kJ the net work transfer the cycle is \_\_\_\_\_.

- a) 60000Nm b) 24000Nm
- c) 12000Nm d) 4400Nm
- 9) In a refrigeration cycle the heat is rejected by a refrigerant in a \_\_\_\_\_.
  - b) Condensor

SLR-FM-4

Set Q

- c) Compressor d) Expansion valve
- 10) Area under the curve of PV diagram is \_\_\_\_
  - a) Entropy b) Heat
  - c) Work d) Pressure
- 11) It is amount of heat required per kg of substance for phase transformation keeping temperature and pressure constant.
  - a) Sensible heat
- b) Latent heat
- c) Specific heat

Evaporator

a)

- d) None of these
- 12) According to kinetic theory of gasses \_\_\_\_
  - a) Temperature should rise during boiling
  - b) Temperature should fall during freezing
  - c) At absolute zero, there is absolutely no vibration of molecules
  - d) All of the above
- 13) During throttling process \_\_\_\_\_.
  - a) internal energy does not change
  - b) pressure does not change
  - c) entropy does not change
  - d) enthalpy does not change
- 14) For viscous discharge like oil which one pump is used?
  - a) Reciprocating pumps
- b) Rotary-(Centrifugal) pump

c) gear pump

d) None

Set

#### F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 BASIC MECHANICAL ENGINEERING

Day & Date: Friday, 13-12-2019

Time: 10:00 AM To 01:00 PM

Seat

No.

Instructions: 1) Q. No. 2 and Q. No. 4 are shorts answer type question.

- 2) Q. 3 and Q. 5 are long answer type question.
- 3) Neat diagram must be drawn whenever necessary.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of log tables and non-programmable single memory calculator is allowed.

#### Section – I

#### Q.2 Answer any five of the following.

- a) State the limitations of First law of thermodynamics.
- b) What are the functions of following unit in thermal power plant?
  - 1) Condenser
  - 2) Economizer
  - 3) Cooling tower
  - 4) Air preheater
- c) Draw neat sketch of split air conditioner. State function of outside unit.
- d) Explain in detail Kaplan turbine.
- e) Explain working of lobe blower with neat sketch.
- f) By applying SFEE, derive an expression for velocity of fluid at the exit of nozzle.
- **g)** A closed system undergoes a thermodynamic cycle consisting of 4 processes. The following data gives the work and heat transfer for each of the process.

Process	Heat transfer in kJ/min	Work transfer in kJ/min
1 - 2	Nil	-10000
2 - 3	10000	Nil
3 - 4	-2000	14000
4 - 1	-6000	-2000

Show that the data is consistent with first law of thermodynamics and determine internal energy change for each process.

#### Q.3 Solve any one out of a) and b) and solve any two out of c) to f).

- A gas turbine was operated with a supply of 17 Kg of hot air per second with specific enthalpy of 1200KJ. The outgoing gas carries specific enthalpy of 360 KJ. The inlet and outlet velocities are 160 m/s and 50 m/s. Find the power developed by the turbine assuming heat carried away by cooling water = 2 KJ/sec.
- **b)** 0.2 m<sup>3</sup> of mixture of air and fuel at 1.2 bar and 60°C is compressed until its **05** pressure becomes 12 bar according to low  $pV^{1.25}$ = C then it is ignited at constant volume such that pressure becomes twice to that at the end of compression. Determine:
  - 1) Maximum temp
  - 2) Overall Work done

Max. Marks: 56

15

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		Set	Q
	c)	Draw a neat sketch of steam power plant. Explain function of air-pre heater economiser and super heater.	04
	d)	How pumps are classified? Explain with the neat sketch the working centrifugal pump.	04
	e) f)	Derive an expression of work done for polytropic process. Explain in brief point function and path function with suitable examples.	04 04
		Section – II	
Q.4	Solv	ve any five out of seven.	15
	a)	Derive an expression for a thermal efficiency of Diesel cycle.	
	b)	Differentiate between two stroke and four stroke engine.	
	c)	Derive an expression for the speed ratio of a belt drive assuming thickness of belt.	
	d)	Which are the different types of gears used in mechanical power transmission system? Explain Bevel gear and Worm and Worm wheel gear.	
	e)	Draw block diagram of lathe machine. Explain turning operation in short.	
	f)	Explain stepwise design process of any mechanical component.	
	g)	Differentiate between soldering and brazing.	
Q.5	Solv	e any one out of a) and b) and solve any two out of c) to f).	13
	a)	An engine working on Otto cycle has total volume of a $0.45m^3$ , pressure 1bar and temperature $27^0$ C at the beginning of compression stroke. At the end of compression stroke the pressure is 11bar and 210KJ of heat is added at constant volume. Calculate.	05
		1) The pressure, temperature and volume at the salient point in the cycle	
	L.)	2) Work done	05
	D)	A cross belt connects two pulleys of 50 cm and 90 cm radius. The distance between shafts is 2 m. The initial tension in the belt is 700 N. If the coefficient of friction between belt and pulley is 0.3. Find the power transmitted if the smaller pulley rotates at 800 rpm. Also calculate the length of the belt.	05
	C)	Sketch and describe in brief pillar drilling machine.	04
	d)	Define factor of safety and explain the different modes of failure of mechanical components.	04
	e)	Explain with neat sketch oxyacetylene welding.	04
	f)	Explain Aesthetic considerations in design.	04

# Set

# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 BASIC MECHANICAL ENGINEERING

Day & Date: Friday, 13-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Make suitable assumptions, if necessary and mention them clearly.
- 3) Figures to the right indicate full marks.
- 4) Use of log tables and non-programmable single memory calculator is allowed.

#### MCQ/Objective Type Questions

**Duration: 30 Minutes** 

Seat

No.

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) According to kinetic theory of gasses \_
  - a) Temperature should rise during boiling
  - b) Temperature should fall during freezing
  - c) At absolute zero, there is absolutely no vibration of molecules
  - d) All of the above
- 2) During throttling process \_\_\_\_\_
  - a) internal energy does not change
  - b) pressure does not change
  - c) entropy does not change
  - d) enthalpy does not change
- 3) For viscous discharge like oil which one pump is used?
  - a) Reciprocating pumps b) Rotary-(Centrifugal) pump
  - c) gear pump d) None
- Draft tube is used for \_\_\_\_\_
  - a) To increase kinetic energy water striking to turbine
  - b) To decrease pressure energy water leaving tailrace
  - c) To increase pressure energy water leaving tailrace
  - d) None of these
- 5) Compression ratio is \_\_\_\_\_.
  - a) total volume / swept volume
  - b) swept volume / total volume
  - c) swept volume / clearance volume
  - d) total volume / clearance volume
- 6) Sum of tensions when the belt is running on the pulley is \_\_\_\_\_.
  - a) half the initial tension
  - b) twice the initial tension
  - c) more than twice the initial tension
  - d) less than twice the initial tension
- 7) Which of the following is unitless?
  - a) Stress
  - c) Young's modulus
- b) Strain
- d) Shear modulus

Max. Marks: 70

Marks: 14

Set R

SLR-FM-4

- 8) In arc welding, the electric arc is produced between the work & the electrode by \_\_\_\_ \_. b) voltage difference
  - a) current flow
  - c) contact resistance
- 9) Which of the following filler material is used in brazing?
  - Copper alloy b) lead-tin alloy a)
  - Both a & b None of these c) d)
- The process of removing material from face of work piece is called \_\_\_\_\_. 10)
  - Chamfering a)

Turning

C)

C)

b) Knurling

d) all of these

- d) Facing
- During a cycle the heat transfer are given by: 120kJ, -60kJ, -48kJ, and 11) 12kJ the net work transfer the cycle is \_
  - a) 60000Nm 24000Nm b) c)
    - 12000Nm d) 4400Nm
- In a refrigeration cycle the heat is rejected by a refrigerant in a \_\_\_\_\_. 12)
  - Evaporator a) Compressor
- b) Condensor d) Expansion valve
- 13) Area under the curve of PV diagram is
  - b) Heat a) Entropy
  - Work d) Pressure C)
- It is amount of heat required per kg of substance for phase transformation 14) - keeping temperature and pressure constant.
  - a) Sensible heat

- b) Latent heat
- Specific heat C)
- d) None of these

SLR-FM-4 Set R

Set

Seat	
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#### F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 BASIC MECHANICAL ENGINEERING

Day & Date: Friday, 13-12-2019

Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 2 and Q. No. 4 are shorts answer type question.

- 2) Q. 3 and Q. 5 are long answer type question.
- 3) Neat diagram must be drawn whenever necessary.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of log tables and non-programmable single memory calculator is allowed.

#### Section – I

#### Q.2 Answer any five of the following.

- a) State the limitations of First law of thermodynamics.
- b) What are the functions of following unit in thermal power plant?
  - 1) Condenser
  - 2) Economizer
  - 3) Cooling tower
  - 4) Air preheater
- c) Draw neat sketch of split air conditioner. State function of outside unit.
- d) Explain in detail Kaplan turbine.
- e) Explain working of lobe blower with neat sketch.
- f) By applying SFEE, derive an expression for velocity of fluid at the exit of nozzle.
- **g)** A closed system undergoes a thermodynamic cycle consisting of 4 processes. The following data gives the work and heat transfer for each of the process.

Process	Heat transfer in kJ/min	Work transfer in kJ/min
1 - 2	Nil	-10000
2 - 3	10000	Nil
3 - 4	-2000	14000
4 - 1	-6000	-2000

Show that the data is consistent with first law of thermodynamics and determine internal energy change for each process.

#### Q.3 Solve any one out of a) and b) and solve any two out of c) to f).

- A gas turbine was operated with a supply of 17 Kg of hot air per second with specific enthalpy of 1200KJ. The outgoing gas carries specific enthalpy of 360 KJ. The inlet and outlet velocities are 160 m/s and 50 m/s. Find the power developed by the turbine assuming heat carried away by cooling water = 2 KJ/sec.
- b) 0.2 m<sup>3</sup> of mixture of air and fuel at 1.2 bar and 60°C is compressed until its pressure becomes 12 bar according to low pV<sup>1.25</sup>= C then it is ignited at constant volume such that pressure becomes twice to that at the end of compression. Determine:
  - 1) Maximum temp
  - 2) Overall Work done

Max. Marks: 56

15

		SLR-FM-4		
		Set	R	
	c)	Draw a neat sketch of steam power plant. Explain function of air-pre heater economiser and super heater.	04	
	d)	How pumps are classified? Explain with the neat sketch the working centrifugal pump.	04	
	e) f)	Derive an expression of work done for polytropic process. Explain in brief point function and path function with suitable examples.	04 04	
		Section – II		
Q.4	Solv a) b) c) d) e)	<ul> <li>ve any five out of seven.</li> <li>Derive an expression for a thermal efficiency of Diesel cycle.</li> <li>Differentiate between two stroke and four stroke engine.</li> <li>Derive an expression for the speed ratio of a belt drive assuming thickness of belt.</li> <li>Which are the different types of gears used in mechanical power transmission system? Explain Bevel gear and Worm and Worm wheel gear.</li> <li>Draw block diagram of lathe machine. Explain turning operation in short.</li> </ul>	15	
	g)	Differentiate between soldering and brazing.		
Q.5	Solv a)	<ul> <li>An engine working on Otto cycle has total volume of a 0.45m<sup>3</sup>, pressure 1bar and temperature 27<sup>o</sup> C at the beginning of compression stroke. At the end of compression stroke the pressure is 11bar and 210KJ of heat is added at constant volume. Calculate.</li> <li>1) The pressure, temperature and volume at the salient point in the cycle 2) Work done</li> </ul>	13 05	
	b)	A cross belt connects two pulleys of 50 cm and 90 cm radius. The distance between shafts is 2 m. The initial tension in the belt is 700 N. If the coefficient of friction between belt and pulley is 0.3. Find the power transmitted if the smaller pulley rotates at 800 rpm. Also calculate the length of the belt.	05	
	c) d)	Sketch and describe in brief pillar drilling machine. Define factor of safety and explain the different modes of failure of mechanical components.	04 04	
	e) f)	Explain with neat sketch oxyacetylene welding. Explain Aesthetic considerations in design.	04 04	

# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 **BASIC MECHANICAL ENGINEERING**

Day & Date: Friday, 13-12-2019 Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Make suitable assumptions, if necessary and mention them clearly.
- 3) Figures to the right indicate full marks.
- 4) Use of log tables and non-programmable single memory calculator is allowed.

#### **MCQ/Objective Type Questions**

**Duration: 30 Minutes** 

c)

a)

C)

a)

C)

Seat No.

#### Choose the correct alternatives from the options and rewrite the sentence. Q.1 14

- Sum of tensions when the belt is running on the pulley is . 1)
  - half the initial tension a)
  - twice the initial tension b)
  - C) more than twice the initial tension
  - less than twice the initial tension d)
- 2) Which of the following is unitless?
  - a) Stress b) Strain
  - Young's modulus d) Shear modulus c)
- In arc welding, the electric arc is produced between the work & the 3) electrode by
  - current flow a)
    - b) voltage difference d) all of these contact resistance
- 4) Which of the following filler material is used in brazing?
  - Copper alloy b) lead-tin alloy a)
    - Both a & b d) None of these C)
- The process of removing material from face of work piece is called \_\_\_\_\_. 5)
  - Chamfering b) Knurling
  - Turning d) Facing
- 6) During a cycle the heat transfer are given by: 120kJ, -60kJ, -48kJ, and 12kJ the net work transfer the cycle is
  - 60000Nm b) 24000Nm a)
  - c) 12000Nm d) 4400Nm
- In a refrigeration cycle the heat is rejected by a refrigerant in a \_\_\_\_\_. 7)
  - b) Condensor d) Expansion valve
- Area under the curve of PV diagram is \_\_\_\_\_ 8)

Evaporator

Compressor

- b) Heat a) Entropy
  - c) Work d) Pressure

SLR-FM-4



Max. Marks: 70

Marks: 14

- It is amount of heat required per kg of substance for phase transformation
   keeping temperature and pressure constant.
  - a) Sensible heat
  - c) Specific heat

b) Latent heatd) None of these

SLR-FM-4

Set

- 10) According to kinetic theory of gasses \_\_\_\_\_
  - a) Temperature should rise during boiling
  - b) Temperature should fall during freezing
  - c) At absolute zero, there is absolutely no vibration of molecules
  - d) All of the above
- 11) During throttling process \_\_\_\_\_
  - a) internal energy does not change
  - b) pressure does not change
  - c) entropy does not change
  - d) enthalpy does not change
- 12) For viscous discharge like oil which one pump is used?
  - a) Reciprocating pumps
- b) Rotary-(Centrifugal) pumpd) None
- c) gear pump
- u) None
- 13) Draft tube is used for \_\_\_\_\_
  - a) To increase kinetic energy water striking to turbine
  - b) To decrease pressure energy water leaving tailrace
  - c) To increase pressure energy water leaving tailrace
  - d) None of these
- 14) Compression ratio is \_\_\_\_\_.
  - a) total volume / swept volume
  - b) swept volume / total volume
  - c) swept volume / clearance volume
  - d) total volume / clearance volume

## F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 BASIC MECHANICAL ENGINEERING

Day & Date: Friday, 13-12-2019

Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 2 and Q. No. 4 are shorts answer type question.

- 2) Q. 3 and Q. 5 are long answer type question.
- 3) Neat diagram must be drawn whenever necessary.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of log tables and non-programmable single memory calculator is allowed.

#### Section – I

#### Q.2 Answer any five of the following.

- a) State the limitations of First law of thermodynamics.
- b) What are the functions of following unit in thermal power plant?
  - 1) Condenser
  - 2) Economizer
  - 3) Cooling tower
  - 4) Air preheater
- c) Draw neat sketch of split air conditioner. State function of outside unit.
- d) Explain in detail Kaplan turbine.
- e) Explain working of lobe blower with neat sketch.
- f) By applying SFEE, derive an expression for velocity of fluid at the exit of nozzle.
- **g)** A closed system undergoes a thermodynamic cycle consisting of 4 processes. The following data gives the work and heat transfer for each of the process.

Process	Heat transfer in kJ/min	Work transfer in kJ/min
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3 - 4	-2000	14000
4 - 1	-6000	-2000

Show that the data is consistent with first law of thermodynamics and determine internal energy change for each process.

#### Q.3 Solve any one out of a) and b) and solve any two out of c) to f).

- A gas turbine was operated with a supply of 17 Kg of hot air per second with specific enthalpy of 1200KJ. The outgoing gas carries specific enthalpy of 360 KJ. The inlet and outlet velocities are 160 m/s and 50 m/s. Find the power developed by the turbine assuming heat carried away by cooling water = 2 KJ/sec.
- **b)** 0.2 m<sup>3</sup> of mixture of air and fuel at 1.2 bar and 60°C is compressed until its **05** pressure becomes 12 bar according to low  $pV^{1.25}$ = C then it is ignited at constant volume such that pressure becomes twice to that at the end of compression. Determine:
  - 1) Maximum temp
  - 2) Overall Work done

Max. Marks: 56

15

13 05



Seat No.

		SLR-FM-4		
		Set	S	
	c)	Draw a neat sketch of steam power plant. Explain function of air-pre heater economiser and super heater.	04	
	d)	How pumps are classified? Explain with the neat sketch the working centrifugal pump.	04	
	e) f)	Derive an expression of work done for polytropic process. Explain in brief point function and path function with suitable examples.	04 04	
		Section – II		
Q.4	Solv a) b) c) d) e) f) g)	<ul> <li><b>Pe any five out of seven.</b></li> <li>Derive an expression for a thermal efficiency of Diesel cycle.</li> <li>Differentiate between two stroke and four stroke engine.</li> <li>Derive an expression for the speed ratio of a belt drive assuming thickness of belt.</li> <li>Which are the different types of gears used in mechanical power transmission system? Explain Bevel gear and Worm and Worm wheel gear.</li> <li>Draw block diagram of lathe machine. Explain turning operation in short.</li> <li>Explain stepwise design process of any mechanical component.</li> <li>Differentiate between soldering and brazing.</li> </ul>	15	
Q.5	Solv a)	<ul> <li>An engine working on Otto cycle has total volume of a 0.45m<sup>3</sup>, pressure 1bar and temperature 27<sup>0</sup> C at the beginning of compression stroke. At the end of compression stroke the pressure is 11bar and 210KJ of heat is added at constant volume. Calculate.</li> <li>1) The pressure, temperature and volume at the salient point in the cycle 2) Work done</li> </ul>	13 05	
	b)	A cross belt connects two pulleys of 50 cm and 90 cm radius. The distance between shafts is 2 m. The initial tension in the belt is 700 N. If the coefficient of friction between belt and pulley is 0.3. Find the power transmitted if the smaller pulley rotates at 800 rpm. Also calculate the length of the belt.	05	
	c) d)	Define factor of safety and explain the different modes of failure of mechanical components.	04 04	
	e) f)	Explain with neat sketch oxyacetylene welding. Explain Aesthetic considerations in design.	04 04	

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Seat No.							Set	Ρ
	E١	F.E. (Part – I) IGINEERING I	(Old) (CBCS) E PHYSICS – I & I	xami ENGI	nation Nov NEERING F	/Dec-2019 PHYSICS -	- 11	
Day & Time:	Date: 10:00	Monday, 16-12- AM To 01:00 PM	2019 1			Ma	x. Marks	s: 70
Instru Const	ction ant: 1	<b>s:</b> 1) Question No answer bool 2) Figures to th 3) Assume suit 1) $N_A = 6.02 \times 10^2$ 2) $e = 1.6 \times 10^{-19}$ 3) $c = 3 \times 10^8$ m/s	o. 1 is compulsory. k. ne right indicate full table data if necess <sup>26</sup> / K mol. C	It sho   mark sary.	uld be solved s.	in first 30 mi	nutes ir	1
		M	CQ/Objective Ty	ype (	Questions			
Duratio	on: 30	) Minutes					Marks	s: 14
Q.1 (	<b>Choo</b> 1)	se the correct al When a Pure Sei a) Goes up b) Goes down c) Remains the d) Initially goes	ni conductor is hea same down and then goo	ne opt ated, if es up	i <b>ons.</b> i's resistance <sub>.</sub>	·		14
2	2)	The relation of ar a) $\alpha = \beta = \gamma =$ c) $\alpha \neq \beta \neq \gamma \neq$	ngle between axes 90° 90°	of a tr b) d)	ficlinic crystal $\alpha \neq \beta = \gamma = \alpha = \beta = \gamma \neq \beta$	system is 90° 90°		
(	3)	The miller indices a) (100) c) (001)	s of the plane paral	lel to t b) d)	the x-axis and (010) (111)	y-axis are _		
2	4)	According to Sab a) Surface area c) Absorption c	vine reverberation ti u oefficient	ime is b) d)	directly propo Volume All of the abo	ortional to		
Į	5)	The acoustic differt a) Wavelength b) Wavelength c) Wavelength d) Velocity of lig	raction method is u of light of ultra-sonic wave of acoustic waves ght	sed to s	determine th	e		
e	6)	According to Eins a) Depends on b) Variable c) Depends on d) A constant	stein, Velocity of lig direction of propag velocity of source a	ht in f ation and ot	ree space is _ oserver			
7	7)	The length of the same, when a) $v = c$ c) $v \le c$	rod moving with ve 	elocity b) d)	v << c v << c $v \ge c$	the observer	is	

#### The resolving power of grating having N slits in n<sup>th</sup> order will be \_\_\_\_\_. 8)

- a) (n+N)
- (n-N)c) *n*.*N* d) n/N
- Prof. R.N. Hall invented \_\_\_\_\_ laser. 9)
  - a) He-Ne Laser Co<sub>2</sub> laser b)
  - c) Semiconductor laser d) Nd: YAG laser

Working principle of laser requires an application of \_\_\_\_\_ nature of light. 10)

- a) Chemical b) c) Classical

#### The optical fibers are based on the principle of \_\_\_\_\_. 11)

- a) Diffraction c) Refraction d) Total internal reflection
- 12) The innermost region of optical fiber which guides light is known as \_\_\_\_\_.
  - a) Core b)
  - c) Sheath d)
- 13) The nuclei suitable for fusion process are \_
  - a) Light nuclei
  - c) Any nuclei
- Heavy nuclei b) d)
- At the middle of periodic table
- 14) The energy released during fission is known as \_\_\_\_
  - Chemical energy a)
  - c) Nuclear energy
- Radiation energy b)
- d) Electrical energy



SLR-FM-5

- Particle
- Wave d)

b)

- b)
  - Reflection

  - Clad
    - Coating

Seat	
No.	

#### F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 ENGINEERING PHYSICS – I & ENGINEERING PHYSICS – II

Day & Date: Monday, 16-12-2019 Time: 10:00 AM To 01:00 PM

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

2) Assume suitable data if necessary.

**Constant:** 1)  $N_A = 6.02 \times 10^{26}$  / K mol. 2)  $e = 1.6 \times 10^{-19}$  C 3)  $c = 3 \times 10^8$  m/s

#### Section – I

#### Q.2 Solve any five.

- a) Derive the equation for length contraction.
- **b)** The hall coefficient (R<sub>H</sub>) of a specimen is 3.66 x 10<sup>-4</sup> m<sup>3</sup>/c. Its resistivity is 8.33 x 10<sup>-3</sup>  $\Omega$  m. Find mobility ' $\mu$ 'and concentration 'n'
- c) Define the terms.
  - 1) Lattice
  - 2) Basis
  - 3) Unit cell
- d) What is atomic radius? Calculate it for BCC.
- e) A particle is moving with speed of 0.5 c. Calculate the ratio of the rest mass and the mass while in motion.
- f) State essential features of an acoustically good hall.
- g) State properties of ultrasonic waves.

#### Q.3 Solve any one of the following.

 What is Hall effect? Derive an expression for Hall Voltage and Hall Coefficient.

#### OR

b) Derive an expression for relativistic variation of mass with velocity.

#### Q.4 Solve any two

- a) Define Fermi-energy. Derive an expression for Fermi energy in intrinsic semiconductors.
- **b)** What is atomic packing factor? Calculate it for SC, BCC and FCC.
- c) The volume of a room is 1200m<sup>3</sup>. The wall area of the room is 220m<sup>2</sup>. The floor area is 120m<sup>2</sup> and the ceiling area of 120m<sup>2</sup>. The average sound absorption coefficient

1) For walls is 0.03, for ceiling 0.80 and for the floor is 0.06. Calculate the average sound absorption coefficient and the reverberation time.

#### Section – II

#### Q.5 Solve any five

- a) Distinguish between Fresnel and Fraunhoffer diffraction.
- b) A grating of width 2 inch is ruled with 15,000 LPI. Find the smallest wavelength separation that can be resolved in second order at a mean wave length of 5000A°.

Max. Marks: 56

08

05

15

#### c) Explain

- 1) Stimulated absorption
- 2) Stimulated emission
- d) What are the advantages of optical fiber?
- e) What are the different types of nanotubes? Classify on the basis of chirality.
- f) Determine energy released by 1 kg of U<sup>235</sup> during the process of nuclear fission by a slow neutron.
- **g)** A 20 cm long glass tube containing sugar solution rotates the plane of polarization by 11°. If the specific rotation of sugar is 66°. Calculate the strength of the solution.

#### Q.6 Solve any one of the following

05

80

a) Explain the design, working and function of each part of the nuclear fission reactors.

#### OR

**b)** Explain in details the construction, working of He-Ne gas laser. Why middle portion of gas discharge tube is narrow?

#### Q.7 Solve any two.

- a) Write a note on resolving power of diffraction grating.
- **b)** Write a note on Semiconductor laser.
- c) Write down classification of different types of nuclear reactors.
- **d)** Write a note on application of optical fiber in communication system, medical and industrial field.
|                 |                             |                                                                                                                                                                                                                                              |                                       | SLR-FM                                                                                                               | -5       |
|-----------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------|
| Seat<br>No.     |                             |                                                                                                                                                                                                                                              |                                       | Set                                                                                                                  | Q        |
|                 | EI                          | F.E. (Part – I) (Old) (CBCS) Ex<br>NGINEERING PHYSICS – I & E                                                                                                                                                                                | kami<br>ENGI                          | ination Nov/Dec-2019<br>INEERING PHYSICS – II                                                                        |          |
| Day &<br>Time:  | Date<br>10:00               | : Monday, 16-12-2019<br>AM To 01:00 PM                                                                                                                                                                                                       |                                       | Max. Marks:                                                                                                          | 70       |
| Instru<br>Const | iction                      | s: 1) Question No. 1 is compulsory.<br>answer book.<br>2) Figures to the right indicate full<br>3) Assume suitable data if necess<br>1) $N_A = 6.02 \times 10^{26}$ / K mol.<br>2) $e = 1.6 \times 10^{-19}$ C<br>3) $c = 3 \times 10^8$ m/s | lt sho<br>mark<br>ary.                | uld be solved in first 30 minutes in                                                                                 |          |
| Durati          | on 31                       | MCQ/Objective Ty                                                                                                                                                                                                                             | /pe (                                 | Questions Marks:                                                                                                     | 11       |
| Q.1             | on: 30<br><b>Choo</b><br>1) | se the correct alternatives from th<br>The resolving power of grating havin<br>a) $(n + N)$<br>c) $n.N$                                                                                                                                      | i <b>e op</b> t<br>ig N s<br>b)<br>d) | Marks:<br>tions.<br>slits in n <sup>th</sup> order will be<br>(n - N)<br>n/N                                         | 14<br>14 |
| :               | 2)                          | Prof. R.N. Hall invented las<br>a) He-Ne Laser<br>c) Semiconductor laser                                                                                                                                                                     | ser.<br>b)<br>d)                      | Co <sub>2</sub> laser<br>Nd: YAG laser                                                                               |          |
| :               | 3)                          | <ul><li>Working principle of laser requires a</li><li>a) Chemical</li><li>c) Classical</li></ul>                                                                                                                                             | n app<br>b)<br>d)                     | blication of nature of light.<br>Particle<br>Wave                                                                    |          |
|                 | 4)                          | <ul><li>The optical fibers are based on the p</li><li>a) Diffraction</li><li>c) Refraction</li></ul>                                                                                                                                         | orincip<br>b)<br>d)                   | ole of<br>Reflection<br>Total internal reflection                                                                    |          |
| :               | 5)                          | The innermost region of optical fiber<br>a) Core<br>c) Sheath                                                                                                                                                                                | whic<br>b)<br>d)                      | h guides light is known as<br>Clad<br>Coating                                                                        |          |
|                 | 6)                          | The nuclei suitable for fusion proces<br>a) Light nuclei<br>c) Any nuclei                                                                                                                                                                    | s are<br>b)<br>d)                     | Heavy nuclei<br>At the middle of periodic table                                                                      |          |
|                 | 7)                          | The energy released during fission is<br>a) Chemical energy<br>c) Nuclear energy                                                                                                                                                             | s kno<br>b)<br>d)                     | wn as<br>Radiation energy<br>Electrical energy                                                                       |          |
| :               | 8)                          | <ul> <li>When a Pure Semi conductor is hea</li> <li>a) Goes up</li> <li>b) Goes down</li> <li>c) Remains the same</li> <li>d) Initially goes down and then goe</li> </ul>                                                                    | ted, i<br>es up                       | t's resistance                                                                                                       |          |
| 9               | 9)                          | The relation of angle between axes (<br>a) $\alpha = \beta = \gamma = 90^{\circ}$<br>c) $\alpha \neq \beta \neq \gamma \neq 90^{\circ}$                                                                                                      | of a tr<br>b)<br>d)                   | riclinic crystal system is<br>$\alpha \neq \beta = \gamma = 90^{\circ}$<br>$\alpha = \beta = \gamma \neq 90^{\circ}$ |          |

10) The miller indices of the plane parallel to the x-axis and y-axis are \_\_\_\_\_.

- a) (100) b)
- (010)c) (001) d) (111)
- According to Sabine reverberation time is directly proportional to \_\_\_\_\_. 11)
  - a) Surface area b) Volume c) Absorption coefficient
    - All of the above d)

SLR-FM-5

Set Q

- 12) The acoustic diffraction method is used to determine the \_\_\_\_\_.
  - a) Wavelength of light
  - b) Wavelength of ultra-sonic waves
  - c) Wavelength of acoustic waves
  - d) Velocity of light

#### 13) According to Einstein, Velocity of light in free space is \_\_\_\_\_.

- a) Depends on direction of propagation
- b) Variable
- c) Depends on velocity of source and observer
- d) A constant
- 14) The length of the rod moving with velocity V relative to the observer is same, when \_\_\_\_\_.
  - a) v = cb)  $v \ll c$ d) c)  $v \leq c$  $v \geq c$

15

# SLR-FM-5

Seat	
No.	

# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 ENGINEERING PHYSICS – I & ENGINEERING PHYSICS – II

Day & Date: Monday, 16-12-2019 Time: 10:00 AM To 01:00 PM

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

2) Assume suitable data if necessary.

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# Section – I

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- **b)** The hall coefficient (R<sub>H</sub>) of a specimen is 3.66 x  $10^{-4}$  m<sup>3</sup>/c. Its resistivity is 8.33 x  $10^{-3}$   $\Omega$  m. Find mobility ' $\mu$ 'and concentration 'n'
- c) Define the terms.
  - 1) Lattice
  - 2) Basis
  - 3) Unit cell
- d) What is atomic radius? Calculate it for BCC.
- e) A particle is moving with speed of 0.5 c. Calculate the ratio of the rest mass and the mass while in motion.
- f) State essential features of an acoustically good hall.
- g) State properties of ultrasonic waves.

# Q.3 Solve any one of the following.

 What is Hall effect? Derive an expression for Hall Voltage and Hall Coefficient.

# OR

b) Derive an expression for relativistic variation of mass with velocity.

# Q.4 Solve any two

- a) Define Fermi-energy. Derive an expression for Fermi energy in intrinsic semiconductors.
- **b)** What is atomic packing factor? Calculate it for SC, BCC and FCC.
- c) The volume of a room is 1200m<sup>3</sup>. The wall area of the room is 220m<sup>2</sup>. The floor area is 120m<sup>2</sup> and the ceiling area of 120m<sup>2</sup>. The average sound absorption coefficient

1) For walls is 0.03, for ceiling 0.80 and for the floor is 0.06. Calculate the average sound absorption coefficient and the reverberation time.

# Section – II

# Q.5 Solve any five

- a) Distinguish between Fresnel and Fraunhoffer diffraction.
- b) A grating of width 2 inch is ruled with 15,000 LPI. Find the smallest wavelength separation that can be resolved in second order at a mean wave length of 5000A°.

Max. Marks: 56

05

15

# c) Explain

- 1) Stimulated absorption
- 2) Stimulated emission
- d) What are the advantages of optical fiber?
- e) What are the different types of nanotubes? Classify on the basis of chirality.
- f) Determine energy released by 1 kg of U<sup>235</sup> during the process of nuclear fission by a slow neutron.
- g) A 20 cm long glass tube containing sugar solution rotates the plane of polarization by 11°. If the specific rotation of sugar is 66°. Calculate the strength of the solution.

### Q.6 Solve any one of the following

05

80

a) Explain the design, working and function of each part of the nuclear fission reactors.

### OR

**b)** Explain in details the construction, working of He-Ne gas laser. Why middle portion of gas discharge tube is narrow?

# Q.7 Solve any two.

- a) Write a note on resolving power of diffraction grating.
- **b)** Write a note on Semiconductor laser.
- c) Write down classification of different types of nuclear reactors.
- d) Write a note on application of optical fiber in communication system, medical and industrial field.

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Seat No.						Set	R
	F.I ENG	E. (Part – I) INEERING	(Old) (CBCS PHYSICS – I	) Exami & ENGI	nation Nov/Dec-20 NEERING PHYSIC	)19 S – II	
Day & Time: 1	Date: Mo 10:00 AN	onday, 16-12 /I To 01:00 PI	-2019 M			Max. Marks	s: 70
Instruc Consta	ctions: 7 2 ant: 1) N 2) e 3) c	1) Question N answer boo 2) Figures to 1 3) Assume su $J_A = 6.02 \times 10^{2}$ $s = 1.6 \times 10^{-19}$ $s = 3 \times 10^8$ m/s	o. 1 is compulso ok. the right indicate itable data if neo <sup>26</sup> / K mol. C s	ory. It sho e full mark cessary.	uld be solved in first 30 s.	) minutes ir	1
<b>D</b> (1		M	CQ/Objective	е Туре С	Questions		
Duratio	on: 30 M	inutes				Marks	s: 14
<b>Q.1 C</b>	l) The a) b) c) d)	the correct a e acoustic diff Wavelength Wavelength Wavelength Velocity of li	fraction method of light of ultra-sonic w of acoustic wav	n the opt is used to aves ⁄es	determine the	·	14
2	2) Ace a) b) c) d)	cording to Ein Depends on Variable Depends on A constant	stein, Velocity o direction of pro velocity of sour	f light in fi pagation ce and ot	ree space is oserver		
3	3) The sar a) c)	e length of the me, when v = c $v \le c$	e rod moving wit 	h velocity b) d)	V relative to the observed $v \ll c$ $v \ge c$	ver is	
4	4) The a) c)	e resolving po (n + N) n. N	ower of grating h	aving N s b) d)	lits in n <sup>th</sup> order will be $_{-}$ (n - N) n/N		
5	5) Pro a) c)	of. R.N. Hall ir He-Ne Lase Semiconduc	r r tor laser	_ laser. b) d)	Co₂ laser Nd: YAG laser		
6	6) Wo a) c)	orking principl Chemical Classical	e of laser require	es an app b) d)	lication of natur Particle Wave	e of light.	
7	7) The a) c)	e optical fiber Diffraction Refraction	s are based on t	the princip b) d)	ble of Reflection Total internal reflectio	n	
8	3) The a) c)	e innermost ro Core Sheath	egion of optical f	fiber whicl b) d)	n guides light is known Clad Coating	as	

				SLR-F	<b>N-5</b>
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9)	The nuclei a) Light n c) Any nu	suitable for fusion proce uclei clei	ss are b) d)	Heavy nuclei At the middle of periodic table	
10)	The energy a) Chemic c) Nuclea	r released during fission cal energy r energy	is kno b) d)	wn as Radiation energy Electrical energy	
11)	When a Pu a) Goes u b) Goes c c) Remain d) Initially	re Semi conductor is he ip lown ns the same goes down and then go	ated, i bes up	t's resistance	
12)	The relation a) $\alpha = \beta = \beta$ c) $\alpha \neq \beta = \beta$	n of angle between axes = $\gamma$ = 90° ≠ γ ≠ 90°	of a ti b) d)	riclinic crystal system is $\alpha \neq \beta = \gamma = 90^{\circ}$ $\alpha = \beta = \gamma \neq 90^{\circ}$	
13)	The miller i a) (100) c) (001)	ndices of the plane para	llel to b) d)	the x-axis and y-axis are (010) (111)	
14)	According t a) Surface c) Absorp	to Sabine reverberation to area otheration to area otheration to a set of the	time is b) d)	directly proportional to Volume All of the above	

15

# SLR-FM-5

Seat	
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# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 ENGINEERING PHYSICS – I & ENGINEERING PHYSICS – II

Day & Date: Monday, 16-12-2019 Time: 10:00 AM To 01:00 PM

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

2) Assume suitable data if necessary.

**Constant:** 1)  $N_A = 6.02 \times 10^{26}$  / K mol. 2)  $e = 1.6 \times 10^{-19}$  C 3)  $c = 3 \times 10^8$  m/s

# Section – I

# Q.2 Solve any five.

- a) Derive the equation for length contraction.
- **b)** The hall coefficient (R<sub>H</sub>) of a specimen is 3.66 x  $10^{-4}$  m<sup>3</sup>/c. Its resistivity is 8.33 x  $10^{-3}$   $\Omega$  m. Find mobility ' $\mu$ 'and concentration 'n'
- c) Define the terms.
  - 1) Lattice
  - 2) Basis
  - 3) Unit cell
- d) What is atomic radius? Calculate it for BCC.
- e) A particle is moving with speed of 0.5 c. Calculate the ratio of the rest mass and the mass while in motion.
- f) State essential features of an acoustically good hall.
- g) State properties of ultrasonic waves.

# Q.3 Solve any one of the following.

 What is Hall effect? Derive an expression for Hall Voltage and Hall Coefficient.

# OR

**b)** Derive an expression for relativistic variation of mass with velocity.

# Q.4 Solve any two

- a) Define Fermi-energy. Derive an expression for Fermi energy in intrinsic semiconductors.
- **b)** What is atomic packing factor? Calculate it for SC, BCC and FCC.
- c) The volume of a room is 1200m<sup>3</sup>. The wall area of the room is 220m<sup>2</sup>. The floor area is 120m<sup>2</sup> and the ceiling area of 120m<sup>2</sup>. The average sound absorption coefficient

1) For walls is 0.03, for ceiling 0.80 and for the floor is 0.06. Calculate the average sound absorption coefficient and the reverberation time.

# Section – II

# Q.5 Solve any five

- a) Distinguish between Fresnel and Fraunhoffer diffraction.
- b) A grating of width 2 inch is ruled with 15,000 LPI. Find the smallest wavelength separation that can be resolved in second order at a mean wave length of 5000A°.

Max. Marks: 56

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# c) Explain

- 1) Stimulated absorption
- 2) Stimulated emission
- d) What are the advantages of optical fiber?
- e) What are the different types of nanotubes? Classify on the basis of chirality.
- f) Determine energy released by 1 kg of U<sup>235</sup> during the process of nuclear fission by a slow neutron.
- **g)** A 20 cm long glass tube containing sugar solution rotates the plane of polarization by 11°. If the specific rotation of sugar is 66°. Calculate the strength of the solution.

# Q.6 Solve any one of the following

05

80

a) Explain the design, working and function of each part of the nuclear fission reactors.

### OR

**b)** Explain in details the construction, working of He-Ne gas laser. Why middle portion of gas discharge tube is narrow?

# Q.7 Solve any two.

- a) Write a note on resolving power of diffraction grating.
- **b)** Write a note on Semiconductor laser.
- c) Write down classification of different types of nuclear reactors.
- **d)** Write a note on application of optical fiber in communication system, medical and industrial field.

Seat No.		Set	S
	Е	F.E. (Part – I) (OId) (CBCS) Examination Nov/Dec-2019 NGINEERING PHYSICS – I & ENGINEERING PHYSICS – II	
Day 8 Time:	& Date 10:00	: Monday, 16-12-2019 Max. Marks ) AM To 01:00 PM	3: 70
Instru Cons	uctior tant:	<ul> <li>(a) S: 1) Question No. 1 is compulsory. It should be solved in first 30 minutes in answer book.</li> <li>(a) Figures to the right indicate full marks.</li> <li>(b) Assume suitable data if necessary.</li> <li>(c) N<sub>A</sub> = 6.02 x 10<sup>26</sup> / K mol.</li> <li>(c) A = 1.6 x 10<sup>-19</sup> C</li> <li>(c) C = 3 x 10<sup>8</sup> m/s</li> </ul>	I
Durat		MCQ/Objective Type Questions	
Durat	ion: 3	) Minutes Marks	3:14
Q.1	<b>Choo</b> 1)	we the correct alternatives from the options.Working principle of laser requires an application of nature of light.a) Chemicalb) Particlec) Classicald) Wave	14
	2)	The optical fibers are based on the principle ofa) Diffractionb) Reflectionc) Refractiond) Total internal reflection	
	3)	The innermost region of optical fiber which guides light is known asa) Coreb) Cladc) Sheathd) Coating	
	4)	The nuclei suitable for fusion process area) Light nucleib) Heavy nucleic) Any nucleid) At the middle of periodic table	
	5)	The energy released during fission is known asa) Chemical energyb) Radiation energyc) Nuclear energyd) Electrical energy	
	6)	<ul> <li>When a Pure Semi conductor is heated, it's resistance</li> <li>a) Goes up</li> <li>b) Goes down</li> <li>c) Remains the same</li> <li>d) Initially goes down and then goes up</li> </ul>	
	7)	The relation of angle between axes of a triclinic crystal system is a) $\alpha = \beta = \gamma = 90^{\circ}$ b) $\alpha \neq \beta = \gamma = 90^{\circ}$ c) $\alpha \neq \beta \neq \gamma \neq 90^{\circ}$ d) $\alpha = \beta = \gamma \neq 90^{\circ}$	
	8)	The miller indices of the plane parallel to the x-axis and y-axis area) (100)b) (010)c) (001)d) (111)	
	9)	According to Sabine reverberation time is directly proportional toa) Surface areab) Volumec) Absorption coefficientd) All of the above	

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- 10) The acoustic diffraction method is used to determine the \_\_\_\_\_.
  - a) Wavelength of light
  - b) Wavelength of ultra-sonic waves
  - c) Wavelength of acoustic waves
  - d) Velocity of light
- 11) According to Einstein, Velocity of light in free space is \_\_\_\_\_.
  - a) Depends on direction of propagation
  - b) Variable
  - c) Depends on velocity of source and observer
  - d) A constant
- 12) The length of the rod moving with velocity V relative to the observer is same, when \_\_\_\_\_.
  - a) v = cb) v << cc)  $v \le c$ d)  $v \ge c$
  - $c) \quad v \leq c \qquad \qquad d) \quad v \geq c$

13) The resolving power of grating having N slits in n<sup>th</sup> order will be \_\_\_\_\_.

- a) (n+N)c) n.Nb) (n-N)d) n/N
- 14) Prof. R.N. Hall invented \_\_\_\_\_ laser.
  - a) He-Ne Laser

b) Co<sub>2</sub> laser

Nd: YAG laser

c) Semiconductor laser d)

Seat	
No.	

# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 ENGINEERING PHYSICS – I & ENGINEERING PHYSICS – II

Day & Date: Monday, 16-12-2019 Time: 10:00 AM To 01:00 PM

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

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- c) Define the terms.
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  - 3) Unit cell
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- f) State essential features of an acoustically good hall.
- g) State properties of ultrasonic waves.

# Q.3 Solve any one of the following.

a) What is Hall effect? Derive an expression for Hall Voltage and Hall Coefficient.

# OR

b) Derive an expression for relativistic variation of mass with velocity.

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1) For walls is 0.03, for ceiling 0.80 and for the floor is 0.06. Calculate the average sound absorption coefficient and the reverberation time.

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# Q.5 Solve any five

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- b) A grating of width 2 inch is ruled with 15,000 LPI. Find the smallest wavelength separation that can be resolved in second order at a mean wave length of 5000A°.

Max. Marks: 56

**08** 

15

05

# c) Explain

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- 2) Stimulated emission
- d) What are the advantages of optical fiber?
- e) What are the different types of nanotubes? Classify on the basis of chirality.
- f) Determine energy released by 1 kg of U<sup>235</sup> during the process of nuclear fission by a slow neutron.
- **g)** A 20 cm long glass tube containing sugar solution rotates the plane of polarization by 11°. If the specific rotation of sugar is 66°. Calculate the strength of the solution.

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a) Explain the design, working and function of each part of the nuclear fission reactors.

### OR

**b)** Explain in details the construction, working of He-Ne gas laser. Why middle portion of gas discharge tube is narrow?

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Seat No.						Set	Ρ
		F.E. (Part – I)	(Old) (CBCS) E	xami	nation Nov/Dec-2019		
	ENG	SINEERING CH		ENG	INEERING CHEMISTR	( Y -11	
Day 8 Time:	2 Date 10:00	e: Wednesday,18- ) AM To 01:00 PM	12-2019 1		Max	. Marks	5: 70
Instru	uctior	<b>is:</b> 1) Q. No. 1 is o Book.	compulsory and she	ould b	e solved in first 30 minutes	in ansv	ver
		<ol><li>Figures to tl</li></ol>	ne right indicate ful	l mark	S.		
		M	CQ/Objective T	ype (	Questions		
Durati	ion: 3	0 Minutes				Marks	5: 14
Q.1	<b>Choo</b> 1)	<ul> <li>bse the correct all Hard water is unfailed a) Causes wast</li> <li>b) Water under</li> <li>c) Forms scaled</li> <li>d) Both a &amp; c</li> </ul>	ternatives from the it for use in boilers age of fuel goes decompositions inside the boiler	ne opt for sto n	i <b>ons.</b> eam raising because		14
	2)	Hard water may a) Sodium silica c) Ion exchange	be softened by pas ate e resins	sing it b) d)	through Limestone Calcium silicate		
	3)	Commonly used a) Chlorine c) Lime	disinfectant is	 b) d)	Bleaching powder Both a & b		
	4)	Animal and vege a) Contains fatt c) Good in oilin	table oils are y acids ess	 b) d)	High viscosity All of these		
	5)	When graphite is a) Grease c) Aquadag	dispersed in oil, it	is call b) d)	ed as Blended oil Oil dag		
	6)	Metals at the top a) Least active c) More stable	of electromotive se	eries a b) d)	are More active None of these		
	7)	Corrosion is an e a) Oxidation - r c) Hydrolysis	xample of eduction process	b) d)	Electro dialysis process Reverse osmosis		
	8)	Wrought iron is _ a) Ductile c) Malleable	<u> </u> .	b) d)	Weldable All are correct		
	9)	An alloy having h appliances is a) Durallumin c) Stainless ste	igh electrical resist  el	ance b) d)	and can be used in heating Nichrome Brass		
	10)	To get accurate r following correcti a) Heating correct c) Cooling correct	esults in Bomb cal on is suggested? ection ection	orime b) d)	ter experiment which of the Alkaline correction None of these		

- Following is not the example of primary fuel \_\_\_\_\_. 11)
  - a) Wood
  - c) Petrol

- b) Coal
- d) Natural gas

- 12) Ebonite is \_\_\_\_\_.
  - a) Polyethylene
  - c) Natural rubber
- b) Highly vulcanized rubber Synthetic rubber d)
- Which of the following polymer contains nitrogen? 13)
  - Teflon a) Nylon b) Terylene
  - c) PVC d)
- In TGA curves horizontal portions represents that the compound is 14) thermally \_\_\_\_\_.
  - a) Stable
  - c) Both a & b

- Unstable b)
- d) None of these



Seat	
No.	

# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 ENGINEERING CHEMISTRY –I & ENGINEERING CHEMISTRY-II

Day & Date: Wednesday,18-12-2019 Time: 10:00 AM To 01:00 PM

# **Instructions:** 1) Attempt all questions.

- 2) Draw neat diagram wherever necessary.
- 3) Figures to right indicate full marks.

# Section – I

# Q.2 A) Solve any two.

- 1) Describe Boundary (thin film) lubrication.
- 2) Write traditional and greener pathway of synthesis of indigo dye.
- 3) A sample of water on analysis was found to contain following impurities in ppm.

Amount (ppm)	Mole. Wt
35	136
46	162
54	95
42	111
	Amount (ppm) 35 46 54 42

Calculate temporary, permanent and total hardness of water sample.

# B) Solve any two.

- 1) Write any six principles of green chemistry.
- 2) Describe estimation of hardness of water by EDTA method.
- 3) Explain any three factors influencing corrosion of metal.

# Q.3 A) Solve any two.

- 1) Define corrosion. Explain wet corrosion with O<sub>2</sub> absorption mechanism.
- 2) Explain disinfection of water with chemical reactions.
- 3) Write a note on liquid lubricants.

# B) Solve the following.

- 1) Describe sacrificial anode method for protection of metal from corrosion.
- In an acid value determination experiment 13.5 gm of oil sample require 7.6 ml of N/10 KOH solution for neutralization to phenolphthalein end point. Calculate the acid value of oil sample. (Mole. Wt of KOH = 56)

# Section – II

# Q.4 A) Solve any two.

- 1) Distinguish between thermosoftening and thermosetting plastics.
- 2) Describe construction and working of Boy's calorimeter.
- Calculate gross and net calorific value of coal having the following composition in percentage, C = 82, H = 5.5, S = 3.5, N = 2.1, O = 3, Ash = 3.2 (Latent Heat of steam = 587 Kcal/kg)

Max. Marks: 56

Set

80

06

80

06

Page <b>4</b> of <b>16</b>

### B) Solve any two.

- 1) Define:
  - i) Calorific value
  - ii) Molality
  - iii) Mole Fraction
- 2) How the natural rubber can be processed from latex?
- Calculate molality of solution containing 4.9 gm of H<sub>2</sub>SO<sub>4</sub> in 1.5 kg water.

(At. Wt.: H= 1, S = 32, O=16)

# Q.5 A) Solve any two.

- 1) Explain refining of crude oil by fractional distillation.
- 2) Define Alloy. Explain any three purposes of making alloys, Give example of each.
- 3) Compare composition, properties and applications of steel.

### B) Solve the following.

- 1) Define conducting polymers. Write its applications.
- 2) Calculate number average molecular weight of a polymer having following composition.

5 molecules of molecular weight each 50000 g/mole 15 molecules of molecular weight each 10000 g/mole

- 20 molecules of molecular weight each 15000 g/mole
- 10 molecules of molecular weight each 25000 g/mole OR

### Solve the following.

- 1) Draw block diagram of instrumentation of GLC and write its uses.
- Degree of polymerization of polystyrene is 5000. Calculate molecular weight of polystyrene. (Structure of styrene C<sub>6</sub>H<sub>5</sub>-CH=CH<sub>2</sub>)

06

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SLR-FM-6

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	ENG	F.E. (Part – GINEERING (	I) (OId) (CBCS) CHEMISTRY –I	Exami & ENG	nation Nov/Dec-2	019 ISTRY
Day a Time	& Date : 10:00	e: Wednesday,1 0 AM To 01:00	8-12-2019 PM			Max. N
Instr	uctior	<b>1s:</b> 1) Q. No. 1 Book.	is compulsory and	should b	e solved in first 30 mi	nutes in
		2) Figures to	o the right indicate	full mark	S.	
Dura	tion: 3	0 Minutes	MCQ/Objective	Туре С	Questions	Ν
Q.1	<b>Choo</b> 1)	ose the correct Wrought iron i a) Ductile c) Malleable	t alternatives fron s	n <b>the opt</b> b) d)	t <b>ions.</b> Weldable All are correct	
	2)	An alloy havin appliances is a) Durallumin c) Stainless	g high electrical res  n steel	sistance b) d)	and can be used in he Nichrome Brass	eating
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	4)	Following is no a) Wood c) Petrol	ot the example of p	rimary fu b) d)	iel Coal Natural gas	
	5)	Ebonite is a) Polyethyle c) Natural ru	 ene bber	b) d)	Highly vulcanized rul Synthetic rubber	bber
	6)	Which of the fo	ollowing polymer c	ontains n	itrogen?	

6) Teflon a) Nylon b)

- Terylene c) PVC d)
- 7) In TGA curves horizontal portions represents that the compound is thermally \_ \_\_\_.
  - Stable b) Unstable a) d) c) Both a & b None of these
- 8) Hard water is unfit for use in boilers for steam raising because \_\_\_\_\_.
  - a) Causes wastage of fuel
  - b) Water undergoes decomposition
  - c) Forms scales inside the boiler
  - d) Both a & c

Seat

- 9) Hard water may be softened by passing it through \_\_\_\_\_. b) Limestone
  - a) Sodium silicate
  - c) Ion exchange resins d) Calcium silicate

SLR-FM-6

Set

**'-II** Marks: 70

Marks: 14

14

answer

SLR-FM-6 Set Q

#### 10) Commonly used disinfectant is \_\_\_\_\_.

a) Chlorine

c) Lime

a) Grease

b) Bleaching powder

High viscosity

d) Both a & b

### 11)

- Animal and vegetable oils are \_\_\_\_\_. b)
- c) Good in oiliness All of these d)

#### When graphite is dispersed in oil, it is called as \_\_\_\_\_. 12)

Blended oil b)

b)

- c) Aquadag d) Oil dag
- Metals at the top of electromotive series are \_\_\_\_\_. 13)
  - a) Least active
  - c) More stable d)

#### Corrosion is an example of \_\_\_\_\_. 14)

- a) Oxidation reduction process
- c) Hydrolysis

- b) Electro dialysis process
- d) Reverse osmosis

More active

None of these

# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 ENGINEERING CHEMISTRY –I & ENGINEERING CHEMISTRY-II

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Calculate temporary, permanent and total hardness of water sample.

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Max. Marks: 56

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**08** 

06

06

	SLR-FN	1-6
	Set	Q
B)	<ul> <li>Solve any two.</li> <li>1) Define: <ul> <li>i) Calorific value</li> <li>ii) Molality</li> <li>iii) Mole Fraction</li> </ul> </li> <li>2) How the natural rubber can be processed from latex?</li> <li>3) Calculate molality of solution containing 4.9 gm of H<sub>2</sub>SO<sub>4</sub> in 1.5 kg water. <ul> <li>(At. Wt.: H= 1, S = 32, O=16)</li> </ul> </li> </ul>	06
A)	<ol> <li>Solve any two.</li> <li>Explain refining of crude oil by fractional distillation.</li> <li>Define Alloy. Explain any three purposes of making alloys, Give example of each.</li> <li>Compare composition, properties and applications of steel.</li> </ol>	08
B)	<ul> <li>Solve the following.</li> <li>1) Define conducting polymers. Write its applications.</li> <li>2) Calculate number average molecular weight of a polymer having following composition.</li> <li>5 molecules of molecular weight each 50000 g/mole 15 molecules of molecular weight each 10000 g/mole 20 molecules of molecular weight each 15000 g/mole 10 molecules of molecular weight each 25000 g/mole OR</li> </ul>	06
	1) Draw block diagram of instrumentation of GLC and write its uses.	

Q.5

Degree of polymerization of polystyrene is 5000. Calculate molecular weight of polystyrene. (Structure of styrene C<sub>6</sub>H<sub>5</sub>-CH=CH<sub>2</sub>)

	ENC	<b>F.E.</b> (Part – I) (OID) (CBCS) E $(CBCS) = 18$	ENC	INEEDING CHEMISTD	V_II
Day o Time	& Date : 10:00	e: Wednesday,18-12-2019 D AM To 01:00 PM		Max.	Marks: 70
Instr	uctior	<b>is:</b> 1) Q. No. 1 is compulsory and she Book.	ould b	e solved in first 30 minutes	in answer
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Dura	tion: 3				Marks: 14
Q.1	<b>Choo</b> 1)	When graphite is dispersed in oil, it a) Grease c) Aquadag	ie op is call b) d)	ed as Blended oil Oil dag	14
	2)	Metals at the top of electromotive se a) Least active c) More stable	eries a b) d)	are More active None of these	
	3)	Corrosion is an example of a) Oxidation - reduction process c) Hydrolysis	b) d)	Electro dialysis process Reverse osmosis	
	4)	Wrought iron is a) Ductile c) Malleable	b) d)	Weldable All are correct	
	5)	<ul><li>An alloy having high electrical resist appliances is</li><li>a) Durallumin</li><li>c) Stainless steel</li></ul>	ance b) d)	and can be used in heating Nichrome Brass	
	6)	<ul><li>To get accurate results in Bomb cale</li><li>following correction is suggested?</li><li>a) Heating correction</li><li>c) Cooling correction</li></ul>	b) d)	ter experiment which of the Alkaline correction None of these	
	7)	Following is not the example of prim a) Wood c) Petrol	ary fu b) d)	iel Coal Natural gas	
	8)	Ebonite is a) Polyethylene c) Natural rubber	b) d)	Highly vulcanized rubber Synthetic rubber	
	9)	<ul><li>Which of the following polymer conta</li><li>a) Nylon</li><li>c) PVC</li></ul>	ains n b) d)	itrogen? Teflon Terylene	
	10)	In TGA curves horizontal portions re thermally	prese	ents that the compound is	

# Seat No.

#### (Dart I) (Old) (CBCS) Examin ation Nov/Dec 2010 -

SLR-FM-6

Set R

c) Both a & b

a) Stable

- - Unstable b)
  - d) None of these



- 11) Hard water is unfit for use in boilers for steam raising because \_\_\_\_\_.
  - a) Causes wastage of fuel
  - b) Water undergoes decomposition
  - c) Forms scales inside the boiler
  - d) Both a & c

c) Lime

#### Hard water may be softened by passing it through \_\_\_\_\_. 12)

- a) Sodium silicate Limestone b)
- c) Ion exchange resins d) Calcium silicate
- Commonly used disinfectant is \_\_\_\_\_. 13)
  - a) Chlorine
- b) Bleaching powder
- d) Both a & b
- Animal and vegetable oils are \_\_\_\_\_. 14) a) Contains fatty acids
  - b) High viscosity
  - c) Good in oiliness
- All of these
- d)

Seat	
No.	

# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 ENGINEERING CHEMISTRY –I & ENGINEERING CHEMISTRY-II

Day & Date: Wednesday,18-12-2019 Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Attempt all questions.

- 2) Draw neat diagram wherever necessary.
- 3) Figures to right indicate full marks.

# Section – I

# Q.2 A) Solve any two.

- 1) Describe Boundary (thin film) lubrication.
- 2) Write traditional and greener pathway of synthesis of indigo dye.
- 3) A sample of water on analysis was found to contain following impurities in ppm.

Impurities	Amount (ppm)	Mole. Wt
CaSO <sub>4</sub>	35	136
Ca (HCO <sub>3</sub> ) <sub>2</sub>	46	162
MgCl <sub>2</sub>	54	95
CaCl <sub>2</sub>	42	111
	42	111

Calculate temporary, permanent and total hardness of water sample.

# B) Solve any two.

- 1) Write any six principles of green chemistry.
- 2) Describe estimation of hardness of water by EDTA method.
- 3) Explain any three factors influencing corrosion of metal.

# Q.3 A) Solve any two.

- 1) Define corrosion. Explain wet corrosion with O<sub>2</sub> absorption mechanism.
- 2) Explain disinfection of water with chemical reactions.
- 3) Write a note on liquid lubricants.

# B) Solve the following.

- 1) Describe sacrificial anode method for protection of metal from corrosion.
- In an acid value determination experiment 13.5 gm of oil sample require 7.6 ml of N/10 KOH solution for neutralization to phenolphthalein end point. Calculate the acid value of oil sample. (Mole. Wt of KOH = 56)

# Section – II

# Q.4 A) Solve any two.

- 1) Distinguish between thermosoftening and thermosetting plastics.
- 2) Describe construction and working of Boy's calorimeter.
- Calculate gross and net calorific value of coal having the following composition in percentage, C = 82, H = 5.5, S = 3.5, N = 2.1, O = 3, Ash = 3.2 (Latent Heat of steam = 587 Kcal/kg)

Max. Marks: 56

Set

R

80

06

**08** 

06

			1-6
		Set	R
	B)	<ul> <li>Solve any two.</li> <li>1) Define: <ul> <li>i) Calorific value</li> <li>ii) Molality</li> <li>iii) Mole Fraction</li> </ul> </li> <li>2) How the natural rubber can be processed from latex?</li> <li>3) Calculate molality of solution containing 4.9 gm of H<sub>2</sub>SO<sub>4</sub> in 1.5 kg water. <ul> <li>(At. Wt.: H= 1, S = 32, O=16)</li> </ul> </li> </ul>	06
Q.5	A)	<ol> <li>Solve any two.</li> <li>Explain refining of crude oil by fractional distillation.</li> <li>Define Alloy. Explain any three purposes of making alloys, Give example of each.</li> <li>Compare composition, properties and applications of steel.</li> </ol>	08
	B)	<ul> <li>Solve the following.</li> <li>1) Define conducting polymers. Write its applications.</li> <li>2) Calculate number average molecular weight of a polymer having following composition.</li> <li>5 molecules of molecular weight each 50000 g/mole 15 molecules of molecular weight each 10000 g/mole 20 molecules of molecular weight each 15000 g/mole 10 molecules of molecular weight each 25000 g/mole OR</li> </ul>	06
		Solvo the following	

### Solve the following.

- Draw block diagram of instrumentation of GLC and write its uses.
   Degree of polymerization of polystyrene is 5000. Calculate molecular weight of polystyrene. (Structure of styrene C<sub>6</sub>H<sub>5</sub>-CH=CH<sub>2</sub>)

### F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 ENGINEERING CHEMISTRY -I & ENGINEERING CHEMISTRY-II Day & Date: Wednesday, 18-12-2019 Max. Marks: 70 Time: 10:00 AM To 01:00 PM Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book. 2) Figures to the right indicate full marks. MCQ/Objective Type Questions **Duration: 30 Minutes** Choose the correct alternatives from the options. To get accurate results in Bomb calorimeter experiment which of the 1) following correction is suggested? a) Heating correction b) Alkaline correction c) Cooling correction d) None of these Following is not the example of primary fuel \_ 2)

- a) Wood b)
  - c) Petrol d)
- 3) Ebonite is

4)

Seat

No.

Q.1

- a) Polyethylene b) c) Natural rubber d)
- Which of the following polymer contains nitrogen?
  - a) Nylon b)
  - c) PVC d)
- In TGA curves horizontal portions represents that the compound is 5) thermally .
  - a) Stable b) Unstable c) Both a & b d) None of these
- 6) Hard water is unfit for use in boilers for steam raising because \_\_\_\_\_.
  - a) Causes wastage of fuel
  - b) Water undergoes decomposition
  - c) Forms scales inside the boiler
  - d) Both a & c

7) Hard water may be softened by passing it through \_\_\_\_\_.

- a) Sodium silicate b) Limestone
- c) Ion exchange resins d) Calcium silicate
- 8) Commonly used disinfectant is \_\_\_\_
  - a) Chlorine Bleaching powder b)
  - c) Lime d) Both a & b
- Animal and vegetable oils are \_\_\_\_ 9)
  - a) Contains fatty acids b) High viscosity
  - c) Good in oiliness All of these d)

SLR-FM-6

Set

Marks: 14

14

Coal

- Natural gas
- Highly vulcanized rubber
- Synthetic rubber
- Teflon
- Terylene

SLR-FM-6 Set S

- 10) When graphite is dispersed in oil, it is called as \_\_\_\_\_.
  - a) Grease

- Blended oil b)
- c) Aquadag d) Oil dag

Metals at the top of electromotive series are \_\_\_\_\_. 11)

- a) Least active b) More active
- c) More stable d)
- Corrosion is an example of \_\_\_\_\_.
- a) Oxidation reduction process
- c) Hydrolysis
- Electro dialysis process b)

None of these

- **Reverse** osmosis d)
- Wrought iron is \_\_\_\_\_. 13)

12)

a) Ductile

- b) Weldable
- c) Malleable d) All are correct
- An alloy having high electrical resistance and can be used in heating 14) appliances is \_\_\_\_\_. b) Nichrome
  - a) Durallumin
  - c) Stainless steel d) Brass

Seat	
No.	

# F.E. (Part – I) (Old) (CBCS) Examination Nov/Dec-2019 ENGINEERING CHEMISTRY –I & ENGINEERING CHEMISTRY-II

Day & Date: Wednesday,18-12-2019 Time: 10:00 AM To 01:00 PM

# **Instructions:** 1) Attempt all questions.

- 2) Draw neat diagram wherever necessary.
- 3) Figures to right indicate full marks.

# Section – I

# Q.2 A) Solve any two.

- 1) Describe Boundary (thin film) lubrication.
- 2) Write traditional and greener pathway of synthesis of indigo dye.
- 3) A sample of water on analysis was found to contain following impurities in ppm.

Amount (ppm)	Mole. Wt
35	136
46	162
54	95
42	111
	Amount (ppm) 35 46 54 42

Calculate temporary, permanent and total hardness of water sample.

# B) Solve any two.

- 1) Write any six principles of green chemistry.
- 2) Describe estimation of hardness of water by EDTA method.
- 3) Explain any three factors influencing corrosion of metal.

# Q.3 A) Solve any two.

- 1) Define corrosion. Explain wet corrosion with O<sub>2</sub> absorption mechanism.
- 2) Explain disinfection of water with chemical reactions.
- 3) Write a note on liquid lubricants.

# B) Solve the following.

- 1) Describe sacrificial anode method for protection of metal from corrosion.
- In an acid value determination experiment 13.5 gm of oil sample require 7.6 ml of N/10 KOH solution for neutralization to phenolphthalein end point. Calculate the acid value of oil sample. (Mole. Wt of KOH = 56)

# Section – II

# Q.4 A) Solve any two.

- 1) Distinguish between thermosoftening and thermosetting plastics.
- 2) Describe construction and working of Boy's calorimeter.
- Calculate gross and net calorific value of coal having the following composition in percentage, C = 82, H = 5.5, S = 3.5, N = 2.1, O = 3, Ash = 3.2 (Latent Heat of steam = 587 Kcal/kg)

Max. Marks: 56

Set

**08** 

06

**08** 

06

# B) Solve any two.

- 1) Define:
  - i) Calorific value
  - ii) Molality
  - iii) Mole Fraction
- 2) How the natural rubber can be processed from latex?
- Calculate molality of solution containing 4.9 gm of H<sub>2</sub>SO<sub>4</sub> in 1.5 kg water.

(At. Wt.: H= 1, S = 32, O=16)

# Q.5 A) Solve any two.

- 1) Explain refining of crude oil by fractional distillation.
- 2) Define Alloy. Explain any three purposes of making alloys, Give example of each.
- 3) Compare composition, properties and applications of steel.

# B) Solve the following.

- 1) Define conducting polymers. Write its applications.
- Calculate number average molecular weight of a polymer having following composition.

5 molecules of molecular weight each 50000 g/mole 15 molecules of molecular weight each 10000 g/mole 20 molecules of molecular weight each 15000 g/mole

10 molecules of molecular weight each 15000 g/mole

### OR

# Solve the following.

- 1) Draw block diagram of instrumentation of GLC and write its uses.
- Degree of polymerization of polystyrene is 5000. Calculate molecular weight of polystyrene. (Structure of styrene C<sub>6</sub>H<sub>5</sub>-CH=CH<sub>2</sub>)

SLR-FM-6 Set S

06

06

# F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2019

ENGINEERING MATHEMATICS – II Day & Date: Friday, 22-11-2019

Time: 10:00 AM To 01:00 PM

a) 1, 2

c) 2, 2

**Duration: 30 Minutes** 

Seat

No.

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

# MCQ/Objective Type Questions

# Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) The order and the degree of the differential equation  $x + \frac{dy}{dx} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$  is .
- 2) The orthogonal trajectories of family of straight lines, y = mx, where 'm' is a parameter are \_\_\_\_\_.

b)

d)

1, 1

1, 3

a)  $y^2 = ax$ b)  $x^2 = by$ c)  $x^2 + y^2 = a^2$ d) None of these

3) A particle moves along the curve  $x = e^{-t}$ ,  $y = 2 \cos 3t$ ,  $z = 2 \sin 3t$  where t is the time. The magnitude of velocity vector at t = 0 is \_\_\_\_\_.

		•		
a)	37		b)	6
C)	7		d)	$\sqrt{37}$

4)	Which of the following is a vector?		
	a) Divergence of a vector	b)	Curl of a vector
	c) Gradient of a scalar	d)	Both b and c

- 5) A vector field  $\overline{F}$  is said to be solenoidal if \_\_\_\_\_. a)  $curl\overline{F} = 0$  b)  $div\overline{F} = 0$ 
  - a)  $curl\bar{F} = 0$ b)  $div\bar{F} = 0$ c) gradF = 0d) None of these
- 6) The  $p-series \sum_{n=1}^{\infty} \frac{1}{n^p}$  is divergent if \_\_\_\_\_. a)  $p \le 1$  b) p = 0c) p > 1 d) p = 27)  $\sum_{n=0}^{\infty} \frac{1}{n!} =$ \_\_\_\_\_.
  - $\begin{array}{ccc} a & b & \infty \\ a & b & b & \infty \\ c & 1 & d & e \end{array}$

SLR-FM-7

Set P

Max. Marks: 70

Marks: 14

SLR-FM-7 Set



14) Length of curve  $2y = x^2$  from x = 0 to 2 a)  $\sqrt{2} + \log \sqrt{2}$ b d

c) 
$$\frac{1}{\sqrt{2}} + \frac{1}{2}\log(1+\sqrt{2})$$

$$x = 1 \text{ is }$$

$$\sqrt{2} + \frac{1}{2} \log \sqrt{2}$$

$$y = 1 \text{ is }$$

$$\sqrt{2} + \frac{1}{2} \log \sqrt{2}$$

$$y = 1 \text{ is }$$

# Seat No.

# F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2019 **ENGINEERING MATHEMATICS – II**

Day & Date: Friday, 22-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

# Section – I

#### Q.2 Attempt any three of the following.

- Solve  $(2x 2y + 5)\frac{dy}{dx} = x y + 3$ a)
- Find the orthogonal trajectories of the family of cardiodes  $r = a(1 + \cos \theta)$ . b)
- Find the tangential and normal components of acceleration of particle c) moving on the curve.  $x = t^3 + 1$ ,  $y = t^2$ , z = t at t = 1.
- d) Prove that  $\nabla \cdot \left( r \nabla \frac{1}{r^3} \right) = \frac{3}{r^4}$
- Test the convergence of  $\sum \left(1 + \frac{1}{n}\right)^{n^2}$ e)

#### Q.3 Attempt any three of the following.

- Solve  $\frac{dy}{dx} = x^3 y^3 xy$ . a)
- Test the convergence of  $\frac{1.2}{3.4.5} + \frac{2.3}{4.5.6} + \frac{3.4}{5.6.7} + \cdots$ Solve (sec x tan x tan y  $e^x$ ) dx + sec x sec<sup>2</sup> y dy = 0 b)
- c)
- Prove that  $\bar{F} = (x + 2y + az)i + (bx 3y z)j + (4x + cy + 2z)k$  is d) solenoidal and determine the constants a, b,  $\tilde{c}$  if  $\bar{F}$  is irrotational.
- Solve  $(1 + y^2)dx = (e^{\tan^{-1}y} x)dy$ . e)

#### Attempt any two of the following Q.4

- A constant e.m.f. E volts is applied to a circuit containing a constant a) resistance R ohms in series and a constant inductance L henries. The current *i* at any time t is given by  $L\frac{di}{dt} + Ri = E$ . If the initial current is zero, show that the current builds upto half its theoretical maximum value in  $\frac{L}{R}\log 2$  seconds.
- Find the directional derivative of  $\phi = x^2y + y^2z + z^2x$  at (2,2,2) in the direction of the normal to the surface  $4x^2y + 2z^2 = 2$  at the point (2,-1,3) b)
- Examine for absolute and conditional convergence of  $\sum \frac{(-1)^n}{\log n}$ C)

# Section – II

#### Q.5 Attempt any three from the following

- a) Evaluate  $\int_{0}^{\infty} x^{2} \bar{e}^{h^{2}x^{2}} dx$ b) Show that  $\int_{0}^{\infty} \frac{\tan^{-1} ax}{x(1+x^{2})} dx = \frac{\pi}{2} \log(1+a)$
- c) Trace the curve  $r = a \cos 3\theta$  with full justification.

Max. Marks: 56

09

10

09

# SLR-FM-7

- Change the order of integration and evaluate d)
- $\int \int e^{-(x^2+y^2)} dy dx$ Change to polar co-ordinate system and evaluate e)

#### Q.6 Attempt any three from the following

- Prove that  $\int_{0}^{\pi} x \sin^5 x \cos^4 x \, dx = \frac{8\pi}{315}$ a)
- Evaluate  $\int \int (x^2 + y^2) x \, dx \, dy$  over region bounded by x = 0, y = 0, y = xb) and x = 1.

c) Evaluate 
$$\int_{0}^{1} \int_{0}^{2} \int_{1}^{2} x^2 yz \, dz dy dx$$

- Find length of loop of the curve  $9y^2 = x(3-x)^2$ d)
- Trace the curve  $y^2 = (x a)(x b)(x c)$  where a < b < c with full e) justification.

### Attempt any two from the following Q.7 $2^{2m-1}$ m $m+\frac{1}{2} = \sqrt{\pi}$ 2m

- Prove the Duplication formula. a)
- Trace the curve  $x = a(t \sin t)$   $y = a(1 + \cos t)$  with full justification, also b) find its length measured from cusp to cusp.
- Find the mass of lamina bounded by curves  $ay^2 = x^3$  and by = x, if c) density at a point varies as,
  - Cube of distance of the point from x axis. i)
  - The square of the distance of the point from x axis. ii)

09

SLR-FM-7 Set

 $\int_{0}^{a} \int_{y}^{y} \frac{x}{x^2 + y^2} dx \, dy$ 

Seat	
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# F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2019 ENGINEERING MATHEMATICS – II

Day & Date: Friday, 22-11-2019 Time: 10:00 AM To 01:00 PM

**Duration: 30 Minutes** 

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

# **MCQ/Objective Type Questions**

# Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1)	$\boxed{\frac{1}{4}}$ $\boxed{\frac{3}{4}}$ =	-			
	a) $\sqrt[4]{2\pi}$	b)	$\sqrt{\frac{\pi}{2}}$		
	c) $\sqrt{\pi}$	d)	$\sqrt{2}\pi$		
2)	The curve $xy = c$ is symmetric				
	<ul><li>a) About both axes</li><li>c) About y – axis</li></ul>	b) d)	About x – axis In opposite quadrants		
3)	Value of integral $\int_0^\infty e^{-x^4} dx$ is	•			
	a) $\frac{1}{2} \boxed{\frac{1}{3}}$	b)	$\frac{5}{4}$		
	c) $\frac{1}{4} \boxed{\frac{1}{3}}$	d)	$\frac{1}{3}$ $\frac{1}{4}$		
4)	Value of integral $\int_0^1 \int_0^{1-x} dx dy$	·			
	a) <u>1</u>	b)	$\underline{1-x}$		
	c) $\frac{3}{2}$	d)	$\frac{(1-x)^2}{2}$		
5)	If the density $\rho$ (rho) at a point of a uniform circular lamina varies as the square of its distance from fixed point on the circumference of circle then				
	$\rho$ IS a) $x^2 + y^2$ .	b)	Kxv		
	c) $K(x^2 + y^2)$	d)	xy		
6)	Polar form of integral $\int_0^a \int_y^a dx dy = -$				
	a) $\frac{\pi}{4} r \cos \theta$	b)	$\pi/2 a \sec \theta$		

a)  $\frac{\pi}{4}x\cos\theta$   $\int_{0}^{0}\int_{0}^{0}rdrd\theta$ b)  $\frac{\pi/2}{3}a\sec\theta$   $\int_{0}^{\pi/2}\int_{0}^{1}rdrd\theta$ c)  $\frac{\pi/4}{3}\sec\theta$ d)  $\frac{\pi/2}{3}a\cos\theta$   $\int_{0}^{\pi/2}\frac{1}{3}\cos\theta$  $\int_{0}^{\pi/2}\frac{1}{3}\cos\theta$  Max. Marks: 70

Set

Q

Marks: 14

			Set	Q
7)	Length of curve $2y = x^2$ from $x = 0$ a a) $\sqrt{2} + \log \sqrt{2}$ c) $\frac{1}{\sqrt{2}} + \frac{1}{2}\log(1 + \sqrt{2})$	to x = b) d)	$1 \text{ is } \underline{\qquad} .$ $\sqrt{2} + \frac{1}{2} \log \sqrt{2}$ $2 + \log 2$	
8)	The order and the degree of the differing	erentia	al equation $x + \frac{dy}{dx} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$	
	a) 1, 2 c) 2, 2	b) d)	1, 1 1, 3	
9)	The orthogonal trajectories of family a parameter are a) $y^2 = ax$	of str b)	aight lines, $y = mx$ , where 'm' is $x^2 = by$	
	c) $x^2 + y^2 = a^2$	d)	None of these	
10)	A particle moves along the curve $x =$ is the time. The magnitude of velocit a) 37 c) 7	= e <sup>-t</sup> , y vec b) d)	$y = 2\cos 3t$ , $z = 2\sin 3t$ where t tor at t = 0 is 6 $\sqrt{37}$	
11)	<ul><li>Which of the following is a vector?</li><li>a) Divergence of a vector</li><li>c) Gradient of a scalar</li></ul>	b) d)	Curl of a vector Both b and c	
12)	A vector field $\overline{F}$ is said to be solenoid	dal if _	·	
	a) $curlF = 0$ c) $gradF = 0$	b) d)	divF = 0 None of these	
13)	The $p-series \sum_{n=1}^{\infty} \frac{1}{n^p}$ is divergen	t if		
	a) $p \le 1$ c) $p > 1$	b) d)	p = 0 $p = 2$	
14)	$\sum_{n=0}^{\infty} \frac{1}{n!} =$			
	a) 0 c) 1	b) d)	∞ E	

# Seat No.

# F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2019 **ENGINEERING MATHEMATICS - II**

Day & Date: Friday, 22-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

# Section – I

#### Q.2 Attempt any three of the following.

- Solve  $(2x 2y + 5)\frac{dy}{dx} = x y + 3$ a)
- Find the orthogonal trajectories of the family of cardiodes  $r = a(1 + \cos \theta)$ . b)
- Find the tangential and normal components of acceleration of particle c) moving on the curve.  $x = t^3 + 1$ ,  $y = t^2$ , z = t at t = 1.
- d) Prove that  $\nabla \cdot \left( r \nabla \frac{1}{r^3} \right) = \frac{3}{r^4}$
- Test the convergence of  $\sum \left(1 + \frac{1}{n}\right)^{n^2}$ e)

#### Q.3 Attempt any three of the following.

- Solve  $\frac{dy}{dx} = x^3 y^3 xy$ . a)
- Test the convergence of  $\frac{1.2}{3.4.5} + \frac{2.3}{4.5.6} + \frac{3.4}{5.6.7} + \cdots$ Solve (sec x tan x tan y  $e^x$ ) dx + sec x sec<sup>2</sup> y dy = 0 b)
- c)
- Prove that  $\bar{F} = (x + 2y + az)i + (bx 3y z)j + (4x + cy + 2z)k$  is d) solenoidal and determine the constants a, b,  $\tilde{c}$  if  $\bar{F}$  is irrotational.
- Solve  $(1 + y^2)dx = (e^{\tan^{-1}y} x)dy$ . e)

#### Attempt any two of the following Q.4

- A constant e.m.f. E volts is applied to a circuit containing a constant a) resistance R ohms in series and a constant inductance L henries. The current *i* at any time t is given by  $L\frac{di}{dt} + Ri = E$ . If the initial current is zero, show that the current builds upto half its theoretical maximum value in  $\frac{L}{R}\log 2$  seconds.
- Find the directional derivative of  $\phi = x^2y + y^2z + z^2x$  at (2,2,2) in the direction of the normal to the surface  $4x^2y + 2z^2 = 2$  at the point (2,-1,3) b)
- Examine for absolute and conditional convergence of  $\sum \frac{(-1)^n}{\log n}$ C)

# Section – II

#### Q.5 Attempt any three from the following

- a) Evaluate  $\int_{0}^{\infty} x^{2} \bar{e}^{h^{2}x^{2}} dx$ b) Show that  $\int_{0}^{\infty} \frac{\tan^{-1} ax}{x(1+x^{2})} dx = \frac{\pi}{2} \log(1+a)$
- c) Trace the curve  $r = a \cos 3\theta$  with full justification.

Max. Marks: 56

09

09

10

09

SLR-FM-7

- Change the order of integration and evaluate d)
- $\int \int e^{-(x^2+y^2)} dy dx$ Change to polar co-ordinate system and evaluate e)

#### Q.6 Attempt any three from the following

- Prove that  $\int_{0}^{\pi} x \sin^5 x \cos^4 x \, dx = \frac{8\pi}{315}$ a)
- Evaluate  $\int \int (x^2 + y^2) x \, dx \, dy$  over region bounded by x = 0, y = 0, y = xb) and x = 1.

c) Evaluate 
$$\int_{0}^{1} \int_{0}^{2} \int_{1}^{2} x^2 yz \, dz dy dx$$

- Find length of loop of the curve  $9y^2 = x(3-x)^2$ d)
- Trace the curve  $y^2 = (x a)(x b)(x c)$  where a < b < c with full e) justification.

### Attempt any two from the following Q.7 $2^{2m-1}$ m $m+\frac{1}{2} = \sqrt{\pi}$ 2m

- Prove the Duplication formula. a)
- Trace the curve  $x = a(t \sin t)$   $y = a(1 + \cos t)$  with full justification, also b) find its length measured from cusp to cusp.
- Find the mass of lamina bounded by curves  $ay^2 = x^3$  and by = x, if c) density at a point varies as,
  - Cube of distance of the point from x axis. i)
  - The square of the distance of the point from x axis. ii)

 $\int_{0}^{\infty} \int_{y}^{y} \frac{x}{x^2 + y^2} dx \, dy$ 

Set

SLR-FM-7

09
Seat	
No.	

# F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2019 **ENGINEERING MATHEMATICS - II**

Day & Date: Friday, 22-11-2019

Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

# **MCQ/Objective Type Questions**

**Duration: 30 Minutes** 

1)

Q.1

- Choose the correct alternatives from the options and rewrite the sentence. Value of integral  $\int_0^1 \int_0^{1-x} dx dy$  \_\_\_\_\_. b)  $\frac{1-x}{2}$ d)  $\frac{(1-x)^2}{2}$ b) a) 1 c)  $\frac{1}{2}$
- 2) If the density  $\rho$  (rho) at a point of a uniform circular lamina varies as the square of its distance from fixed point on the circumference of circle then
  - $\rho \text{ is } \__{x^2 + y^2}.$ b) Kxy c)  $K(x^2 + y^2)$ d) xν

3) Polar form of integral 
$$\int_0^a \int_y^a dx dy =$$
\_\_\_\_\_.  
a)  $\frac{\pi}{4} x \cos \theta$  b)  $\frac{\pi/2}{2} a \sec \theta$ 

c) 
$$\int_{0}^{0} \int_{0}^{0} r dr d\theta$$
  
b) Length of curve  $2y = x^{2}$  from  $x = 0$  to  $x = 1$  is

Length of curve  $2y = x^2$  from x = 0 to x - 1 is a)  $\sqrt{2} + \log \sqrt{2}$ b)  $\sqrt{2} + \frac{1}{2} \log \sqrt{2}$ c) 1 1 (1) (2) (3) (4) (2) +  $\log 2$ 4) c)  $\frac{1}{\sqrt{2}} + \frac{1}{2}\log(1+\sqrt{2})$ 

The order and the degree of the differential equation  $x + \frac{dy}{dx} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$ 5) is \_\_\_\_\_.

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

The orthogonal trajectories of family of straight lines, y = mx, where 'm' is 6) a parameter are \_\_\_\_\_. h) ...2

a) 
$$y^2 = ax$$
  
c)  $x^2 + y^2 = a^2$   
b)  $x^2 = by$   
d) None of these

Max. Marks: 70

Marks: 14



A particle moves along the curve  $x = e^{-t}$ ,  $y = 2 \cos 3t$ ,  $z = 2 \sin 3t$  where t 7) is the time. The magnitude of velocity vector at t = 0 is \_\_\_\_\_. a) 37 b) 6 c) 7 d)  $\sqrt{37}$ 8) Which of the following is a vector? a) Divergence of a vector Curl of a vector b) c) Gradient of a scalar Both b and c d) 9) A vector field  $\overline{F}$  is said to be solenoidal if \_\_\_\_\_ a)  $curl\bar{F} = 0$  $div\overline{F} = 0$ b) c) gradF = 0d) None of these The  $p-series \sum_{n=1}^{\infty} \frac{1}{n^p}$  is divergent if \_\_\_\_\_. 10) b) a)  $p \leq 1$ p = 0d) p = 2c) p > 111) a) 0 b)  $\infty$ c) 1 d) е  $\frac{3}{4}$ 12) a) b)  $\frac{\pi}{2}$  $\sqrt{2\pi}$ c)  $\sqrt{\pi}$ d)  $\sqrt{2}\pi$ 13) The curve xy = c is symmetric \_\_\_\_ About x – axis a) About both axes b) c) About y – axis d) In opposite quadrants Value of integral  $\int_0^\infty e^{-x^4} dx$  is \_\_\_\_\_ 14)  $\frac{5}{4}$ b)  $\frac{1}{2} \mid \frac{1}{3}$ a)  $\frac{1}{4}$  |  $\frac{1}{3}$  $\frac{1}{3}$   $\frac{1}{4}$ d) c)

SLR-FM-7

Set

R

# Seat No.

# F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2019 **ENGINEERING MATHEMATICS - II**

Day & Date: Friday, 22-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

# Section – I

### Q.2 Attempt any three of the following.

- Solve  $(2x 2y + 5)\frac{dy}{dx} = x y + 3$ a)
- Find the orthogonal trajectories of the family of cardiodes  $r = a(1 + \cos \theta)$ . b)
- Find the tangential and normal components of acceleration of particle c) moving on the curve.  $x = t^3 + 1$ ,  $y = t^2$ , z = t at t = 1.
- d) Prove that  $\nabla \cdot \left( r \nabla \frac{1}{r^3} \right) = \frac{3}{r^4}$
- Test the convergence of  $\sum \left(1 + \frac{1}{n}\right)^{n^2}$ e)

### Q.3 Attempt any three of the following.

- Solve  $\frac{dy}{dx} = x^3 y^3 xy$ . a)
- b)
- Test the convergence of  $\frac{1.2}{3.4.5} + \frac{2.3}{4.5.6} + \frac{3.4}{5.6.7} + \cdots$ Solve (sec x tan x tan y  $e^x$ ) dx + sec x sec<sup>2</sup> y dy = 0 c)
- Prove that  $\bar{F} = (x + 2y + az)i + (bx 3y z)j + (4x + cy + 2z)k$  is d) solenoidal and determine the constants a, b, c if  $\overline{F}$  is irrotational.
- Solve  $(1 + y^2)dx = (e^{\tan^{-1}y} x)dy$ . e)

### Attempt any two of the following Q.4

- A constant e.m.f. E volts is applied to a circuit containing a constant a) resistance R ohms in series and a constant inductance L henries. The current *i* at any time t is given by  $L\frac{di}{dt} + Ri = E$ . If the initial current is zero, show that the current builds upto half its theoretical maximum value in  $\frac{L}{R}\log 2$  seconds.
- Find the directional derivative of  $\phi = x^2y + y^2z + z^2x$  at (2,2,2) in the direction of the normal to the surface  $4x^2y + 2z^2 = 2$  at the point (2,-1,3) b)
- Examine for absolute and conditional convergence of  $\sum \frac{(-1)^n}{\log n}$ C)

### Section – II

### Q.5 Attempt any three from the following

- a) Evaluate  $\int_{0}^{\infty} x^{2} \bar{e}^{h^{2}x^{2}} dx$ b) Show that  $\int_{0}^{\infty} \frac{\tan^{-1} ax}{x(1+x^{2})} dx = \frac{\pi}{2} \log(1+a)$
- c) Trace the curve  $r = a \cos 3\theta$  with full justification.

Max. Marks: 56

09

10

09

# SLR-FM-7

- Change the order of integration and evaluate d)
- $\int \int e^{-(x^2+y^2)} dy dx$ Change to polar co-ordinate system and evaluate e)

#### Q.6 Attempt any three from the following

- Prove that  $\int_{0}^{\pi} x \sin^5 x \cos^4 x \, dx = \frac{8\pi}{315}$ a)
- Evaluate  $\int \int (x^2 + y^2) x \, dx \, dy$  over region bounded by x = 0, y = 0, y = xb) and x = 1.

c) Evaluate 
$$\int_{0}^{1} \int_{0}^{2} \int_{1}^{2} x^2 yz \, dz dy dx$$

- Find length of loop of the curve  $9y^2 = x(3-x)^2$ d)
- Trace the curve  $y^2 = (x a)(x b)(x c)$  where a < b < c with full e) justification.

### Attempt any two from the following Q.7 $2^{2m-1}$ m $m+\frac{1}{2} = \sqrt{\pi}$ 2m

- Prove the Duplication formula. a)
- Trace the curve  $x = a(t \sin t)$   $y = a(1 + \cos t)$  with full justification, also b) find its length measured from cusp to cusp.
- Find the mass of lamina bounded by curves  $ay^2 = x^3$  and by = x, if c) density at a point varies as,
  - Cube of distance of the point from x axis. i)
  - The square of the distance of the point from x axis. ii)

SLR-FM-7

Set

 $\int_{0}^{a} \int_{y}^{y} \frac{x}{x^2 + y^2} dx \, dy$ 

09

# Set

# F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2019 ENGINEERING MATHEMATICS - II

Day & Date: Friday, 22-11-2019 Time: 10:00 AM To 01:00 PM

**Duration: 30 Minutes** 

Seat

No.

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

# **MCQ/Objective Type Questions**

# Q.1 Choose the correct alternatives from the options and rewrite the sentence.

1)	The $p-series$ $\sum_{n=1}^{\infty} \frac{1}{n^p}$ is divergen	nt if _	·
	a) $p \le 1$ c) $p > 1$	b) d)	p = 0 p = 2
2)	$\sum_{n=0}^{\infty} \frac{1}{n!} =$		
	a) 0 c) 1	b) d)	∞ e
3)	a) $\sqrt{2\pi}$ $\frac{3}{4} =$	b)	π
	c) $\sqrt{\pi}$	d)	$\sqrt{\frac{2}{2}}$ $\sqrt{2}\pi$
4)	The curve $xy = c$ is symmetric a) About both axes c) About y – axis	b) d)	 About x – axis In opposite quadrants
5)	Value of integral $\int_0^\infty e^{-x^4} dx$ is a) $\frac{1}{2} \left[ \frac{1}{3} \right]$	 b)	$\frac{5}{4}$
	c) $\frac{1}{4} \frac{1}{3}$	d)	$\frac{1}{3}$ $\frac{1}{4}$
6)	Value of integral $\int_0^1 \int_0^{1-x} dx dy$ a) <u>1</u>	 b)	1-x
	c) $\frac{\frac{3}{1}}{\frac{1}{2}}$	d)	$\frac{\frac{2}{(1-x)^2}}{2}$

Max. Marks: 70

Marks: 14

14

Set S

# SLR-FM-7

			SLR-FM-7
			Set S
7)	If the density $\rho$ (rho) at a point of a use square of its distance from fixed point $\rho$ is a) $x^2 + y^2$ .	niforn nt on t b)	n circular lamina varies as the he circumference of circle then <i>Kxy</i>
8)	Polar form of integral $\int_{a}^{a} \int_{a}^{a} dx dy =$	u)	xy
	a) $\frac{\pi}{4} x \cos \theta$ $\int_{0}^{0} \int_{0}^{0} r dr d\theta$ c) $\frac{\pi}{4} a \sec \theta$ $\int_{0}^{0} \int_{0}^{0} r dr d\theta$	b) d)	$\int_{0}^{\pi/2} \int_{0}^{a \sec \theta} r dr d\theta$ $\int_{0}^{\pi/2} \int_{0}^{a \cos \theta} r dr d\theta$ $\int_{0}^{\pi/2} \int_{0}^{a \cos \theta} r dr d\theta$
9)	Length of curve $2y = x^2$ from $x = 0$	to x =	: 1 is
	a) $\sqrt{2} + \log \sqrt{2}$	b)	$\sqrt{2} + \frac{1}{2}\log\sqrt{2}$
	c) $\frac{1}{\sqrt{2}} + \frac{1}{2}\log(1+\sqrt{2})$	d)	$2 + \log 2$
10)	The order and the degree of the diffe	erentia	al equation $x + \frac{dy}{dx} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$
	a) 1, 2 c) 2, 2	b) d)	1, 1 1, 3
11)	The orthogonal trajectories of family a parameter are	of str	aight lines, $y = mx$ , where 'm' is
	a) $y^2 = ax$ c) $x^2 + y^2 = a^2$	b) d)	$x^2 = by$ None of these
12)	A particle moves along the curve $x =$ is the time. The magnitude of velocit a) 37 c) 7	= e <sup>-t</sup> , y vec b) d)	$y = 2\cos 3t, z = 2\sin 3t$ where t tor at t = 0 is 6 $\sqrt{37}$
13)	<ul><li>Which of the following is a vector?</li><li>a) Divergence of a vector</li><li>c) Gradient of a scalar</li></ul>	b) d)	Curl of a vector Both b and c
14)	A vector field $\overline{F}$ is said to be solenoid	dal if _	·

- b)  $div\overline{F} = 0$
- a)  $curl\overline{F} = 0$ c) gradF = 0d) None of these

# Seat No.

# F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2019 **ENGINEERING MATHEMATICS - II**

Day & Date: Friday, 22-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

### Section – I

### Q.2 Attempt any three of the following.

- Solve  $(2x 2y + 5)\frac{dy}{dx} = x y + 3$ a)
- Find the orthogonal trajectories of the family of cardiodes  $r = a(1 + \cos \theta)$ . b)
- Find the tangential and normal components of acceleration of particle c) moving on the curve.  $x = t^3 + 1$ ,  $y = t^2$ , z = t at t = 1.
- d) Prove that  $\nabla \cdot \left( r \nabla \frac{1}{r^3} \right) = \frac{3}{r^4}$
- Test the convergence of  $\sum \left(1 + \frac{1}{n}\right)^{n^2}$ e)

#### Q.3 Attempt any three of the following.

- Solve  $\frac{dy}{dx} = x^3 y^3 xy$ . a)
- Test the convergence of  $\frac{1.2}{3.4.5} + \frac{2.3}{4.5.6} + \frac{3.4}{5.6.7} + \cdots$ Solve (sec x tan x tan y  $e^x$ ) dx + sec x sec<sup>2</sup> y dy = 0 b)
- c)
- Prove that  $\bar{F} = (x + 2y + az)i + (bx 3y z)j + (4x + cy + 2z)k$  is d) solenoidal and determine the constants a, b, c if  $\overline{F}$  is irrotational.
- Solve  $(1 + y^2)dx = (e^{\tan^{-1}y} x)dy$ . e)

### Attempt any two of the following Q.4

- A constant e.m.f. E volts is applied to a circuit containing a constant a) resistance R ohms in series and a constant inductance L henries. The current *i* at any time t is given by  $L\frac{di}{dt} + Ri = E$ . If the initial current is zero, show that the current builds upto half its theoretical maximum value in  $\frac{L}{R}\log 2$  seconds.
- Find the directional derivative of  $\phi = x^2y + y^2z + z^2x$  at (2,2,2) in the direction of the normal to the surface  $4x^2y + 2z^2 = 2$  at the point (2,-1,3) b)
- Examine for absolute and conditional convergence of  $\sum \frac{(-1)^n}{\log n}$ C)

### Section – II

### Q.5 Attempt any three from the following

- a) Evaluate  $\int_{0}^{\infty} x^{2} \bar{e}^{h^{2}x^{2}} dx$ b) Show that  $\int_{0}^{\infty} \frac{\tan^{-1} ax}{x(1+x^{2})} dx = \frac{\pi}{2} \log(1+a)$
- c) Trace the curve  $r = a \cos 3\theta$  with full justification.

Max. Marks: 56

09

10

- Change the order of integration and evaluate d)
- $\int \int e^{-(x^2+y^2)} dy dx$ Change to polar co-ordinate system and evaluate e)

#### Q.6 Attempt any three from the following

- Prove that  $\int_{0}^{\pi} x \sin^5 x \cos^4 x \, dx = \frac{8\pi}{315}$ a)
- Evaluate  $\int \int (x^2 + y^2) x \, dx \, dy$  over region bounded by x = 0, y = 0, y = xb) and x = 1.

c) Evaluate 
$$\int_{0}^{1} \int_{0}^{2} \int_{1}^{2} x^2 yz \, dz dy dx$$

- Find length of loop of the curve  $9y^2 = x(3-x)^2$ d)
- Trace the curve  $y^2 = (x a)(x b)(x c)$  where a < b < c with full e) justification.

### Attempt any two from the following Q.7 $2^{2m-1}$ m $m+\frac{1}{2} = \sqrt{\pi}$ 2m

- Prove the Duplication formula. a)
- Trace the curve  $x = a(t \sin t)$   $y = a(1 + \cos t)$  with full justification, also b) find its length measured from cusp to cusp.
- Find the mass of lamina bounded by curves  $ay^2 = x^3$  and by = x, if c) density at a point varies as,
  - Cube of distance of the point from x axis. i)
  - The square of the distance of the point from x axis. ii)

SLR-FM-7

Set

 $\int_{0}^{a} \int_{y}^{y} \frac{x}{x^2 + y^2} dx \, dy$ 

09

			BASIC CIVIL EN	GIN	EERING	
Day a Time	& Date : 10.00	e: Sat D AM	urday, 23-11-2019 To 01.00 PM		1	Vax. Marks: 70
Instr	uctior	<b>is:</b> 1)	Q. No. 1 is compulsory and sho	ould b	e solved in first 30 minu	utes in answer
		2) 3) 4)	BOOK. Use of non-programmable scie Figures to right indicate full ma Assume suitable data if necess	ntific rks. ary a	calculator is allowed. nd state it clearly.	
			MCQ/Objective Ty	vpe C	Questions	
Dura	tion: 3	0 Mir	nutes	-		Marks: 14
Q.1	Choo	ose tl	he correct alternatives from th	e opt	ions and rewrite the	14
	1)	Follo a) c)	owing is not a branch of civil eng automobile engineering environmental engineering	ineeri b) d)	ing soil mechanics hydraulic engineering	
	2)	Hyd a) c)	rographic surveys deal with the i Heavenly bodies Large water bodies	mapp b) d)	ing of Hills Canal system	
	3)	Whie a) c)	ch of the following reference dire True meridian Arbitrary meridian	ection b) d)	is used in a geodetic s Magnetic meridian Any of the these	urvey?
	4)	Fly I a) b) c) d)	eveling is adopted for the purpos Establishing new bench Marks For checking accuracy of work For fixing alignment of road, ca All the above	se of <sub>.</sub> nnel		
	5)	A lei a) c)	ngth of link of a metric chain is _ 10 cm 30 cm	b) d)	20 cm 100 cm	
	6)	No r a) c)	eservoir is formed in following ty Storage dam Both a and b	pe of b) d)	Dam Diversion dam None of the above	
	7)	The as _ a) c)	portion of a road surface, which  carriage-way express way	is uso b) d)	ed by vehicular traffic, i Shoulder all of the above	s known
	8)	The knov a) c)	lowest part of a structure which wn as Super – structure Foundation	transı b) d)	mits the load to the soil Plinth Parapet	is
	9)	Whe a) c)	en two or more footings are conn beam footing strap footing	ectec b) d)	l by a beam, it is called combined footing mat footing	

F.E. (Part - II) (Old) (CBCS) Examination Nov/Dec-2019

# Seat No.

Page **1** of **16** 

Set P

SLR-FM-8

10) One of the following does not affect FAR \_\_\_\_\_. Type of construction b) Locality of density a) Colour of building C) Parking facilities d) Privacy is of utmost importance in case of \_ 11) W/c Bedroom b) a) d) All of above C) Bathroom A good building stone should have \_ 12) Strength b) hardness and toughness a) resistance to fire d) all of the above C) 13) Initial setting time for cement should not be less than \_\_\_\_\_. a) 30 min b) 120 min 180 min 360 min C) d) 14) Electromagnetic energy moves with velocity of \_\_\_\_\_ . Sound a) Light b)

c) Magnet d) Electricity

**SLR-FM-8** 

Set P

12

# F.E. (Part - II) (Old) (CBCS) Examination Nov/Dec-2019

Day & Date: Saturday, 23-11-2019 Time: 10.00 AM To 01.00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable scientific calculator is allowed.

**BASIC CIVIL ENGINEERING** 

4) Assume suitable data if necessary and state it clearly.

### Section – I

#### Q.2 Attempt any four of the following.

- a) Explain with examples knowledge of civil engineering is applicable to other branches of engineering.
- Explain the role of civil engineering various construction activities. b)
- c) With neat sketch explain reciprocal ranging.
- d) What is mean by local attraction? How to detect it.
- What are the temporary adjustment of dumpy level explain with neat e) sketches.
- With neat sketch explain different storage zones of reservoir. **f**)
- Give the detailed classification of road as per IRC. g)

#### Q.3 Attempt any two of the following.

- The length of survey line was measured with a 20 m chain and was found a) to be 1200m. As a check the length was again measured 25 m chain and was found to be 1212 m. On comparing with test gauge it was found to be 1 decimeter too long. Find the actual length of the chain used.
- b) The observed whole circle bearings in a closed compass traverse ABCDA are given below.

Line	AB	BC	CD	DA
FB	46°10'	199°20'	169°30'	280°20'
BB	226°10'	298°40'	351°10'	99°20'

Calculate the inclined angle and apply correction for local attraction and find corrected fore and back bearings. Draw a neat sketch of the traverse. Calculations are must.

The following reading were taken in running a line of levels from a BM of c) 100.00

BS: 1.290 (on BM), 3.115, 0.235, -1.125 (bottom of lintel) FS: 0.025, 0.975, -1.095 (bottom of lintel), 3.565 (at B) Work out staff readings and rule out a page in details

### Section – II

#### Q.4 Attempt any four of the following.

- Differentiate between load bearing and framed structure. a)
- Explain the requirements of earthquake resistant buildings with neat sketches. b)
- Enlist different principles of planning and explain any two with neat sketches. c)
- Enlist the ideal engineering properties and uses of plastic and aluminium. d)
- Differentiate between plain and Reinforced cement concrete. e)
- **f**) Write a short note on green building.

Max. Marks: 56

16

12

SLR-FM-8

Set



# SLR-FM-8 Set P

# 16

# Q.5 Attempt any two of the following.

- a) Explain with neat sketch different elements of framed structure. Also give the use of each element.
- **b)** What are the different building bye laws? Explain any two with neat sketches.
- c) Explain the working of remote sensing system and give the applications of GPS.

TIMO	. 10.0	0 / 11				
Instr	uctior	<b>าร:</b> 1)	) Q. No. 1 is compulsory and she Book.	ould b	e solved in first 30 minutes	in answer
		2 3 4	) Use of non-programmable scie ) Figures to right indicate full ma ) Assume suitable data if necess	entific irks. sary a	calculator is allowed. nd state it clearly.	
			MCQ/Objective T	ype (	Questions	
Dura	tion: 3	0 Mir	nutes			Marks: 14
Q.1	Choo	ose ti ence	he correct alternatives from th	ne op	tions and rewrite the	14
	1)	The know	lowest part of a structure which wn as	trans	mits the load to the soil is	
		a) c)	Super - structure foundation	b) d)	plinth parapet	
	2)	Whe a) c)	en two or more footings are con beam footing strap footing	necteo b) d)	d by a beam, it is called combined footing mat footing	<u> </u> .
	3)	One	e of the following does not affect	FAR		
		a) c)	Type of construction Parking facilities	b) d)	Locality of density Colour of building	
	4)	Priv a) c)	acy is of utmost importance in c Bedroom Bathroom	ase o b) d)	f W/c All of above	
	5)	A go a) c)	ood building stone should have _ strength resistance to fire	b) d)	hardness and toughness all of the above	
	6)	Initia a) c)	al setting time for cement should 30 min 180 min	l not b b) d)	be less than 120 min 360 min	
	7)	Elec a) c)	ctromagnetic energy moves with Light Magnet	veloo b) d)	tity of Sound Electricity	
	8)	Folle a) c)	owing is not a branch of civil eng automobile engineering environmental engineering	gineer b) d)	ing soil mechanics hydraulic engineering	
	9)	Hyd a) c)	rographic surveys deal with the Heavenly bodies Large water bodies	mapp b) d)	ing of Hills Canal system	
	10)	Whi a) c)	ch of the following reference dire True meridian Arbitrary meridian	ection b) d)	is used in a geodetic surve Magnetic meridian Any of the these	ey?

F.E. (Part - II) (Old) (CBCS) Examination Nov/Dec-2019

**BASIC CIVIL ENGINEERING** 

Day & Date: Saturday, 23-11-2019 Time: 10.00 AM To 01.00 PM

SLR-FM-8

Max. Marks: 70

Set Q

# SLR-FM-8 Set Q

- 11) Fly leveling is adopted for the purpose of \_\_\_\_\_.
  - a) Establishing new bench Marks
  - b) For checking accuracy of work
  - c) For fixing alignment of road, cannel
  - d) All the above
- 12) A length of link of a metric chain is \_
  - a) 10 cm b) 20 cm
  - c) 30 cm d) 100 cm
- 13) No reservoir is formed in following type of Dam \_\_\_\_\_
  - a) Storage dam

C)

- b) Diversion dam
- Both a and b d) None o
  - b d) None of the above
- The portion of a road surface, which is used by vehicular traffic, is known as \_\_\_\_\_.
  - a) carriage-way

b) shoulder

c) express way

d) all of the above

12

# Seat No.

# F.E. (Part - II) (Old) (CBCS) Examination Nov/Dec-2019 **BASIC CIVIL ENGINEERING**

Day & Date: Saturday, 23-11-2019 Time: 10.00 AM To 01.00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable scientific calculator is allowed.
- 4) Assume suitable data if necessary and state it clearly.

### Section – I

#### Q.2 Attempt any four of the following.

- a) Explain with examples knowledge of civil engineering is applicable to other branches of engineering.
- Explain the role of civil engineering various construction activities. b)
- c) With neat sketch explain reciprocal ranging.
- d) What is mean by local attraction? How to detect it.
- What are the temporary adjustment of dumpy level explain with neat e) sketches.
- With neat sketch explain different storage zones of reservoir. **f**)
- Give the detailed classification of road as per IRC. g)

#### Q.3 Attempt any two of the following.

- The length of survey line was measured with a 20 m chain and was found a) to be 1200m. As a check the length was again measured 25 m chain and was found to be 1212 m. On comparing with test gauge it was found to be 1 decimeter too long. Find the actual length of the chain used.
- b) The observed whole circle bearings in a closed compass traverse ABCDA are given below.

Line	AB	BC	CD	DA
FB	46°10'	199°20'	169°30'	280°20'
BB	226°10'	298°40'	351°10'	99°20'

Calculate the inclined angle and apply correction for local attraction and find corrected fore and back bearings. Draw a neat sketch of the traverse. Calculations are must.

The following reading were taken in running a line of levels from a BM of c) 100.00

BS: 1.290 (on BM), 3.115, 0.235, -1.125 (bottom of lintel) FS: 0.025, 0.975, -1.095 (bottom of lintel), 3.565 (at B) Work out staff readings and rule out a page in details

### Section – II

#### Q.4 Attempt any four of the following.

- Differentiate between load bearing and framed structure. a)
- Explain the requirements of earthquake resistant buildings with neat sketches. b)
- Enlist different principles of planning and explain any two with neat sketches. c)
- Enlist the ideal engineering properties and uses of plastic and aluminium. d)
- Differentiate between plain and Reinforced cement concrete. e)
- **f**) Write a short note on green building.

# Max. Marks: 56

16

12

# SLR-FM-8



# SLR-FM-8 Set Q

# Q.5 Attempt any two of the following.

- a) Explain with neat sketch different elements of framed structure. Also give the use of each element.
- **b)** What are the different building bye laws? Explain any two with neat sketches.
- c) Explain the working of remote sensing system and give the applications of GPS.

# Day & Date: Saturday, 23-11-2019 Time: 10.00 AM To 01.00 PM Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book. 2) Use of non-programmable scientific calculator is allowed. 3) Figures to right indicate full marks. 4) Assume suitable data if necessary and state it clearly.

180 min

C)

# **MCQ/Objective Type Questions**

**Duration: 30 Minutes** 

1	Choo sent	Choose the correct alternatives from the options and rewrite the sentence.					
	1)	A ler a) c)	ngth of link of a metric chain is _ 10 cm 30 cm	b) d)	20 cm 100 cm		
	2)	No re a) c)	eservoir is formed in following ty Storage dam Both a and b	rpe of b) d)	Dam Diversion dam None of the above		
	3)	The as a) c)	portion of a road surface, which  carriage-way express way	is us b) d)	ed by vehicular traffic, is known Shoulder all of the above		
	4)	The know a) c)	lowest part of a structure which vn as Super - structure foundation	trans b) d)	mits the load to the soil is Plinth Parapet		
	5)	Whe a) c)	n two or more footings are conr beam footing strap footing	ecteo b) d)	l by a beam, it is called combined footing mat footing		
	6)	One a) c)	of the following does not affect Type of construction Parking facilities	FAR <sub>.</sub> b) d)	Locality of density Colour of building		
	7)	Priva a) c)	acy is of utmost importance in ca Bedroom Bathroom	ase of b) d)	W/c All of above		
	8)	A go a) c)	od building stone should have _ strength resistance to fire	b) d)	hardness and toughness all of the above		
	9)	Initia a)	I setting time for cement should 30 min	not b b)	e less than 120 min		

d)

360 min

**~**1-. . . . . . . . . ... ... • • • . Q.1

Seat No.

# F.E. (Part - II) (Old) (CBCS) Examination Nov/Dec-2019 **BASIC CIVIL ENGINEERING**

Max. Marks: 70

Marks: 14

**SLR-FM-8** 



- SLR-FM-8 Set R
- 10) Electromagnetic energy moves with velocity of \_\_\_\_\_.
  - a) Light c) Magnet

- b) Sound
- Magnet d)
- 11) Following is not a branch of civil engineering \_\_\_\_
  - a) automobile engineering
- b) soil mechanics

Electricity

- c) environmental engineering
- d) hydraulic engineering

.

- 12) Hydrographic surveys deal with the mapping of \_\_\_\_\_.
  - a) Heavenly bodies b) Hills
  - c) Large water bodies d)
- 13) Which of the following reference direction is used in a geodetic survey?
  - a) True meridian
    - b) Magnetic meridiand) Any of the these

Canal system

- c) Arbitrary meridian d)
- 14) Fly leveling is adopted for the purpose of \_\_\_\_\_.
  - a) Establishing new bench Marks
  - b) For checking accuracy of work
  - c) For fixing alignment of road, cannel
  - d) All the above

12

# Seat No.

# F.E. (Part - II) (Old) (CBCS) Examination Nov/Dec-2019 BASIC CIVIL ENGINEERING

Day & Date: Saturday, 23-11-2019 Time: 10.00 AM To 01.00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable scientific calculator is allowed.
- 4) Assume suitable data if necessary and state it clearly.

### Section – I

# Q.2 Attempt any four of the following.

- a) Explain with examples knowledge of civil engineering is applicable to other branches of engineering.
- b) Explain the role of civil engineering various construction activities.
- c) With neat sketch explain reciprocal ranging.
- d) What is mean by local attraction? How to detect it.
- e) What are the temporary adjustment of dumpy level explain with neat sketches.
- f) With neat sketch explain different storage zones of reservoir.
- g) Give the detailed classification of road as per IRC.

### Q.3 Attempt any two of the following.

- a) The length of survey line was measured with a 20 m chain and was found to be 1200m. As a check the length was again measured 25 m chain and was found to be 1212 m. On comparing with test gauge it was found to be 1 decimeter too long. Find the actual length of the chain used.
- **b)** The observed whole circle bearings in a closed compass traverse ABCDA are given below.

Line	AB	BC	CD	DA
FB	46°10'	199°20'	169°30'	280°20'
BB	226°10'	298°40'	351°10'	99°20'

Calculate the inclined angle and apply correction for local attraction and find corrected fore and back bearings. Draw a neat sketch of the traverse. Calculations are must.

c) The following reading were taken in running a line of levels from a BM of 100.00

BS: 1.290 (on BM), 3.115, 0.235, -1.125 (bottom of lintel) FS: 0.025, 0.975, -1.095 (bottom of lintel), 3.565 (at B) Work out staff readings and rule out a page in details

### Section – II

# Q.4 Attempt any four of the following.

- a) Differentiate between load bearing and framed structure.
- b) Explain the requirements of earthquake resistant buildings with neat sketches.
- c) Enlist different principles of planning and explain any two with neat sketches.
- d) Enlist the ideal engineering properties and uses of plastic and aluminium.
- e) Differentiate between plain and Reinforced cement concrete.
- f) Write a short note on green building.

Max. Marks: 56

16

12

SLR-FM-8



# SLR-FM-8 Set R

# 16

# Q.5 Attempt any two of the following.

- a) Explain with neat sketch different elements of framed structure. Also give the use of each element.
- **b)** What are the different building bye laws? Explain any two with neat sketches.
- c) Explain the working of remote sensing system and give the applications of GPS.

	c)	Parking facilities	d)	Colour of building
2)	Priv a) c)	acy is of utmost importance in ca Bedroom Bathroom	ise of b) d)	W/c All of above
3)	A go a) c)	ood building stone should have _ Strength resistance to fire	b) d)	hardness and toughness all of the above
4)	Initia	al setting time for cement should	not b	e less than
	a)	30 min	b)	120 min
	c)	180 min	d)	360 min
5)	Elec	ctromagnetic energy moves with	veloc	ity of
	a)	Light	b)	Sound
	c)	Magnet	d)	Electricity
6)	Folle	owing is not a branch of civil eng	ineer	ing
	a)	automobile engineering	b)	soil mechanics
	c)	environmental engineering	d)	hydraulic engineering
7)	Hyd	rographic surveys deal with the r	napp	ing of
	a)	Heavenly bodies	b)	Hills
	c)	Large water bodies	d)	Canal system
8)	Whi	ch of the following reference dire	ction	is used in a geodetic survey?
	a)	True meridian	b)	Magnetic meridian
	c)	Arbitrary meridian	d)	Any of the these
9)	Fly l a) b) c) d)	leveling is adopted for the purpos Establishing new bench Marks For checking accuracy of work For fixing alignment of road, ca All the above	se of . nnel	

Seat No.

> F.E. (Part - II) (Old) (CBCS) Examination Nov/Dec-2019 **BASIC CIVIL ENGINEERING**

Day & Date: Saturday, 23-11-2019 Time: 10.00 AM To 01.00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

- 2) Use of non-programmable scientific calculator is allowed.
- 3) Figures to right indicate full marks.

One of the following does not affect FAR

Type of construction

4) Assume suitable data if necessary and state it clearly.

Choose the correct alternatives from the options and rewrite the

# **MCQ/Objective Type Questions**

b)

Locality of density

**Duration: 30 Minutes** 

sentence.

a)

1)

Q.1

Set

Max. Marks: 70

S

Marks: 14

**SLR-FM-8** Set S

- 10) A length of link of a metric chain is \_
  - b) 20 cm 10 cm a)
  - 30 cm d) 100 cm c)
- 11) No reservoir is formed in following type of Dam \_\_\_\_
  - Storage dam a)
- Diversion dam b)
- Both a and b None of the above d) c)
- The portion of a road surface, which is used by vehicular traffic, is known 12) as . a)
  - carriage-way b) Shoulder
  - express way d) all of the above C)
- 13) The lowest part of a structure which transmits the load to the soil is known as .
  - a) Super - structure b) Plinth
  - foundation d) Parapet C)
- 14) When two or more footings are connected by a beam, it is called \_\_\_\_\_.
  - beam footing a)

C)

- strap footing
- combined footing b) mat footing d)

# Seat No.

F.E. (Part -II) (Old) (CBCS) Examination Nov/Dec-2019 BASIC CIVIL ENGINEERING

Day & Date: Saturday, 23-11-2019 Time: 10.00 AM To 01.00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable scientific calculator is allowed.
- 4) Assume suitable data if necessary and state it clearly.

### Section – I

# Q.2 Attempt any four of the following.

- a) Explain with examples knowledge of civil engineering is applicable to other branches of engineering.
- b) Explain the role of civil engineering various construction activities.
- c) With neat sketch explain reciprocal ranging.
- d) What is mean by local attraction? How to detect it.
- e) What are the temporary adjustment of dumpy level explain with neat sketches.
- f) With neat sketch explain different storage zones of reservoir.
- g) Give the detailed classification of road as per IRC.

## Q.3 Attempt any two of the following.

- a) The length of survey line was measured with a 20 m chain and was found to be 1200m. As a check the length was again measured 25 m chain and was found to be 1212 m. On comparing with test gauge it was found to be 1 decimeter too long. Find the actual length of the chain used.
- **b)** The observed whole circle bearings in a closed compass traverse ABCDA are given below.

Line	AB	BC	CD	DA
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Calculate the inclined angle and apply correction for local attraction and find corrected fore and back bearings. Draw a neat sketch of the traverse. Calculations are must.

c) The following reading were taken in running a line of levels from a BM of 100.00

BS: 1.290 (on BM), 3.115, 0.235, -1.125 (bottom of lintel) FS: 0.025, 0.975, -1.095 (bottom of lintel), 3.565 (at B) Work out staff readings and rule out a page in details

### Section – II

# Q.4 Attempt any four of the following.

- a) Differentiate between load bearing and framed structure.
- b) Explain the requirements of earthquake resistant buildings with neat sketches.
- c) Enlist different principles of planning and explain any two with neat sketches.
- d) Enlist the ideal engineering properties and uses of plastic and aluminium.
- e) Differentiate between plain and Reinforced cement concrete.
- f) Write a short note on green building.

# Max. Marks: 56

16

12

Set S

SLR-FM-8

# SLR-FM-8 Set S

# 16

# Q.5 Attempt any two of the following.

- a) Explain with neat sketch different elements of framed structure. Also give the use of each element.
- **b)** What are the different building bye laws? Explain any two with neat sketches.
- c) Explain the working of remote sensing system and give the applications of GPS.

		F.E	. (Part – II) (Old) (CBCS) E BASIC ELEC	kami ΓRΟ	nation Nov/Dec-2019 NICS
Day 8 Time	& Date : 10:00	) AN	onday, 25-11-2019 1 To 12:00 PM		Max. Marks: 35
Instr	uction	<b>is:</b> 1 2	) MCQ should be solved in first 1 ) Figures to the right indicate full	5 min mark	utes. s.
			MCQ/Objective Ty	pe C	Questions
Durat	ion: 1	5 Mi	nutes		Marks: 07
Q.1	Choc	se t	he correct alternatives from the back effect is observed in	e opt	ions and rewrite the sentence. 07
	.,	a) c)	LVDT RTD	b) d)	Strain gauge Thermocouple
	2)	The a) c)	e logic gate giving output high whe OR AND	en bo b) d)	th inputs are low is NAND None of these
	3)	Rec a) c)	ctifier efficiency of a full wave rect 48.6% 78%	ifier is b) d)	8 40.6% 81.2%
	4)	A+A a) c)	ΑΒ= Α Β	b) d)	AB A+B
	5)	The a) c)	e average value of half wave rectine 0.159Vm 0.63Vm	fier is b) d)	0.318Vm 0.707Vm
	6)	The a) c)	e relation between $\alpha$ and $\beta$ is give $\alpha = \beta / (1 - \beta)$ $\alpha = (1 + \beta) / \beta$	n by b) d)	$\frac{\alpha = \beta / (1 + \beta)}{\alpha = 1 / (1 + \beta)}$
	7)	For a) c)	CB configuration, current amplified $I_C/I_B$ $I_C/I_E$	catior b) d)	factor is $I_E/I_B$ $I_B/I_E$

Set P

Seat					Set	Ρ
110.	F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2019 BASIC ELECTRONICS					
Day & Time:	Da 10:	ate: Monday, 25-11 00 AM To 12:00 P	2019 M	Ма	x. Marks	s: 28
Instru	ICtio	ons: 1) All question 2) Figures to	s are compulsory. he right indicate full mark	S.		
			Section – I			
Q.2	Att a) b) c)	empt any two of t Explain P- type & Describe active, o Explain capacitor	ne following questions. N- type semiconductors. ut off and saturation regio filter with suitable wavefo	ons of transistor. rm & circuit diagram.		06
Q.3	Att a) b) c)	empt any two of t Explain half wave efficiency. Explain common characteristics. Explain 7 segmer	ne following questions. rectifier with suitable diag emitter transistor configur t LED display with suitab	gram. Derive expression for ation with I/P and O/P e circuit diagram.	or	08
			Section – II			
Q.4	Att a) b) c)	empt any two of t Explain photo ele Simplify following i) $Y = (A + B + A + A + A + A + A + A + A + A + $	tric pickup. Boolean expressions. $\overline{C} \cdot (\overline{A} + B + C)$ $\overline{AB}$ ates using NAND gates of	only.		06
Q.5	Att a) b)	empt any two of t Discuss selection Perform binary su i) Subtract (74)	ne following questions. parameters of electrical t btraction using 2's compl from (143) <sub>8</sub>	ransducer. ement method only		08

- ii) Subtract (4AC)<sub>16</sub> from (5FF)<sub>16</sub>c) Explain LVDT with suitable diagrams.

Seat No.		
	F.E. (Part – II	) (Old) (CBCS) Examination Nov/Dec-2019 BASIC ELECTRONICS

Day & Date: Monday, 25-11-2019 Time: 10:00 AM To 12:00 PM

Instructions: 1) MCQ should be solved in first 15 minutes.

2) Figures to the right indicate full marks.

#### - 1 !-4: -

			MCQ/Objective Ty	ире С	luestions	
Durat	tion: 1	5 Mi	nutes	•	Marks	: 07
Q.1	Choc 1)	<b>ose t</b> Th∉ a) c)	the correct alternatives from th average value of half wave recti 0.159Vm 0.63Vm	<b>e opt</b> fier is b) d)	ions and rewrite the sentence. 0.318Vm 0.707Vm	07
	2)	Th∉ a) c)	e relation between $\alpha$ and $\beta$ is give $\alpha = \beta / (1 - \beta)$ $\alpha = (1 + \beta) / \beta$	en by b) d)	$\frac{\alpha = \beta / (1 + \beta)}{\alpha = 1 / (1 + \beta)}$	
	3)	For a) c)	CB configuration, current amplifi $I_C/I_B$ $I_C/I_E$	catior b) d)	factor is $I_E/I_B$ $I_B/I_E$	
	4)	See a) c)	e back effect is observed in LVDT RTD	b) d)	Strain gauge Thermocouple	
	5)	The a) c)	e logic gate giving output high who OR AND	en bo b) d)	th inputs are low is NAND None of these	
	6)	Reo a) c)	ctifier efficiency of a full wave rect 48.6% 78%	tifier is b) d)	s 40.6% 81.2%	
	7)	A+A a) c)	AB= A B	b) d)	AB A+B	

# SLR-FM-9

Set

Q

Max. Marks: 35

Seat No.		Set Q
	F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2 BASIC ELECTRONICS	2019
Day & Time:	Date: Monday, 25-11-2019 10:00 AM To 12:00 PM	Max. Marks: 28
Instru	<ul><li>ctions: 1) All questions are compulsory.</li><li>2) Figures to the right indicate full marks.</li></ul>	
	Section – I	
Q.2	<ul> <li>Attempt any two of the following questions.</li> <li>a) Explain P- type &amp; N- type semiconductors.</li> <li>b) Describe active, cut off and saturation regions of transistor.</li> <li>c) Explain capacitor filter with suitable waveform &amp; circuit diagram.</li> </ul>	06
Q.3	<ul> <li>Attempt any two of the following questions.</li> <li>a) Explain half wave rectifier with suitable diagram. Derive express efficiency.</li> <li>b) Explain common emitter transistor configuration with I/P and O/F characteristics.</li> <li>c) Explain 7 segment LED display with suitable circuit diagram.</li> </ul>	08 ion for
	Section – II	
Q.4	Attempt any two of the following questions. a) Explain photo electric pickup. b) Simplify following Boolean expressions. i) $Y = \overline{(A + B + \overline{C}) \cdot (\overline{A} + B + C)}$ ii) $Y = \overline{(AB + \overline{A} + AB)}$ c) Implement basic gates using NAND gates only.	06
Q.5	<ul> <li>Attempt any two of the following questions.</li> <li>a) Discuss selection parameters of electrical transducer.</li> <li>b) Perform binary subtraction using 2's complement method only</li> <li>i) Subtract (74)<sub>8</sub> from (143)<sub>8</sub></li> <li>ii) Subtract (44C) from (555)</li> </ul>	08

# Seat No.

- ii) Subtract (4AC)<sub>16</sub> from (5FF)<sub>16</sub>c) Explain LVDT with suitable diagrams.

Seat No.	t					Set	R
		F.E. (Part –	II) (OId) (CBCS BASIC EL	6) Exam .ECTRO	ination Nov/Dec-20 NICS	19	
Day & Time	& Date : 10:0	e: Monday, 25- 0 AM To 12:00	11-2019 PM		r	Max. Marks	: 35
Instr	uctior	<b>ns:</b> 1) MCQ sho 2) Figures t	ould be solved in f o the right indicate	irst 15 mir e full mark	nutes. s.		
			MCQ/Objective	e Type (	Questions		
Dura	tion: 1	5 Minutes	•			Marks	: 07
Q.1	<b>Choo</b> 1)	<b>Dise the correc</b> Rectifier efficie a) 48.6% c) 78%	t alternatives from ency of a full wave	<b>m the op</b> t e rectifier i b) d)	tions and rewrite the s s 40.6% 81.2%	entence.	07
	2)	A+AB= a) A c) B		b) d)	AB A+B		
	3)	The average v a) 0.159Vm c) 0.63Vm	alue of half wave	rectifier is b) d)	6 0.318Vm 0.707Vm		
	4)	The relation b a) $\alpha = \beta / (1)$	etween <i>α</i> and <i>β</i> is $(-\beta)$	s given by b)	$\underline{\alpha = \beta / (1 + \beta)}$		

For CB configuration, current amplification factor is \_\_\_\_\_.

 $\alpha = 1 / (1 + \beta)$ 

Strain gauge

Thermocouple

None of these

 $I_E/I_B$ 

 $I_{\rm B}/I_{\rm E}$ 

NAND

d)

b)

d)

\_\_-b)

d)

b)

d)

The logic gate giving output high when both inputs are low is \_\_\_\_\_.

c)  $\alpha = (1 + \beta) / \beta$ 

See back effect is observed in \_\_\_\_

a)  $I_C/I_B$ 

c)  $I_C/I_E$ 

a) LVDT

c) RTD

a) OR c) AND

5)

6)

7)

Seat

SLR-FM-9

Seat No.			:	Set	R
		F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2 BASIC ELECTRONICS	2019		
Day 8 Time:	k Da 10:	ate: Monday, 25-11-2019 00 AM To 12:00 PM	Max. I	Marks	: 28
Instru	uctio	<ul><li>ons: 1) All questions are compulsory.</li><li>2) Figures to the right indicate full marks.</li></ul>			
		Section – I			
Q.2	Att a) b) c)	empt any two of the following questions. Explain P- type & N- type semiconductors. Describe active, cut off and saturation regions of transistor. Explain capacitor filter with suitable waveform & circuit diagram.			06
Q.3	Att a) b) c)	empt any two of the following questions. Explain half wave rectifier with suitable diagram. Derive expression efficiency. Explain common emitter transistor configuration with I/P and O/P characteristics. Explain 7 segment LED display with suitable circuit diagram.	on for		08
	,	Section – II			
Q.4	Att a) b) c)	empt any two of the following questions. Explain photo electric pickup. Simplify following Boolean expressions. i) $Y = \overline{(A + B + \overline{C}) \cdot (\overline{A} + B + C)}$ ii) $Y = \overline{(A\overline{B} + \overline{A} + AB)}$ Implement basic gates using NAND gates only.			06
Q.5	Att a) b)	empt any two of the following questions. Discuss selection parameters of electrical transducer. Perform binary subtraction using 2's complement method only i) Subtract (74) <sub>8</sub> from (143) <sub>8</sub>			80

- ii) Subtract (4AC)<sub>16</sub> from (5FF)<sub>16</sub>c) Explain LVDT with suitable diagrams.

# Seat No.

Seat No.			
	F.E. (Part – II	) (Old) (CBCS) Examinat BASIC ELECTRONIC	tion Nov/Dec-2019 S
Day & [ Time: 1	Date: Monday, 25-11 0:00 AM To 12:00 P	-2019 M	Мах
Instruc	tions: 1) MCQ shou	ld be solved in first 15 minutes	6.

**Duration: 15 Minutes** 

2) Figures to the right indicate full marks.

# MCQ/Objective Type Questions

Q.1	<b>Choo</b> 1)	<b>se t</b> The	<b>he correct alternatives from the</b> relation between <i>α</i> and <i>β</i> is give	e opti n by	ions and rewrite the sentence.
	,	a) c)	$\alpha = \beta / (1 - \beta)$ $\alpha = (1 + \beta) / \beta$	b) d)	$ \frac{\alpha = \beta / (1 + \beta)}{\alpha = 1 / (1 + \beta)} $
	2)	For a) c)	CB configuration, current amplified $I_C/I_B$ $I_C/I_E$	cation b) d)	factor is $I_E/I_B$ $I_B/I_E$
	3)	See a) c)	e back effect is observed in LVDT RTD	b) d)	Strain gauge Thermocouple
	4)	The a) c)	e logic gate giving output high whe OR AND	en bot b) d)	th inputs are low is NAND None of these
	5)	Rec a) c)	ctifier efficiency of a full wave rect 48.6% 78%	ifier is b) d)	8 40.6% 81.2%
	6)	A+A a) c)	ΑΒ= Α Β	b) d)	AB A+B
	7)	The a) c)	e average value of half wave recti 0.159Vm 0.63Vm	fier is b) d)	0.318Vm 0.707Vm



SLR-FM-9

Marks: 07

07

Max. Marks: 35

		F.E. (Part – II) (Old) (CBCS) Examination Nov/Dec-2 BASIC ELECTRONICS	2019
Day a Time	& Da : 10	ate: Monday, 25-11-2019 :00 AM To 12:00 PM	Max. Marks: 28
Instr	ucti	<ul><li>ons: 1) All questions are compulsory.</li><li>2) Figures to the right indicate full marks.</li></ul>	
		Section – I	
Q.2	Att a) b) c)	empt any two of the following questions. Explain P- type & N- type semiconductors. Describe active, cut off and saturation regions of transistor. Explain capacitor filter with suitable waveform & circuit diagram.	06
Q.3	Att a) b) c)	empt any two of the following questions. Explain half wave rectifier with suitable diagram. Derive expression efficiency. Explain common emitter transistor configuration with I/P and O/P characteristics. Explain 7 segment LED display with suitable circuit diagram.	<b>08</b> on for
		Section – II	
Q.4	Att a) b) c)	The empt any two of the following questions. Explain photo electric pickup. Simplify following Boolean expressions. i) $Y = \overline{(A + B + \overline{C}) \cdot (\overline{A} + B + C)}$ ii) $Y = \overline{(A\overline{B} + \overline{A} + AB)}$ Implement basic gates using NAND gates only.	06
Q.5	Att a) b)	<ul> <li>empt any two of the following questions.</li> <li>Discuss selection parameters of electrical transducer.</li> <li>Perform binary subtraction using 2's complement method only</li> <li>i) Subtract (74)<sub>8</sub> from (143)<sub>8</sub></li> <li>ii) Subtract (4AC) to from (5EE) to 500000000000000000000000000000000000</li></ul>	08

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- ii) Subtract (4AC)<sub>16</sub> from (5FF)<sub>16</sub>c) Explain LVDT with suitable diagrams.

Page	1	of	3

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# F.E. (Part - II) (Old) (CBCS) Examination Nov/Dec-2019 **ENGINEERING GRAPHICS**

Day & Date: Tuesday, 26-11-2019 Time: 10:00 AM To 02:00 PM

**Instructions:** 1) All questions are compulsory.

- 2) Q.1 is objective type, return objective answer sheet to junior supervisor after first 40 minutes.
- Retain all construction lines.
- 4) Assume suitable data if required and mention it.
- 5) All dimensions are in mm
- 6) Return all answer sheets to the junior supervisor irrespective of their use.
- 7) Figures to the right indicate full marks.

### Section I

#### Q.1 Solve any FOUR: (Objective Type)

- Complete projections of Line AB, 70 mm long, having point B 50 mm above 03 a) HRP, having bearing of S40Ewith respect to A. [Refer figure (a)]
- Complete projections of Line PQ, having grade 60%. Find Bearing of Line. b) 03 [Refer figure (b)]
- Complete projections of Line PQ, perpendicular to Line AB. Find true length 03 C) of PQ.[Refer figure (c)] 04
- Find strike and Dip of Plane PQR[ Refer figure (d)] d)
- Complete projections of parallelogram ABCD. [Refer figure (e)] e)
- Draw front view of plane ABC having strike of S60W and dips 45<sup>0</sup>NW.[Refer **f**) 04 figure (f)]

#### Q.2 Solve the following:

- A line MN has grade 75% w.r.t. M, its bearing w.r.t. M is S45<sup>0</sup>E and its front a) 04 view length is 60 mm. Draw the projections of line MN and find its true angle with VP. Point M is 15 mm above H.P and 15 mm in front of VP.
- Line AB,50 mm long has bearing of S45<sup>0</sup>E and gradient of 100%. Draw its 03 b) elevation and plan. Point A is 15 mm above HP and 15 mm in front of VP.
- Find the inclination of triangular plane PQR with VP. The coordinates of the C) 04 points are: P (30,50,110), Q (50,20,140), R (90,70,100)
- Q.3 A thin rectangular plate PQRS having sides PQ=RS=40 mm and QR= PS=70 07 mm is resting on one of its small sides PQ on HP. Its top view appears as square of sides 40 mm. Draw the projections of plate when PQ makes an angle of  $40^{\circ}$ with VP.
- Q.4 A pentagonal prism side of base 50mm and height 80mm is held on a corner of 10 its base on HP. The axis of the prism makes 50<sup>°</sup> with HP and 40<sup>°</sup> with VP. Draw the projections of the prism.

### OR

A square pyramid, side of base 40 mm and axis length 60 mm is kept on HP on 10 one of its base corners, in such a way that its axis makes 300 with HP and 450 with VP. Draw the projections of the pyramid keeping apex away from the observer.

Max. Marks: 70

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### Section II

- Q.5 Figure shows a pictorial view of an object. Draw following views by using first 14 angle projection method
  - a) Sectional elevation in the direction of 'X' along A-B
  - b) Left hand side view
  - c) Plan



Q.6 A tetrahedron with all sides 50mm rest on one of its corner in HP and tilts to have 07 axis 45<sup>0</sup> to HP and parallel to VP. It is cut by section plane inclined to HP in such way that top view of section appears as trapezium with parallel sides 8mm and 36mm. Complete projection. Also find angle made by cutting plane with HP.

OR

A cone of base circle diameter 50mm axis 75mm is lying on ground on one of its generator with its axis parallel to VP. It cut by horizontal section plane 20mm above ground. Draw Front view, sectional top view and true shape of section.

**Q.7** Draw the development of lateral surfaces of cut hexagonal prism.



A Hexagonal pyramid side of base 30 mm and axis 70 mm long is resting on base in HRP with a side parallel to FRP. It is cut by an auxiliary inclined plane passing through extreme right hand corner of base and inclined at 45<sup>0</sup> to HRP. Draw front view, top view and development of lateral surfaces of cut hexagonal pyramid.

# F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019

**ENGINEERING MATHEMATICS – I** 

Day & Date: Friday, 06-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.

- 2) Figures to the right indicate full marks.
- 3) Use of non programmable calculator is allowed.

### **MCQ/Objective Type Questions**

### **Duration: 30 Minutes**

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# Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

1)	If $y = \frac{x^n - 1}{x - 1}$ then $y_n = $		
	a) $0^{x-1}$ c) 1	b) d)	n! (n-1)!
2)	If $y = 2^{x}x$ the $y_{n} = $ a) $2^{x}[(\log 2)^{n} + n(\log 2)^{n-3}]$ c) $2^{x}[(\log 2)^{n} + n(\log 2)^{n-1}]$	b) d)	$2^{x}[(\log 2)^{n} + (\log 2)^{n-3}]$ $2^{x}[(\log 2)^{n} + (\log 2)^{n-1}]$
3)	lf $L = lim_{x \to 0} (cos x)^{\frac{1}{x^2}}$ then $L = $ a) $\frac{-1}{2}$	b)	$-\log 2$
	c) $e^{\frac{-1}{2}}$	d)	-2
4)	The expansion of $\log(1 - x) = $ a) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$	 b)	$-x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \cdots$
	c) $x - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \cdots$	d)	$x - \frac{x^2}{2!} - \frac{x^3}{3!} - \frac{x^4}{4!} - \cdots$
5)	$\sinh^{-1}\frac{3}{4} = $		
	a) log 1 c) log 3	b) d)	log 2 log 4
6)	log(1 + i) = a) $log 2 + i$	b)	$\frac{1}{2}\log 2 - i\frac{\pi}{4}$
	c) $\frac{1}{2}\log 2 + i\frac{\pi}{4}$	d)	$\log 2 + i\frac{\pi}{4}$
7)	If $x = e^{i\theta}$ and $y = e^{-i\theta}$ then $x^n - y^n =$ a) $\cos^n \theta + \sin^n \theta$ c) $2\cos n\theta$	b) d)	$\frac{1}{2}\cos^{n}\theta$ $2i\sin n\theta$

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Max. Marks: 70

Marks: 14

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**SLR-FM-610** Set If  $k \neq 0$  then the rank of matrix A is where  $A = \begin{pmatrix} k & k & k \\ k & k & k \\ k & k & k \end{pmatrix}$ 8) a) 2 b) k c) 0 d) 1 If rank of matrix  $[A]_{3\times 3}$  is 2, then the value of |A|= \_\_\_\_\_. 9) b) 0 a) 1 d) -1 C) 2 If the characteristic equation of the matrix A is  $\lambda^2 - \lambda - 1 = 0$  then \_\_\_\_\_. 10) a)  $A^{-1}$  does not exists b)  $A^{-1} = A + 1$ c)  $A^{-1}$  exists but cannot be determine from existing data d)  $A^{-1} = A - 1$ 11) If 1, 1, 8 are eigen values and 5, 2, k are diagonal elements of matrix  $[A]_{3\times 3}$ . then the value of K equals. a) 0 b) 1 c) 2 d) 3 If  $u = e^{xy^2z^3}$  then  $\frac{\partial u}{\partial z} =$ \_\_\_\_\_. a)  $e^{xy^2z^3} xy^2z^3$ c)  $e^{xy^2z^3} 3xy^2z^2$ 12) b)  $e^{xy^2z^3}y^2z^3$ d)  $e^{xy^2z^3}2xyz^3$ If (x, y, z) = 0 then the value of  $\frac{\partial z}{\partial x} =$ \_\_\_\_\_. 13) b)  $\frac{\frac{\partial y}{\partial x}}{\frac{\partial x}{\partial g}}$  $\frac{\partial g}{\partial z} \\ \frac{\partial z}{\partial y}$ a) d)  $-\frac{\frac{\partial g}{\partial x}}{\frac{\partial g}{\partial g}}$ ду дg C) The percentage error in the area of a circle when an error of 1% is made in 14) measuring its radius is \_\_\_\_\_. 3

a) 4 b) 3 c) 2 d) 1

Seat No.			Set	Ρ
		F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-20 ENGINEERING MATHEMATICS - I	019	
Day 8 Time:	& Da : 10:	ate: Friday, 06-12-2019 :00 AM To 01:00 PM	Max. Marks	s: 56
Instru	ucti	ons: 1) Q. No. 5 & Q. No. 9 is compulsory. solve any two questions Section.	s from each	
		<ul><li>2) Use of non programmable calculator is allowed.</li><li>3) Figure to the right indicates full marks.</li></ul>		
		Section – I		
Q.2	Att	empt the following questions.		09
	a)	Find the nth derivative of $y = \frac{x-1}{x+1} + \sin x \cos x \cos 2x$		
	b) c)	Find the nth derivative of $y = e^{-x} \cdot x \cdot \cos x$ If $y^{1/m} + y^{-1/m} = 2x$ then prove that		
		$(x^{2} - 1)y_{n+2} + (2n+1)xy_{n+1} + (n^{2} - m^{2})y_{n} = 0$		
Q.3	Att	empt the following questions.		09
	a)	Expand $8 + 7(x + 2) + 6(x + 2)^2 + 5(x + 2)^3 + (x + 2)^4$ in powers	s of	
	b)	(x + 1) Expand $\log(1 + e^x)$ in powers of x up to $x^2$ .		
	c)	Find all the values of <i>a</i> , <i>b</i> , <i>c</i> if. $\lim_{x \to \infty} \frac{x(a + b\cos x) - c\sin x}{x^5} = 1$		
Q.4	Att	empt the following questions.		09
	a)	Prove that $(1 + i\sqrt{3})^8 + (1 - i\sqrt{3})^8 = -2^8$		
	b)	Separate in to real and imaginary parts.		
		$\begin{array}{l} \text{I}  Log \ (3+4i) \\ \text{II}  -\sqrt{i} \end{array}$		
	$\sim$	$\frac{11}{\sqrt{i}}$		
05	с) ли	Find all the values of $(-1)^{-7}$		40
Q.5	Atte	Separate into real and imaginary parts $\cos^{-1}{3i}$		10
	, b)	Separate into real and imaginary parts $\cos\left(\frac{1}{4}\right)$		
	5)	$\frac{1}{1}$		
		$\phi = \frac{1}{2}\log\cot\alpha/2$		
		And $\pi$		
	- \	$2\theta = n\pi + \frac{1}{2} + \alpha$		
	C)	If $u + iv = \cosh\left(\alpha + \frac{u}{4}\right)$ Prove that $u^2 - v^2 = \frac{1}{2}$		

#### Section – II

### Q.6 Attempt the following questions.

- a) Find the rank of the matrix by reducing it to Normal from
- b) Solve the equations
  - x + y z + s = 0, x y + 2z s = 0, 3x + y + s = 0
- c) Investigate for what value of  $\mu$  and  $\lambda$  the equations.
  - 2x + 3y + 5z = 9, 7x + 3y 2z = 8,  $2x + 3y + \lambda z = \mu$  will have
  - 1) No. solution
  - 2) Infinite solutions
  - 3) Unique solution

#### Q.7 Attempt the following questions.

a) Verify Cayley Hamilton theorem for A where

$$A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$$

Find the Eigen Values and Eigen Vector for the Smallest Eigen Value for b) (8 - 8 - 2)Α

$$I = \begin{pmatrix} 4 & -3 & -2 \\ 3 & -4 & 1 \end{pmatrix}$$

c) Examine the vector for Linear Dependence and Independence [3, 1, 1], [2, 0, -1], [4, 2, 1]

#### Attempt the following questions. **Q.8**

- A rectangular box open at top is have volume 32 cubic unit. Find its a) dimensions if the material required is least.
- **b)** Find the stationary value of xy(1 x y)
- c) If  $x = u \cos v$ ,  $y = u \sin v$  prove that J J' = 1.

# **Q.9** Attempt the following questions.

a) If 
$$u = \sin^{-1} \left[ \frac{x^{1/4} + y^{1/4}}{x^{1/5} + y^{1/5}} \right]$$
 then find the values of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$   
and  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$ 

- **b)** If u = lx + my and v = ly mx and z is function of u, v then prove that  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = (l^2 + m^2) \left[ \frac{\partial^2 z}{\partial n^2} + \frac{\partial^2 q}{\partial y^2} \right]$
- **c)** If  $u = (x^2 + y^2 + z^2)^{-1/2}$ Find the value of  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2}$

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#### Max. Marks: 70 answer book. 2) Figures to the right indicate full marks. 3) Use of non programmable calculator is allowed. **MCQ/Objective Type Questions Duration: 30 Minutes** Marks: 14 Q.1 Choose the correct alternatives from the options and rewrite the sentence. $(k \ k \ k)$ If $k \neq 0$ then the rank of matrix A is where $A = \begin{pmatrix} k & k \\ k & k \end{pmatrix}$ a) 2 b) k d) c) 0 1 If rank of matrix $[A]_{3\times 3}$ is 2, then the value of |A| =\_\_\_\_\_. a) 1 b) 0 2 d) -1 C) If the characteristic equation of the matrix A is $\lambda^2 - \lambda - 1 = 0$ then \_\_\_\_\_. a) $A^{-1}$ does not exists b) $A^{-1} = A + 1$ $A^{-1}$ exists but cannot be determine from existing data c) d) $A^{-1} = A - 1$ If 1, 1, 8 are eigen values and 5, 2, k are diagonal elements of matrix $[A]_{3\times 3}$ . then the value of K equals. a) 0 b) 1 c) 2 d) 3 If $u = e^{xy^2z^3}$ then $\frac{\partial u}{\partial z} =$ \_\_\_\_\_. a) $e^{xy^2z^3}xy^2z^3$ b) $e^{xy^2z^3}y^2z^3$ d) $e^{xy^2z^3}2xyz^3$ c) $e^{xy^2z^3} 3xy^2z^2$

Seat No.

# F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **ENGINEERING MATHEMATICS – I**

Day & Date: Friday, 06-12-2019 Time: 10:00 AM To 01:00 PM

5)

Instructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in

- 1)
- 2)
- 3)
- 4)

  - If (x, y, z) = 0 then the value of  $\frac{\partial z}{\partial x} =$  \_\_\_\_\_. 6)
    - $\partial y$ дх ∂x дg b) a) ∂x ∂z дg дy ду дg C) d)

14

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7) The percentage error in the area of a circle when an error of 1% is made in measuring its radius is \_\_\_\_\_. 3 a) 4 b) C) 2 d) 1 If  $y = \frac{x^n - 1}{x - 1}$  then  $y_n =$ \_\_\_\_. a) 0 8) b) n!c) (n-1)!1 d) If  $y = 2^{x} x$  the  $y_n =$ \_\_\_\_\_. a)  $2^{x} [(\log 2)^n + n(\log 2)^{n-3}]$ 9) b)  $2^{x} [(\log 2)^{n} + (\log 2)^{n-3}]$ c)  $2^{x} [(\log 2)^{n} + n(\log 2)^{n-1}]$ d)  $2^{x} [(\log 2)^{n} + (\log 2)^{n-1}]$ If  $L = \lim_{x \to 0} (\cos x)^{\frac{1}{x^2}}$  then L =\_\_\_\_\_. 10) a)  $\frac{-1}{2}$ b) - log 2 C)  $\rho^{\frac{-1}{2}}$ d) -211) The expansion of log(1 - x) =b)  $-x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \cdots$  $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$ a) d)  $x - \frac{x^2}{2!} - \frac{x^3}{3!} - \frac{x^4}{4!} - \cdots$ C)  $x - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \cdots$  $\sinh^{-1}\frac{3}{4} =$ \_\_\_\_\_. 12) a)  $\log 1$ b) log 2 c)  $\log 3$ d) log 4 13)  $\log(1+i) = \_\_\_.$ a)  $\log 2 + i$ b)  $\frac{1}{2}\log 2 - i\frac{\pi}{4}$ c)  $\frac{1}{2}\log 2 + i\frac{\pi}{\Lambda}$ d)  $\log 2 + i \frac{\pi}{4}$ If  $x = e^{i\theta}$  and  $y = e^{-i\theta}$  then  $x^n - y^n =$ 14) a)  $\cos^n \theta + \sin^n \theta$ b)  $2\cos^n\theta$ 

d)

 $2i \sin n\theta$ 

C)

 $2\cos n\theta$ 

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Seat No.	t		Set	Q
		F.E. (Part – I) (Old) (CO ENGINEERI	SPA) Examination Nov/Dec-2019 NG MATHEMATICS - I	
Day & Time:	& Da : 10:	ite: Friday, 06-12-2019 00 AM To 01:00 PM	Max. Mark	s: 56
Instru	ucti	ons: 1) Q. No. 5 & Q. No. 9 is Section.	compulsory. solve any two questions from each	l
		<ol> <li>Use of non programma</li> <li>Figure to the right indic</li> </ol>	able calculator is allowed. cates full marks.	
			Section – I	
Q.2	Att	empt the following questions	5. r_1	09
	a)	Find the nth derivative of $y =$	$\frac{x-1}{x+1} + \sin x \cos x \cos 2x$	
	b) c)	Find the nth derivative of $y =$ If $y^{1/m} + y^{-1/m} = 2x$ then pro-	$e^{-x} \cdot x \cdot \cos x$ we that	
		$(x^2 - 1)y_{n+2} + (2n+1)xy_{n+2}$	$y_1 + (n^2 - m^2)y_n = 0$	
Q.3	Att	empt the following questions	5.	09
	a)	Expand $8 + 7(x + 2) + 6(x + (x + 1))$	$(2)^{2} + 5(x+2)^{3} + (x+2)^{4}$ in powers of	
	b)	(x + 1) Expand $\log(1 + e^x)$ in powers	s of x up to $x^2$ .	
	c)	Find all the values of $a, b, c$ if.	$\lim_{x \to \infty} \frac{\dot{x}(a+b\cos x) - c\sin x}{x^5} = 1$	
Q.4	Att	empt the following questions	5.	09
	a)	Prove that $(1 + i\sqrt{3})^8 + (1 - i\sqrt{3})^8$	$i\sqrt{3}$ ) <sup>8</sup> = -2 <sup>8</sup>	
	b)	Separate in to real and imaginal $I = I = a \left(2 + 4i\right)$	hary parts.	
		i) $Log(3+4l)$ ii) $r^{\sqrt{l}}$		
	c)	Find all the values of $(-1)^{1/6}$		
Q.5	Att	empt the following questions	S.	10
	a)	Separate into real and imagin	ary parts $\cos^{-1}\left(\frac{3i}{4}\right)$	
	b)	If $\tan(\theta + i\phi) = \tan \alpha + i \sec \alpha$	r prove that	
		$\phi = \frac{1}{2} \log \cot \alpha / 2$		
		And		
		$2\theta = n\pi + \frac{\pi}{2} + \alpha$		
	c)	If $u + iv = \cosh\left(\alpha + \frac{i\pi}{4}\right)$ Prov	e that $u^2 - v^2 = \frac{1}{2}$	

#### Section – II

### Q.6 Attempt the following questions.

- a) Find the rank of the matrix by reducing it to Normal from
- b) Solve the equations
  - x + y z + s = 0, x y + 2z s = 0, 3x + y + s = 0
- c) Investigate for what value of  $\mu$  and  $\lambda$  the equations.
  - 2x + 3y + 5z = 9, 7x + 3y 2z = 8,  $2x + 3y + \lambda z = \mu$  will have
  - 1) No. solution
  - 2) Infinite solutions
  - 3) Unique solution

## Q.7 Attempt the following questions.

a) Verify Cayley Hamilton theorem for A where

$$A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$$

Find the Eigen Values and Eigen Vector for the Smallest Eigen Value for b) (8 - 8 - 2)A

$$I = \begin{pmatrix} 4 & -3 & -2 \\ 3 & -4 & 1 \end{pmatrix}$$

c) Examine the vector for Linear Dependence and Independence [3, 1, 1], [2, 0, -1], [4, 2, 1]

#### Attempt the following questions. **Q.8**

- A rectangular box open at top is have volume 32 cubic unit. Find its a) dimensions if the material required is least.
- **b)** Find the stationary value of xy(1 x y)
- c) If  $x = u \cos v$ ,  $y = u \sin v$  prove that J J' = 1.

## Q.9 Attempt the following questions.

a) If 
$$u = \sin^{-1} \left[ \frac{x^{1/4} + y^{1/4}}{x^{1/5} + y^{1/5}} \right]$$
 then find the values of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$   
and  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$ 

- **b)** If u = lx + my and v = ly mx and z is function of u, v then prove that  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = (l^2 + m^2) \left[ \frac{\partial^2 z}{\partial p^2} + \frac{\partial^2 q}{\partial y^2} \right]$
- c) If  $u = (x^2 + y^2 + z^2)^{-1/2}$ Find the value of  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2}$

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# F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 ENGINEERING MATHEMATICS – I

Day & Date: Friday, 06-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.

- 2) Figures to the right indicate full marks.
- 3) Use of non programmable calculator is allowed.

### **MCQ/Objective Type Questions**

## **Duration: 30 Minutes**

# Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14 1) $\sinh^{-1}\frac{3}{4} =$ \_\_\_\_\_.

	a) c)	log 1 log 3	b) d)	log 2 log 4
2)	log a)	$(1+i) = \underline{\qquad}.$ $\log 2 + i$	b)	$\frac{1}{2}\log 2 - i\frac{\pi}{4}$
	c)	$\frac{1}{2}\log 2 + i\frac{\pi}{4}$	d)	$\log 2 + i\frac{\pi}{4}$
3)	lf <i>x</i> a) c)	= $e^{i\theta}$ and $y = e^{-i\theta}$ then $x^n - y^n = \cos^n \theta + \sin^n \theta$ $2 \cos n\theta$	= b) d)	$\frac{1}{2}\cos^{n}\theta$ $2i\sin n\theta$ $(k-k-k)$
4)	lf k	$\neq$ 0 then the rank of matrix A is w	vhere	$A = \begin{pmatrix} \kappa & \kappa & \kappa \\ k & k & k \\ k & k & k \end{pmatrix}$
	a) c)	2 0	b) d)	k 1
5)	lf ra	ank of matrix $[A]_{3\times 3}$ is 2, then the	value	of  A =
	a) c)	2	d)	-1
6)	lf th a) b) c) d)	the characteristic equation of the m $A^{-1}$ does not exists $A^{-1} = A + 1$ $A^{-1}$ exists but cannot be determ $A^{-1} = A - 1$	natrix ine fro	A is $\lambda^2 - \lambda - 1 = 0$ then om existing data
7)	lf 1 the	, 1, 8 are eigen values and 5, 2, k n the value of K equals	are c	liagonal elements of matrix $[A]_{3\times 3}$ .
	a) c)	0 2	b) d)	1 3
8)	lf u	$e^{z} = e^{xy^2z^3}$ then $\frac{\partial u}{\partial z} = 0$ .	ς,	-
	a)	$e^{xy^2z^3}xy^2z^3$	b)	$e^{xy^2z^3}y^2z^3$
	c)	$e^{xy^2z^3} 3xy^2z^2$	d)	$e^{xy^2z^3}$ $2xyz^3$

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Marks: 14

# SLR-FM-610 Set R



10) The percentage error in the area of a circle when an error of 1% is made in measuring its radius is \_\_\_\_\_.

	a) 4	b)	3
	c) 2	d)	1
11)	If $y = \frac{x^n - 1}{x - 1}$ then $y_n = $		
	a) 0	b)	n!
	c) 1	d)	(n-1)!
12)	If $y = 2^{x} x$ the $y_{n} =$		
	a) $2^{x}[(\log 2)^{n} + n(\log 2)^{n-3}]$	b)	$2^{x}[(\log 2)^{n} + (\log 2)^{n-3}]$
	c) $2^{x}[(\log 2)^{n} + n(\log 2)^{n-1}]$	d)	$2^{x}[(\log 2)^{n} + (\log 2)^{n-1}]$
13)	If $L = \lim_{x \to 0} (\cos x)^{\frac{1}{x^2}}$ then $L =$		
	-1 -1	 b)	log 2
	a) <u>2</u>	0)	$-\log 2$
	<b>C)</b> $a^{-\frac{1}{2}}$	d)	-2

c) 
$$e^{\frac{-1}{2}}$$
 d)

14) The expansion of 
$$\log(1-x) =$$
\_\_\_\_\_.  
a)  $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$  b)  $-x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \cdots$   
c)  $x - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \cdots$  d)  $x - \frac{x^2}{2!} - \frac{x^3}{3!} - \frac{x^4}{4!} - \cdots$ 

Seat No.			Set	R
		F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2 ENGINEERING MATHEMATICS - I	019	
Day & Time:	& Da : 10:	ate: Friday, 06-12-2019 :00 AM To 01:00 PM	Max. Marks	s: 56
Instru	ucti	ons: 1) Q. No. 5 & Q. No. 9 is compulsory. solve any two questions Section.	s from each	
		<ul><li>2) Use of non programmable calculator is allowed.</li><li>3) Figure to the right indicates full marks.</li></ul>		
		Section – I		
Q.2	Att	empt the following questions.		09
	a)	Find the nth derivative of $y = \frac{x-1}{x+1} + \sin x \cos x \cos 2x$		
	b) c)	Find the nth derivative of $y = e^{-x} \cdot x \cdot \cos x$ If $y^{1/m} + y^{-1/m} = 2x$ then prove that		
		$(x^{2} - 1)y_{n+2} + (2n+1)xy_{n+1} + (n^{2} - m^{2})y_{n} = 0$		
Q.3	Att	empt the following questions.		09
	a)	Expand $8 + 7(x + 2) + 6(x + 2)^2 + 5(x + 2)^3 + (x + 2)^4$ in powers	s of	
	ь)	(x + 1) Expand $\log(1 + a^x)$ in powers of x up to $x^2$		
	c)	Find all the values of <i>a</i> , <i>b</i> , <i>c</i> if. $\lim_{x \to a} \frac{x(a + b \cos x) - c \sin x}{c} = 1$		
04	Δ++	$x \to \infty$ $x^{5}$		na
ч.т	a)	Prove that $(1 + i\sqrt{2})^8 + (1 - i\sqrt{2})^8 - 2^8$		03
	b)	Separate in to real and imaginary parts		
	~,	i) $Log(3+4i)$		
		ii) $\sqrt{i}^{\sqrt{i}}$		
	c)	Find all the values of $(-1)^{1/6}$		
Q.5	Att	empt the following questions.		10
	a)	Separate into real and imaginary parts $\cos^{-1}\left(\frac{3i}{4}\right)$		
	b)	If $tan(\theta + i\phi) = tan \alpha + i \sec \alpha$ prove that		
		$\phi = \frac{1}{2} \log \cot \alpha / 2$		
		And		
		$2\theta = n\pi + \frac{\pi}{2} + \alpha$		
	c)	If $u + iv = \cosh\left(\alpha + \frac{i\pi}{4}\right)$ Prove that $u^2 - v^2 = \frac{1}{2}$		

#### Section – II

### Q.6 Attempt the following questions.

- a) Find the rank of the matrix by reducing it to Normal from
- b) Solve the equations
  - x + y z + s = 0, x y + 2z s = 0, 3x + y + s = 0
- c) Investigate for what value of  $\mu$  and  $\lambda$  the equations.
  - 2x + 3y + 5z = 9, 7x + 3y 2z = 8,  $2x + 3y + \lambda z = \mu$  will have
  - 1) No. solution
  - 2) Infinite solutions
  - 3) Unique solution

## Q.7 Attempt the following questions.

a) Verify Cayley Hamilton theorem for A where

$$A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$$

Find the Eigen Values and Eigen Vector for the Smallest Eigen Value for b) (8 - 8 - 2)A

$$\mathbf{I} = \begin{pmatrix} 4 & -3 & -2 \\ 3 & -4 & 1 \end{pmatrix}$$

c) Examine the vector for Linear Dependence and Independence [3, 1, 1], [2, 0, -1], [4, 2, 1]

#### Attempt the following questions. **Q.8**

- A rectangular box open at top is have volume 32 cubic unit. Find its a) dimensions if the material required is least.
- **b)** Find the stationary value of xy(1 x y)
- c) If  $x = u \cos v$ ,  $y = u \sin v$  prove that J J' = 1.

## Q.9 Attempt the following questions.

a) If 
$$u = \sin^{-1} \left[ \frac{x^{1/4} + y^{1/4}}{x^{1/5} + y^{1/5}} \right]$$
 then find the values of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$   
and  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$ 

- **b)** If u = lx + my and v = ly mx and z is function of u, v then prove that  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = (l^2 + m^2) \left[ \frac{\partial^2 z}{\partial n^2} + \frac{\partial^2 q}{\partial y^2} \right]$
- **c)** If  $u = (x^2 + y^2 + z^2)^{-1/2}$ Find the value of  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2}$

09

Set | R

**SLR-FM-610** 

09

09

Page	13	of	16

# F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **ENGINEERING MATHEMATICS – I**

Day & Date: Friday, 06-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.

- 2) Figures to the right indicate full marks.
- 3) Use of non programmable calculator is allowed.

## **MCQ/Objective Type Questions**

## **Duration: 30 Minutes**

Seat

No.

#### Marks: 14

14

# Q.1 Choose the correct alternatives from the options and rewrite the sentence.

- If the characteristic equation of the matrix A is  $\lambda^2 \lambda 1 = 0$  then . 1)
  - a)  $A^{-1}$  does not exists
    - b)  $A^{-1} = A + 1$
    - c)  $A^{-1}$  exists but cannot be determine from existing data
    - d)  $A^{-1} = A 1$
- If 1, 1, 8 are eigen values and 5, 2, k are diagonal elements of matrix  $[A]_{3\times 3}$ . 2) then the value of K equals.
  - a) 0 1 b) c) 2 d) 3
- If  $u = e^{xy^2z^3}$  then  $\frac{\partial u}{\partial z} =$ \_\_\_\_\_. a)  $e^{xy^2z^3} xy^2z^3$ c)  $e^{xy^2z^3} 3xy^2z^2$ 3) b)  $e^{xy^2z^3}y^2z^3$ d)  $e^{xy^2z^3}2xyz^3$ 
  - If (x, y, z) = 0 then the value of  $\frac{\partial z}{\partial x} =$  \_\_\_\_\_. 4) b)  $\frac{\frac{\partial y}{\partial x}}{\frac{\partial x}{\partial g}}$ <u>д</u>д дz a) ðν d)  $-\frac{\frac{\partial g}{\partial x}}{\frac{\partial g}{\partial g}}$  $-\frac{\partial g}{\partial y}}{\partial g}$ C)

The percentage error in the area of a circle when an error of 1% is made in 5) measuring its radius is \_\_\_\_\_.

- a) 4 b) 3 1 2 d) C) If  $y = \frac{x^n - 1}{x - 1}$  then  $y_n =$ \_\_\_\_. a) 0 6) b) n!c) 1 d) (n-1)!7)
  - If  $y = 2^{x} x$  the  $y_n =$ \_\_\_\_\_. a)  $2^{x} [(\log 2)^n + n(\log 2)^{n-3}]$ b)  $2^{x} [(\log 2)^{n} + (\log 2)^{n-3}]$ c)  $2^{x}[(\log 2)^{n} + n(\log 2)^{n-1}]$ d)  $2^{x} [(\log 2)^{n} + (\log 2)^{n-1}]$

Set

Max. Marks: 70



8)	If $L = lim_{x \to 0} (cos x)^{\frac{1}{x^2}}$ then $L = $		
	a) $\frac{-1}{2}$	b)	– log 2
	c) $e^{\frac{-1}{2}}$	d)	-2
9)	The expansion of $\log(1 - x) =$ a) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$	 b)	$-x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \cdots$
	c) $x - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \cdots$	d)	$x - \frac{x^2}{2!} - \frac{x^3}{3!} - \frac{x^4}{4!} - \cdots$
10)	$\sinh^{-1}\frac{3}{4} = $		
	a) log 1 c) log 3	b) d)	log 2 log 4
11)	$log(1 + i) = \$ a) $log 2 + i$	b)	$\frac{1}{2}\log 2 - i\frac{\pi}{4}$
	c) $\frac{1}{2}\log 2 + i\frac{\pi}{4}$	d)	$\log 2 + i\frac{\pi}{4}$
12)	If $x = e^{i\theta}$ and $y = e^{-i\theta}$ then $x^n - y^n =$ a) $\cos^n \theta + \sin^n \theta$ c) $2\cos n\theta$	= b) d)	$\frac{2}{2}\cos^{n}\theta$ $2i\sin n\theta$
13)	If $k \neq 0$ then the rank of matrix A is w	/here	$A = \begin{pmatrix} k & k & k \\ k & k & k \\ k & k & k \end{pmatrix}$
	a) 2 c) 0	b) d)	k 1
14)	If rank of matrix $[A]_{3\times 3}$ is 2, then the a) 1 c) 2	value b) d)	of   <i>A</i>  = 0 -1

Set S

Seat No.			Set	S
		F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-20 ENGINEERING MATHEMATICS - I	)19	
Day 8 Time:	& Da : 10:	ate: Friday, 06-12-2019 :00 AM To 01:00 PM	Max. Marks	s: 56
Instru	ucti	ons: 1) Q. No. 5 & Q. No. 9 is compulsory. solve any two questions Section.	from each	
		<ul><li>2) Use of non programmable calculator is allowed.</li><li>3) Figure to the right indicates full marks.</li></ul>		
		Section – I		
Q.2	Att	empt the following questions.		09
	a)	Find the nth derivative of $y = \frac{x-1}{x+1} + \sin x \cos x \cos 2x$		
	b) c)	Find the nth derivative of $y = e^{-x} \cdot x \cdot \cos x$ If $y^{1/m} + y^{-1/m} = 2x$ then prove that		
		$(x^2 - 1)y_{n+2} + (2n+1)xy_{n+1} + (n^2 - m^2)y_n = 0$		
Q.3	Att a)	empt the following questions. Expand $8 + 7(x + 2) + 6(x + 2)^2 + 5(x + 2)^3 + (x + 2)^4$ in powers $(x + 1)$	s of	09
	b)	Expand $\log(1 + e^x)$ in powers of x up to $x^2$ .		
	C)	Find all the values of <i>a</i> , <i>b</i> , <i>c</i> if. $\lim_{x \to \infty} \frac{x(a + b\cos x) - c\sin x}{x^5} = 1$		
Q.4	Att	empt the following questions. $\overline{}^{8}$		09
	a) 6)	Prove that $(1 + i\sqrt{3})^2 + (1 - i\sqrt{3})^2 = -2^8$		
	D)	i) $Log (3 + 4i)$		
	2)	$II) = \sqrt{i}^{1/6}$		
0 F	ر) میں	Find all the values of $(-1)^{-7}$		10
Q.5	a)	Separate into real and imaginary parts $\cos^{-1}{3i}$		10
	h)	If $\tan(\theta + i\phi) = \tan \alpha + i \sec \alpha$ prove that		
	~)	$\frac{1}{1}$		
		$\varphi = \frac{1}{2} \log \cot \alpha / 2$		
		$2\theta = n\pi + \frac{\pi}{2} + \alpha$		
	c)	If $u + iv = \cosh\left(\alpha + \frac{i\pi}{4}\right)$ Prove that $u^2 - v^2 = \frac{1}{2}$		

#### Section – II

### Q.6 Attempt the following questions.

- a) Find the rank of the matrix by reducing it to Normal from
- b) Solve the equations
  - x + y z + s = 0, x y + 2z s = 0, 3x + y + s = 0
- c) Investigate for what value of  $\mu$  and  $\lambda$  the equations.
  - 2x + 3y + 5z = 9, 7x + 3y 2z = 8,  $2x + 3y + \lambda z = \mu$  will have
  - 1) No. solution
  - 2) Infinite solutions
  - 3) Unique solution

## Q.7 Attempt the following questions.

a) Verify Cayley Hamilton theorem for A where

$$A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$$

Find the Eigen Values and Eigen Vector for the Smallest Eigen Value for b) (8 - 8 - 2)A

$$\mathbf{I} = \begin{pmatrix} 4 & -3 & -2 \\ 3 & -4 & 1 \end{pmatrix}$$

c) Examine the vector for Linear Dependence and Independence [3, 1, 1], [2, 0, -1], [4, 2, 1]

#### Attempt the following questions. **Q.8**

- A rectangular box open at top is have volume 32 cubic unit. Find its a) dimensions if the material required is least.
- **b)** Find the stationary value of xy(1 x y)
- c) If  $x = u \cos v$ ,  $y = u \sin v$  prove that J J' = 1.

## Q.9 Attempt the following questions.

a) If 
$$u = \sin^{-1} \left[ \frac{x^{1/4} + y^{1/4}}{x^{1/5} + y^{1/5}} \right]$$
 then find the values of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$   
and  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$ 

- **b)** If u = lx + my and v = ly mx and z is function of u, v then prove that  $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = (l^2 + m^2) \left[ \frac{\partial^2 z}{\partial n^2} + \frac{\partial^2 q}{\partial y^2} \right]$
- **c)** If  $u = (x^2 + y^2 + z^2)^{-1/2}$ Find the value of  $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2}$

09

**SLR-FM-610** 

Set

09

09

SLR-FM-61 <sup>2</sup>	
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Seat	
No.	

# F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **APPLIED MECHANICS**

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

# MCQ/Objective Type Questions

**Duration: 30 Minutes** 

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- Composition of forces is nothing but \_\_\_\_\_ 1)
  - a) splitting of forces
  - c) both a & b are correct
- finding resultant forces b)
- none of these d)
- 2) 1 Kg force is equal to \_\_\_\_\_. a) 7.5 N 8.91 N b)
  - c) 9.81 N d) 8.55 N
- Angle made by resultant of normal reaction and frictional force with 3) vertical is called as \_\_\_\_\_. b) angle of repose
  - a) angle of friction
  - c) both a & b

- d) cone of friction
- 4) A couple produces \_\_\_\_\_. a) translatory motion
- rotational motion b)
- c) both translation & rotation d) no motion
- A framed structure of triangular shape is \_\_\_\_ 5)
  - a) perfect imperfect b) c) deficient d) redundant
- The geometrical center of lamina through which all area is supposed to 6) be acting is called as .
  - a) center of gravity b) center of mass
  - c) center of inertia d) centroid
- The M.I of a triangular section of base (b) & height (h) about on axis 7) through it's base is given as \_\_\_\_
  - bh<sup>3</sup>/18 a)  $bh^{3}/12$ b) c) bh<sup>3</sup>/36 bh<sup>3</sup>/64 d)

Max. Marks: 70

Marks: 14

Set

# Set P

- 8) If gravitational acceleration at any place is doubled then weight of body will be \_\_\_\_.
  - a) g/2 b) g
  - 2g c) √2g d)
- 9) In a rectilinear motion all the particles in body \_\_\_\_\_.
  - a) have same displacement have some velocity b)
  - c) have some acceleration all of these d)
- 10) D'Alembert's principle correlates \_\_\_\_
  - a) force, mass, velocity, and displacement
  - b) force, mass, and acceleration
  - c) force, time, mass and velocity
  - d) mass and velocity

#### 11) Angular momentum is the product of \_\_\_\_\_.

- a) mass moment of inertia x angular velocity
- b) mass moment of inertia x angular acceleration
- c) mass normal of inertia x angular displacement
- d) none of these
- The time rate of doing work is known as \_\_\_\_\_. 12)
  - a) potential energy kinetic energy b)
  - c) rotational energy d) power
- The bodies which regains their size and shape after impact are called \_\_\_\_\_. 13) rigid bodies
  - a) plastic bodies
  - c) elastic bodies
- Impulse is measured in \_\_\_\_\_. 14)
  - a) N-sec
    - c) N/  $sec^2$

b) N /sec

partially plastic bodied

Ν d)

b)

d)

# F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **APPLIED MECHANICS**

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

Seat

No.

## **Instructions:** 1) All questions are compulsory.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

## Section – I

#### Q.2 Attempt any four of the following questions.

- State and prove the Varignon's theorem. a)
- b) State and prove the Lami's theorem
- Enlist different types of supports and explain any two with neat sketches. C)
- Explain the concept of free body diagram with neat sketch. d)
- e) What are the different types of trusses explain any two with neat sketches.
- State and prove parallel axis theorem. **f**)

#### Q.3 Attempt any two of the following questions.

Determine the resultant of the four forces acting tangentially to a circle of a) radius3m as shown in fig 1 below. Also determine location of resultant from center of circle.



16

Max. Marks: 56

12

Ρ

Set P

**b)** Find out forces in all members CD, DE, BD and AD of a truss as shown in fig.2 below



c) Find the moment of inertia of the section shown in fig. (3) About thecentroidal axis XX perpendicular to the web.





### Q.4 Attempt any four of the following questions.

- a) Derive the three equations of linear motion for a body moving with constant acceleration 'a'
- **b)** What is mean by relative velocity? Explain it with example.
- c) State and explain D' Alembert's principle of linear motion.
- d) Derive the equation of trajectory of a projectile.
- e) State and derive principle of work energy for linear motion
- f) State and explain principle of conservation of energy.

# Set P

## Q.5 Attempt any two of the following questions.

- a) A stone is dropped into a well is heard to strike the water after 6 seconds. Find depth of well, if the velocity of sound is 350 m/sec.
- **b)** Two bodies of weight 60 N and 40 N are connected to the two ends of alight inextensible string. The string is passing over a smooth pulley. Determine:
  - i) Acceleration of the system
  - ii) Tension in the string.
  - Use D' Alembert's principle
- c) A car moving on a straight level road skidded for a total distance of 60meters after the breaks were applied. Determine the speed of the car, just before the breaks were applied, if the co-efficient of friction between the car tyres and the road is 0.4. take  $g = 9.81 \text{ m/sec}^2$

Set

Max. Marks: 70

Seat	
No.	

# F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **APPLIED MECHANICS**

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

# MCQ/Objective Type Questions

**Duration: 30 Minutes** 

1)

#### Choose the correct alternatives from the options and rewrite the sentence. Q.1 14

b)

d)

- If gravitational acceleration at any place is doubled then weight of body will be
  - a) q/2
  - b) g c) √2g d) 2g
- 2) In a rectilinear motion all the particles in body .
  - a) have same displacement
  - c) have some acceleration
- D'Alembert's principle correlates \_ 3)
  - a) force, mass, velocity, and displacement
  - b) force, mass, and acceleration
  - c) force, time, mass and velocity
  - d) mass and velocity
- Angular momentum is the product of \_\_\_\_\_. 4)
  - a) mass moment of inertia x angular velocity
  - b) mass moment of inertia x angular acceleration
  - c) mass normal of inertia x angular displacement
  - d) none of these

#### The time rate of doing work is known as \_\_\_\_\_ 5)

- a) potential energy b) kinetic energy
- c) rotational energy d) power
- The bodies which regains their size and shape after impact are called . 6)
  - a) plastic bodies

- rigid bodies b)
- elastic bodies c) d)
  - partially plastic bodied

have some velocity

all of these

Marks: 14

Set Q 7) Impulse is measured in \_\_\_\_\_. N /sec a) N-sec b) c) N/  $sec^2$ d) Ν Composition of forces is nothing but 8) a) splitting of forces finding resultant forces b) none of these c) both a & b are correct d) 1 Kg force is equal to \_\_\_\_\_. 9) a) 7.5 N b) 8.91 N c) 9.81 N 8.55 N d) Angle made by resultant of normal reaction and frictional force with 10) vertical is called as \_\_\_\_\_. a) angle of friction b) angle of repose c) both a & b cone of friction d) 11) A couple produces \_\_\_\_\_. a) translatory motion rotational motion b) c) both translation & rotation d) no motion A framed structure of triangular shape is . 12) a) perfect imperfect b) c) deficient d) redundant The geometrical center of lamina through which all area is supposed to 13) be acting is called as \_\_\_\_\_. a) center of gravity b) center of mass c) center of inertia d) centroid The M.I of a triangular section of base (b) & height (h) about on axis 14) through it's base is given as \_\_\_\_\_. bh<sup>3</sup>/18 b) a)  $bh^{3}/12$ c)  $bh^{3}/36$ bh<sup>3</sup>/64 d)

F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
APPLIED MECHANICS

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

Seat

No.

## **Instructions:** 1) All questions are compulsory.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

### Section – I

## Q.2 Attempt any four of the following questions.

- a) State and prove the Varignon's theorem.
- **b**) State and prove the Lami's theorem
- c) Enlist different types of supports and explain any two with neat sketches.
- d) Explain the concept of free body diagram with neat sketch.
- e) What are the different types of trusses explain any two with neat sketches.
- f) State and prove parallel axis theorem.

## Q.3 Attempt any two of the following questions.

a) Determine the resultant of the four forces acting tangentially to a circle of radius3m as shown in fig 1 below. Also determine location of resultant from center of circle.



16

## Max. Marks: 56

12



Set

Set Q

**b)** Find out forces in all members CD, DE, BD and AD of a truss as shown in fig.2 below



c) Find the moment of inertia of the section shown in fig. (3) About thecentroidal axis XX perpendicular to the web.





### Q.4 Attempt any four of the following questions.

- a) Derive the three equations of linear motion for a body moving with constant acceleration 'a'
- **b)** What is mean by relative velocity? Explain it with example.
- c) State and explain D' Alembert's principle of linear motion.
- d) Derive the equation of trajectory of a projectile.
- e) State and derive principle of work energy for linear motion
- f) State and explain principle of conservation of energy.

# Set Q

# Q.5 Attempt any two of the following questions.

- a) A stone is dropped into a well is heard to strike the water after 6 seconds. Find depth of well, if the velocity of sound is 350 m/sec.
- **b)** Two bodies of weight 60 N and 40 N are connected to the two ends of alight inextensible string. The string is passing over a smooth pulley. Determine:
  - i) Acceleration of the system
  - ii) Tension in the string.
  - Use D' Alembert's principle
- c) A car moving on a straight level road skidded for a total distance of 60meters after the breaks were applied. Determine the speed of the car, just before the breaks were applied, if the co-efficient of friction between the car tyres and the road is 0.4. take  $g = 9.81 \text{ m/sec}^2$

Seat	
No.	

# F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 APPLIED MECHANICS

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

# MCQ/Objective Type Questions

**Duration: 30 Minutes** 

## Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) A framed structure of triangular shape is \_\_\_\_\_.
  - a) perfect b) imperfect
  - c) deficient d) redundant
- 2) The geometrical center of lamina through which all area is supposed to be acting is called as \_\_\_\_\_.
  - a) center of gravity b) center of mass
  - c) center of inertia d) centroid
- 3) The M.I of a triangular section of base (b) & height (h) about on axis through it's base is given as \_\_\_\_\_.
  - a)  $bh^{3}/12$  b)  $bh^{3}/18$
  - c) bh<sup>3</sup>/36 d) bh<sup>3</sup>/64
- If gravitational acceleration at any place is doubled then weight of body will be \_\_\_\_\_.
  - a) g/2 b) gc)  $\sqrt{2g}$  d) 2g
- c) √2g
  d) 2g
  5) In a rectilinear motion all the particles in body
  - a) have same displacement b) have some velocity
    - c) have some acceleration d) all of these
- 6) D'Alembert's principle correlates \_\_\_\_\_
  - a) force, mass, velocity, and displacement
  - b) force, mass, and acceleration
  - c) force, time, mass and velocity
  - d) mass and velocity

Max. Marks: 70

Set

R

Marks: 14

Set R 7) Angular momentum is the product of \_\_\_\_\_. a) mass moment of inertia x angular velocity b) mass moment of inertia x angular acceleration c) mass normal of inertia x angular displacement d) none of these The time rate of doing work is known as \_\_\_\_\_ 8) a) potential energy b) kinetic energy c) rotational energy d) power 9) The bodies which regains their size and shape after impact are called \_\_\_\_\_. a) plastic bodies rigid bodies b) c) elastic bodies d) partially plastic bodied 10) Impulse is measured in \_\_\_\_\_. a) N-sec b) N /sec c) N/  $\sec^2$ d) Ν 11) Composition of forces is nothing but a) splitting of forces b) finding resultant forces c) both a & b are correct d) none of these 1 Kg force is equal to \_\_\_\_\_. 12) a) 7.5 N 8.91 N b) 8.55 N c) 9.81 N d) Angle made by resultant of normal reaction and frictional force with 13) vertical is called as \_\_\_\_\_. a) angle of friction b) angle of repose cone of friction c) both a & b d) 14) A couple produces \_\_\_\_\_. a) translatory motion rotational motion b)

- c) both translation & rotation
- d) no motion

F.E. (Part – I) (	(Old) (CGPA) Examination Nov/Dec-2019
	APPLIED MECHANICS

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

# **Instructions:** 1) All questions are compulsory.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

## Section – I

## Q.2 Attempt any four of the following questions.

- a) State and prove the Varignon's theorem.
- **b)** State and prove the Lami's theorem
- c) Enlist different types of supports and explain any two with neat sketches.
- d) Explain the concept of free body diagram with neat sketch.
- e) What are the different types of trusses explain any two with neat sketches.
- f) State and prove parallel axis theorem.

## Q.3 Attempt any two of the following questions.

a) Determine the resultant of the four forces acting tangentially to a circle of radius3m as shown in fig 1 below. Also determine location of resultant from center of circle.



16

12

Max. Marks: 56

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Seat No.

Set R

Set R

**b)** Find out forces in all members CD, DE, BD and AD of a truss as shown in fig.2 below



c) Find the moment of inertia of the section shown in fig. (3) About thecentroidal axis XX perpendicular to the web.





### Q.4 Attempt any four of the following questions.

- a) Derive the three equations of linear motion for a body moving with constant acceleration 'a'
- **b)** What is mean by relative velocity? Explain it with example.
- c) State and explain D' Alembert's principle of linear motion.
- d) Derive the equation of trajectory of a projectile.
- e) State and derive principle of work energy for linear motion
- f) State and explain principle of conservation of energy.

# Set R

# Q.5 Attempt any two of the following questions.

- a) A stone is dropped into a well is heard to strike the water after 6 seconds. Find depth of well, if the velocity of sound is 350 m/sec.
- **b)** Two bodies of weight 60 N and 40 N are connected to the two ends of alight inextensible string. The string is passing over a smooth pulley. Determine:
  - i) Acceleration of the system
  - ii) Tension in the string.
  - Use D' Alembert's principle
- c) A car moving on a straight level road skidded for a total distance of 60meters after the breaks were applied. Determine the speed of the car, just before the breaks were applied, if the co-efficient of friction between the car tyres and the road is 0.4. take  $g = 9.81 \text{ m/sec}^2$

Set

Max. Marks: 70

Seat	
No.	

# F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **APPLIED MECHANICS**

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory and it should be solved in first 30 minutes in answer book.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

# MCQ/Objective Type Questions

**Duration: 30 Minutes** 

5)

Marks: 14

#### Choose the correct alternatives from the options and rewrite the sentence. Q.1 14

- D'Alembert's principle correlates 1)
  - a) force, mass, velocity, and displacement
  - b) force, mass, and acceleration
  - c) force, time, mass and velocity
  - d) mass and velocity

#### 2) Angular momentum is the product of .

- a) mass moment of inertia x angular velocity
- b) mass moment of inertia x angular acceleration
- c) mass normal of inertia x angular displacement
- d) none of these
- The time rate of doing work is known as \_ 3)
  - a) potential energy kinetic energy b)
  - c) rotational energy d) power

#### 4) The bodies which regains their size and shape after impact are called \_\_\_\_\_.

- a) plastic bodies rigid bodies b)
- c) elastic bodies d)
  - partially plastic bodied
- Impulse is measured in \_\_\_\_\_. a) N-sec N /sec b)
  - c) N/  $\sec^2$ d) Ν
- Composition of forces is nothing but 6)
  - a) splitting of forces
- finding resultant forces b) none of these d)
- c) both a & b are correct

Set S 7) 1 Kg force is equal to \_\_\_\_\_. a) 7.5 N b) 8.91 N c) 9.81 N d) 8.55 N Angle made by resultant of normal reaction and frictional force with 8) vertical is called as \_\_\_\_\_. a) angle of friction b) angle of repose c) both a & b cone of friction d) A couple produces \_\_\_\_\_. 9) a) translatory motion b) rotational motion c) both translation & rotation d) no motion 10) A framed structure of triangular shape is \_\_\_\_ a) perfect imperfect b) c) deficient d) redundant 11) The geometrical center of lamina through which all area is supposed to be acting is called as \_\_\_\_\_. a) center of gravity b) center of mass c) center of inertia d) centroid The M.I of a triangular section of base (b) & height (h) about on axis 12) through it's base is given as bh<sup>3</sup>/18 a) bh<sup>3</sup>/12 b) c) bh<sup>3</sup>/36 d) bh<sup>3</sup>/64 If gravitational acceleration at any place is doubled then weight of body 13) will be \_\_\_\_\_. a) g/2 b) g c) √2g d) 2q In a rectilinear motion all the particles in body \_\_\_\_\_. 14) a) have same displacement b) have some velocity

- c) have some acceleration

**SLR-FM-611** 

d) all of these

F.E. (Part – I	) (Old) (CGPA) Examination Nov/Dec-2019
•	APPLIED MECHANICS

Day & Date: Monday, 09-12-2019

Time: 10:00 AM To 01:00 PM

Seat

No.

# **Instructions:** 1) All questions are compulsory.

- 2) Use of non programmable scientific calculator allowed.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary and state it clearly.

## Section – I

## Q.2 Attempt any four of the following questions.

- a) State and prove the Varignon's theorem.
- **b**) State and prove the Lami's theorem
- c) Enlist different types of supports and explain any two with neat sketches.
- d) Explain the concept of free body diagram with neat sketch.
- e) What are the different types of trusses explain any two with neat sketches.
- f) State and prove parallel axis theorem.

## Q.3 Attempt any two of the following questions.

a) Determine the resultant of the four forces acting tangentially to a circle of radius3m as shown in fig 1 below. Also determine location of resultant from center of circle.



12

16

# SLR-FM-611

Set S

Max. Marks: 56

- Set S
- **b)** Find out forces in all members CD, DE, BD and AD of a truss as shown in fig.2 below



c) Find the moment of inertia of the section shown in fig. (3) About thecentroidal axis XX perpendicular to the web.





### Q.4 Attempt any four of the following questions.

- a) Derive the three equations of linear motion for a body moving with constant acceleration 'a'
- **b)** What is mean by relative velocity? Explain it with example.
- c) State and explain D' Alembert's principle of linear motion.
- d) Derive the equation of trajectory of a projectile.
- e) State and derive principle of work energy for linear motion
- f) State and explain principle of conservation of energy.

# Set S

# Q.5 Attempt any two of the following questions.

- a) A stone is dropped into a well is heard to strike the water after 6 seconds. Find depth of well, if the velocity of sound is 350 m/sec.
- **b)** Two bodies of weight 60 N and 40 N are connected to the two ends of alight inextensible string. The string is passing over a smooth pulley. Determine:
  - i) Acceleration of the system
  - ii) Tension in the string.
  - Use D' Alembert's principle
- c) A car moving on a straight level road skidded for a total distance of 60meters after the breaks were applied. Determine the speed of the car, just before the breaks were applied, if the co-efficient of friction between the car tyres and the road is 0.4. take  $g = 9.81 \text{ m/sec}^2$

# Set

F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC ELECTRICAL ENGINEERING** 

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

**Duration: 30 Minutes** 

Seat

No.

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

- 2) Assume suitable data if necessary and mention it clearly.
- 3) Figures to the right indicate full marks.

# MCQ/Objective Type Questions

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- If a network does not contain any energy source is called as 1) b) Unilateral network
  - a) Bilateral network
  - c) Active network
- 2) How much of unit of electric energy consumed in operating ten 50 watt bulbs for 5 hours per day for December 2006? \_\_\_\_\_ units.

d)

Passive network

- a) 80 b) 77 c) 77.5 d) 100
- 3) Joule's law of electrical heating is given by \_
  - a)  $H = I^2 Rt/I$ H = IRt/Jb) c)  $H = I^2 R/t I$ d)  $H = I^2 I/Rt$
- 4) A 25 W, 220V bulb and a 100 W. 220V bulb are joined in parallel and connected to 220V supply. Which bulb will glow more brightly? a) 25 W bulb
  - b) 100 W bulb
  - c) Bothwill glow with same brightness
  - d) Neither bulb will glow
- The value of magnetic field strength required to wipe out the residual flux 5) density is called as .
  - b) a) Retentivity Demagnetization
  - Coercive force Hysteresis loop d) c)
- 6) If a sinusoidal wave has a frequency of 50Hz with 15 A rms value. Which of the following equations represent this wave?
  - a) 15 sin 50 t b) 30 sin 314 t
  - c) 42.42 sin 314 t d) 21.21 sin 314 t
- 7) Average value of full cycle of symmetrical AC waveform is \_\_\_\_\_.
  - 0.637 a) one b)
  - c) zero d) 0.707
- The impedance of purely capacitive circuit is given by \_\_\_\_\_. 8)
  - a)  $z = R jX_c$ b)  $z = R + jX_c$ c)  $z = -jX_c$ d) z = R



Max. Marks: 70

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Marks: 14
			Set P
9)	The average power in R-L series cir	cuit is	given by
	a) V <sub>rms</sub> I <sub>rms</sub> cosφ c) Zero	b) d)	V <sub>rms</sub> I <sub>rms</sub> V <sub>rms</sub> I <sub>rms</sub> sinφ
10)	Three identical resistances connected three resistances are connected in a power consumed will be	ed in s delta a	star consume 4000w. If these across the same supply, the
	a) 4000W c) 8000W	b) d)	6000W 12000W
11)	For a balanced three phase system a) $\sqrt{3} V_{ph}I_{ph}\cos \emptyset$ c) $\sqrt{3} V_LI_L\cos \emptyset$	the to b) d)	otal power consumed is given by V <sub>ph</sub> I <sub>ph</sub> cos Ø 3 V <sub>L</sub> I <sub>L</sub> cos Ø
12)	The emf induced in a transformer de a) Frequency c) Maximum flux	epend b) d)	s upon Number of turns All the above
13)	A 2000/200V, 20 KVA ideal transfor The number of primary turns is a) 440 c) 550	mer h  b) d)	as 66 turns in the secondary. 660 330
14)	When the load is removed the moto the	r that	will run at the highest speed is
	c) Cumulative compound	d)	Differentially compound

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## F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 BASIC ELECTRICAL ENGINEERING

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

#### Section – I

#### Q.2 Answer any four.

Seat

No.

- a) A tungsten lamp filament has a temperature of 2050°c and a resistance of 500Ω when taking normal working current. Calculate the resistance of the filament when it has a temperature of 25°C. Temperature coefficient at 0°c is 0.005/°C.
- **b)** Define following terms:
  - 1) Cycle
  - 2) Time period
  - 3) Frequency
- c) Phase difference Define- MMF, magnetic flux density, magnetic field strength, reluctance.

4

SA

d) Derive an expression for rms value of an AC quantity.

B

e) Find  $R_{AB}$  in the circuit, given in fig



a) Calculate the equivalent resistance between the terminals A and B in the network shown in figure below. All resistances are in ohm



11

Max. Marks: 56

16



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- b) A flux density of 1.2 T is required in 3 mm air gap of an electromagnet wound with 500 turns of wire and having an iron path of 125 cm. calculate the current required, assuming  $\mu_r$ = 1000 for iron and neglect leakage & fringing.
- c) Three voltages are represented by  $e_1 = 20 \sin(\omega t)$ ;  $e_2 = 30 \sin(\omega t \pi/4)$  $e_3 = 40\cos(\omega t + \pi/6)$  volts act together in a circuit. Find an expression for the resultant voltage. Draw phasor diagram for  $(e_1+e_2+e_3)$

#### Section – II

#### Q.4 Attempt any four.

- a) Explain resonance is R-L-C series circuit.
- **b)** An inductor coil connected to a supply of 250V, 50Hz and takes a current of 5A.The coil dissipates 750W. Calculate
  - 1) Power Factor
  - 2) Resistance of the coil
  - 3) Inductance of the coil.
- c) Derive the relation between line and phase voltages & currents in balanced delta connected 3-phase load.
- d) Derive an expression for induced emf in a transformer in terms of frequency, maximum flux and the number of turns on the winding.
- e) A single phase, 50Hz transformer has 1000 primary turns and 400 secondary turns. The net cross-sectional area of the core is 60 cm<sup>2</sup>. If the primary induced EMF is 1250V, Find
  - 1) Maximum flux density in the core
  - 2) emf induced in the secondary

#### Q.5 Attempt any two.

- a) A 40 KVA single phase transformer has iron loss of 450W. The full load copper loss is 850 watts. Calculate
  - 1) Efficiency at full load, 0.8 lagging p.f
  - 2) KVA supplied at maximum efficiency
  - 3) Maximum efficiency at 0.8 lagging p.f
- **b)** Discuss the different types of DC motor with suitable circuit diagram, voltage equation and applications.
- c) A choking coil and a pure resistor are connected in series across a supply of 230 V, 50 Hz. The voltage drop across the resistor is 100 V and that across the choking coil is 150 V. Find voltage drop across the inductance and resistance of the choking coil. Find resistance & Inductance if current is 1 A.

# SLR-FM-612



16

F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019
BASIC FLECTRICAL ENGINEERING

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

**Duration: 30 Minutes** 

Seat

No.

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

- Assume suitable data if necessary and mention it clearly.
- 3) Figures to the right indicate full marks.

## MCQ/Objective Type Questions

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14 1)

The impedance of purely capacitive circuit is given by				
a)	$z = R - jX_c$	b) <i>z</i>	$r = R + jX_c$	
c)	$z = -jX_c$	d) <i>z</i>	r = R	

#### 2) The average power in R-L series circuit is given by \_\_\_\_\_.

a)	V <sub>rms</sub> I <sub>rms</sub> cosφ	b) V <sub>r</sub>	rms <sup>I</sup> rms
----	----------------------------------------	-------------------	----------------------

- c) Zero d) V<sub>rms</sub>I<sub>rms</sub>sin¢
- 3) Three identical resistances connected in star consume 4000w. If these three resistances are connected in delta across the same supply, the power consumed will be \_\_\_\_\_.
  - 4000W b) 6000W a)
  - 12000W c) 8000W d)
- 4) For a balanced three phase system the total power consumed is given by \_\_\_\_.
  - a)  $\sqrt{3} V_{ph} I_{ph} \cos \emptyset$ b)  $V_{ph}I_{ph}\cos \phi$
  - c)  $\sqrt{3} V_1 I_1 \cos \phi$  $3 V_1 I_1 \cos \emptyset$ d)
- 5) The emf induced in a transformer depends upon
  - a) Frequency Number of turns b)
  - c) Maximum flux d) All the above
- A 2000/200V, 20 KVA ideal transformer has 66 turns in the secondary. 6) The number of primary turns is \_
  - b) 660 a) 440 330 550 d) C)
- When the load is removed the motor that will run at the highest speed is 7) the \_\_\_\_
  - a) Shunt b) Series
  - c) Cumulative compound d) Differentially compound
- 8) If a network does not contain any energy source is called as \_\_\_\_
  - Unilateral network a) Bilateral network b)
  - c) Active network d) Passive network
- 9) How much of unit of electric energy consumed in operating ten 50 watt bulbs for 5 hours per day for December 2006? units. a) 80 77
  - b) c) 77.5 100 d)

Max. Marks: 70

Set

Q

Marks: 14

Set Q

**SLR-FM-612** 

- Joule's law of electrical heating is given by \_\_\_\_\_. 10)
  - a)  $H = I^2 Rt/J$ b) H = IRt/J
  - c)  $H = I^2 R/tI$ d)  $H = I^2 I/Rt$
- 11) A 25 W, 220V bulb and a 100 W. 220V bulb are joined in parallel and connected to 220V supply. Which bulb will glow more brightly?
  - a) 25 W bulb
  - b) 100 W bulb
  - c) Bothwill glow with same brightness
  - d) Neither bulb will glow
- 12) The value of magnetic field strength required to wipe out the residual flux density is called as \_\_\_\_\_.
  - a) Retentivity b) Coercive force
    - Demagnetization d) Hysteresis loop
- 13) If a sinusoidal wave has a frequency of 50Hz with 15 A rms value. Which of the following equations represent this wave?
  - a) 15 sin 50 t

C)

- b) 30 sin 314 t
- c) 42.42 sin 314 t d) 21.21 sin 314 t
- Average value of full cycle of symmetrical AC waveform is \_\_\_\_\_. 14)
  - a) one
  - c) zero

b) 0.637 d) 0.707

12

## F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC ELECTRICAL ENGINEERING**

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

#### Section – I

#### Answer any four. Q.2

- A tungsten lamp filament has a temperature of 2050°c and a resistance of a)  $500\Omega$  when taking normal working current. Calculate the resistance of the filament when it has a temperature of 25°C. Temperature coefficient at 0°c is 0.005/°C.
- Define following terms: b)
  - 1) Cycle
  - Time period 2)
  - Frequency 3)
- Phase difference Define- MMF, magnetic flux density, magnetic field C) strength, reluctance.

4

Derive an expression for rms value of an AC quantity. d)

B

Find  $R_{AB}$  in the circuit, given in fig e)

- Q.3 Attempt any two.
  - Calculate the equivalent resistance between the terminals A and B in the a) network shown in figure below. All resistances are in ohm





5n

16

Set Q

Max. Marks: 56

Seat No.

Page 8 of 16

- b) A flux density of 1.2 T is required in 3 mm air gap of an electromagnet wound with 500 turns of wire and having an iron path of 125 cm. calculate the current required, assuming  $\mu_r$ = 1000 for iron and neglect leakage & fringing.
- c) Three voltages are represented by  $e_1 = 20 \sin(\omega t)$ ;  $e_2 = 30 \sin(\omega t \pi/4)$  $e_3 = 40\cos(\omega t + \pi/6)$  volts act together in a circuit. Find an expression for the resultant voltage. Draw phasor diagram for  $(e_1+e_2+e_3)$

#### Section – II

#### Q.4 Attempt any four.

- a) Explain resonance is R-L-C series circuit.
- **b)** An inductor coil connected to a supply of 250V, 50Hz and takes a current of 5A.The coil dissipates 750W. Calculate
  - 1) Power Factor
  - 2) Resistance of the coil
  - 3) Inductance of the coil.
- c) Derive the relation between line and phase voltages & currents in balanced delta connected 3-phase load.
- d) Derive an expression for induced emf in a transformer in terms of frequency, maximum flux and the number of turns on the winding.
- e) A single phase, 50Hz transformer has 1000 primary turns and 400 secondary turns. The net cross-sectional area of the core is 60 cm<sup>2</sup>. If the primary induced EMF is 1250V, Find
  - 1) Maximum flux density in the core
  - 2) emf induced in the secondary

#### Q.5 Attempt any two.

- a) A 40 KVA single phase transformer has iron loss of 450W. The full load copper loss is 850 watts. Calculate
  - 1) Efficiency at full load, 0.8 lagging p.f
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  - 3) Maximum efficiency at 0.8 lagging p.f
- **b)** Discuss the different types of DC motor with suitable circuit diagram, voltage equation and applications.
- c) A choking coil and a pure resistor are connected in series across a supply of 230 V, 50 Hz. The voltage drop across the resistor is 100 V and that across the choking coil is 150 V. Find voltage drop across the inductance and resistance of the choking coil. Find resistance & Inductance if current is 1 A.

# SLR-FM-612



16

Seat	
No.	

**Duration: 30 Minutes** 

## F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC ELECTRICAL ENGINEERING**

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

- Assume suitable data if necessary and mention it clearly.
- 3) Figures to the right indicate full marks.

## MCQ/Objective Type Questions

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- The value of magnetic field strength required to wipe out the residual flux 1) density is called as .
  - a) Retentivity c) Coercive force

b) Demagnetization d) Hysteresis loop

 $z = R + iX_c$ 

z = R

- 2) If a sinusoidal wave has a frequency of 50Hz with 15 A rms value. Which of the following equations represent this wave?
  - a) 15 sin 50 t b) 30 sin 314 t c) 42.42 sin 314 t d) 21.21 sin 314 t
- 3) Average value of full cycle of symmetrical AC waveform is \_\_\_\_\_.
  - one 0.637 a) b)
  - c) zero d) 0.707
- The impedance of purely capacitive circuit is given by \_\_\_\_\_. 4)
  - a)  $z = R iX_c$ b)
  - c)  $z = -iX_c$ d)
- The average power in R-L series circuit is given by \_\_\_\_\_. 5)
  - V<sub>rms</sub> I<sub>rms</sub>cos¢ b) V<sub>rms</sub>I<sub>rms</sub> a) c) Zero d)
  - V<sub>rms</sub>I<sub>rms</sub>sin¢
- 6) Three identical resistances connected in star consume 4000w. If these three resistances are connected in delta across the same supply, the power consumed will be .
  - a) 4000W b) 6000W c) 8000W d) 12000W
- 7) For a balanced three phase system the total power consumed is given by \_\_\_\_.
  - a)  $\sqrt{3} V_{ph} I_{ph} \cos \emptyset$ V<sub>ph</sub>I<sub>ph</sub>cos Ø b)
    - c)  $\sqrt{3} V_{L} I_{L} \cos \phi$ d)  $3 V_L I_L \cos \emptyset$
- The emf induced in a transformer depends upon \_\_\_\_ 8)
  - a) Frequency b) Number of turns c) Maximum flux d) All the above
- 9) A 2000/200V, 20 KVA ideal transformer has 66 turns in the secondary. The number of primary turns is \_\_\_\_
  - a) 440 b) 660 330 550 d) c)

Max. Marks: 70

Set

R

Marks: 14

10) When the load is removed the motor that will run at the highest speed is the \_\_\_\_\_. a) Shunt

- c) Cumulative compound
- Series b)
- d)
- Differentially compound

**SLR-FM-612** 

Set

R

- 11) If a network does not contain any energy source is called as \_\_\_\_\_.
  - Bilateral network b) Unilateral network
  - c) Active network

a)

- d) Passive network
- How much of unit of electric energy consumed in operating ten 50 watt 12) bulbs for 5 hours per day for December 2006? \_\_\_\_\_ units.
  - a) 80 77 b)
  - c) 77.5 d) 100
- 13) Joule's law of electrical heating is given by .
  - a)  $H = I^2 R t / I$ b) H = IRt/I
  - c)  $H = I^2 R/t I$  $H = I^2 I/Rt$ d)
- A 25 W, 220V bulb and a 100 W. 220V bulb are joined in parallel and 14) connected to 220V supply. Which bulb will glow more brightly?
  - a) 25 W bulb
  - b) 100 W bulb
  - c) Bothwill glow with same brightness
  - d) Neither bulb will glow

### Seat No. F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

#### Section – I

**BASIC ELECTRICAL ENGINEERING** 

#### Answer any four. Q.2

- A tungsten lamp filament has a temperature of 2050°c and a resistance of a)  $500\Omega$  when taking normal working current. Calculate the resistance of the filament when it has a temperature of 25°C. Temperature coefficient at 0°c is 0.005/°C.
- Define following terms: b)
  - 1) Cycle
  - Time period 2)
  - 3) Frequency
- Phase difference Define- MMF, magnetic flux density, magnetic field C) strength, reluctance.

4

5n

Derive an expression for rms value of an AC quantity. d)

B

Find  $R_{AB}$  in the circuit, given in fig e)

- Q.3 Attempt any two.
  - Calculate the equivalent resistance between the terminals A and B in the a) network shown in figure below. All resistances are in ohm



11

Max. Marks: 56

16





Page 12 of 16

- b) A flux density of 1.2 T is required in 3 mm air gap of an electromagnet wound with 500 turns of wire and having an iron path of 125 cm. calculate the current required, assuming  $\mu_r$ = 1000 for iron and neglect leakage & fringing.
- c) Three voltages are represented by  $e_1 = 20 \sin(\omega t)$ ;  $e_2 = 30 \sin(\omega t \pi/4)$  $e_3 = 40\cos(\omega t + \pi/6)$  volts act together in a circuit. Find an expression for the resultant voltage. Draw phasor diagram for  $(e_1+e_2+e_3)$

#### Section – II

#### Q.4 Attempt any four.

- a) Explain resonance is R-L-C series circuit.
- **b)** An inductor coil connected to a supply of 250V, 50Hz and takes a current of 5A.The coil dissipates 750W. Calculate
  - 1) Power Factor
  - 2) Resistance of the coil
  - 3) Inductance of the coil.
- c) Derive the relation between line and phase voltages & currents in balanced delta connected 3-phase load.
- d) Derive an expression for induced emf in a transformer in terms of frequency, maximum flux and the number of turns on the winding.
- e) A single phase, 50Hz transformer has 1000 primary turns and 400 secondary turns. The net cross-sectional area of the core is 60 cm<sup>2</sup>. If the primary induced EMF is 1250V, Find
  - 1) Maximum flux density in the core
  - 2) emf induced in the secondary

#### Q.5 Attempt any two.

- a) A 40 KVA single phase transformer has iron loss of 450W. The full load copper loss is 850 watts. Calculate
  - 1) Efficiency at full load, 0.8 lagging p.f
  - 2) KVA supplied at maximum efficiency
  - 3) Maximum efficiency at 0.8 lagging p.f
- **b)** Discuss the different types of DC motor with suitable circuit diagram, voltage equation and applications.
- c) A choking coil and a pure resistor are connected in series across a supply of 230 V, 50 Hz. The voltage drop across the resistor is 100 V and that across the choking coil is 150 V. Find voltage drop across the inductance and resistance of the choking coil. Find resistance & Inductance if current is 1 A.

# SLR-FM-612



16

Seat	
No.	

**Duration: 30 Minutes** 

## F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC ELECTRICAL ENGINEERING**

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

- 2) Assume suitable data if necessary and mention it clearly.
- 3) Figures to the right indicate full marks.

## MCQ/Objective Type Questions

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

Three identical resistances connected in star consume 4000w. If these 1) three resistances are connected in delta across the same supply, the power consumed will be \_\_\_\_\_. 6000W b)

a) 4000W

- c) 8000W d) 12000W
- For a balanced three phase system the total power consumed is given by . 2)
  - a)  $\sqrt{3} V_{ph} I_{ph} \cos \emptyset$ b)  $V_{ph}I_{ph}\cos \phi$ c)  $\sqrt{3} V_L I_L \cos \phi$  $3 V_1 I_1 \cos \emptyset$ d)
- 3) The emf induced in a transformer depends upon \_\_\_\_\_
  - Frequency Number of turns a) b)
  - Maximum flux d) All the above c)
- A 2000/200V, 20 KVA ideal transformer has 66 turns in the secondary. 4) The number of primary turns is
  - a) 440 b) 660 c) 550 d) 330
- When the load is removed the motor that will run at the highest speed is 5) the
  - a) Shunt b) Series
  - c) Cumulative compound d) Differentially compound

6) If a network does not contain any energy source is called as

- Unilateral network a) Bilateral network b)
- c) Active network d) Passive network

How much of unit of electric energy consumed in operating ten 50 watt 7) bulbs for 5 hours per day for December 2006? \_\_\_\_\_ units.

- a) 80 b) 77
- c) 77.5 d) 100
- 8) Joule's law of electrical heating is given by \_\_\_\_\_.

a)	$H = I^2 R t / J$	b)	H = IRt/J
<b>~</b> )		الم الم	11 121/D

d)  $H = I^2 I / Rt$ C)  $H = I^2 R/tJ$ 

Set

Max. Marks: 70

Marks: 14

#### 9) A 25 W, 220V bulb and a 100 W. 220V bulb are joined in parallel and connected to 220V supply. Which bulb will glow more brightly?

- 25 W bulb a)
- b) 100 W bulb
- c) Bothwill glow with same brightness
- d) Neither bulb will glow
- The value of magnetic field strength required to wipe out the residual flux 10) density is called as \_\_\_\_\_.
  - Retentivitv b) a)
  - Demagnetization c) Coercive force d) Hysteresis loop
- 11) If a sinusoidal wave has a frequency of 50Hz with 15 A rms value. Which of the following equations represent this wave?
  - a) 15 sin 50 t b) 30 sin 314 t
  - c) 42.42 sin 314 t d) 21.21 sin 314 t
- Average value of full cycle of symmetrical AC waveform is \_\_\_\_\_. 12)
  - a) one b) 0.637 c) zero d) 0.707
- 13) The impedance of purely capacitive circuit is given by \_\_\_\_\_.
  - a)  $z = R jX_c$ b)  $z = R + jX_c$
  - d) c)  $z = -jX_c$ z = R
- The average power in R-L series circuit is given by \_\_\_\_\_. 14)
  - a) V<sub>rms</sub> I<sub>rms</sub>cos φ b) V<sub>rms</sub>I<sub>rms</sub>
  - Zero c)

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Set S

d) V<sub>rms</sub>I<sub>rms</sub>sin¢

12

### Seat No. F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019

Day & Date: Wednesday, 11-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

2) Figures to the right indicates full marks.

#### Section – I

**BASIC ELECTRICAL ENGINEERING** 

#### Answer any four. Q.2

- A tungsten lamp filament has a temperature of 2050°c and a resistance of a)  $500\Omega$  when taking normal working current. Calculate the resistance of the filament when it has a temperature of 25°C. Temperature coefficient at 0°c is 0.005/°C.
- Define following terms: b)
  - 1) Cycle
  - Time period 2)
  - Frequency 3)
- Phase difference Define- MMF, magnetic flux density, magnetic field C) strength, reluctance.
- Derive an expression for rms value of an AC quantity. d)
- Find  $R_{AB}$  in the circuit, given in fig e)

- Q.3 Attempt any two.
  - Calculate the equivalent resistance between the terminals A and B in the a) network shown in figure below. All resistances are in ohm



Max. Marks: 56





Page **16** of **16** 

- b) A flux density of 1.2 T is required in 3 mm air gap of an electromagnet wound with 500 turns of wire and having an iron path of 125 cm. calculate the current required, assuming  $\mu_r$ = 1000 for iron and neglect leakage & fringing.
- c) Three voltages are represented by  $e_1 = 20 \sin(\omega t)$ ;  $e_2 = 30 \sin(\omega t \pi/4)$  $e_3 = 40\cos(\omega t + \pi/6)$  volts act together in a circuit. Find an expression for the resultant voltage. Draw phasor diagram for  $(e_1+e_2+e_3)$

#### Section – II

#### Q.4 Attempt any four.

- a) Explain resonance is R-L-C series circuit.
- **b)** An inductor coil connected to a supply of 250V, 50Hz and takes a current of 5A.The coil dissipates 750W. Calculate
  - 1) Power Factor
  - 2) Resistance of the coil
  - 3) Inductance of the coil.
- c) Derive the relation between line and phase voltages & currents in balanced delta connected 3-phase load.
- d) Derive an expression for induced emf in a transformer in terms of frequency, maximum flux and the number of turns on the winding.
- e) A single phase, 50Hz transformer has 1000 primary turns and 400 secondary turns. The net cross-sectional area of the core is 60 cm<sup>2</sup>. If the primary induced EMF is 1250V, Find
  - 1) Maximum flux density in the core
  - 2) emf induced in the secondary

#### Q.5 Attempt any two.

- a) A 40 KVA single phase transformer has iron loss of 450W. The full load copper loss is 850 watts. Calculate
  - 1) Efficiency at full load, 0.8 lagging p.f
  - 2) KVA supplied at maximum efficiency
  - 3) Maximum efficiency at 0.8 lagging p.f
- **b)** Discuss the different types of DC motor with suitable circuit diagram, voltage equation and applications.
- c) A choking coil and a pure resistor are connected in series across a supply of 230 V, 50 Hz. The voltage drop across the resistor is 100 V and that across the choking coil is 150 V. Find voltage drop across the inductance and resistance of the choking coil. Find resistance & Inductance if current is 1 A.

# SLR-FM-612



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# F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019

Day & Date: Friday, 13-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

**BASIC MECHANICAL ENGINEERING** 

- 2) Neat diagrams must be drawn whenever necessary.
- 3) Figures to the right indicate full marks.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of log tables and non-programmable single memory calculator is allowed.

### **MCQ/Objective Type Questions**

**Duration: 30 Minutes** 

C)

Seat

No.

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- A system comprising of a single phase, is known as 1) b) closed system
  - a) open system
    - homogeneous system
- 2) For a closed system, the difference between the heat added to the system and work done by the gas, is equal to the change in \_\_\_\_\_.
  - enthalpy a)
  - internal energy C)
- 3) Heat-pump is used \_\_\_\_\_.
  - a) to heat space
  - c) to convert heat into work
- 4) Universal gas constant of perfect gas \_\_\_\_\_.
  - a) increases with temperature
  - decreases with temperature b)
  - c) increases with increase in molecular weight
  - d) is always constant
- The internal energy of an ideal gas depends only on \_\_\_\_\_. 5)
  - pressure b) Volume a)
  - temperature d) none of the above c)
- 6) Impeller is used in \_\_\_\_
  - centrifugal pump a) turbine C)
- 7) Following is the impulse type water turbine \_\_\_\_ b) Francis turbine
  - Pelton turbine a) C)
    - Kaplan turbine d) None
- 8) The penstock is used \_\_\_\_\_
  - a) to increase pressure energy of water leaving to tailrace
  - to decrease pressure energy of water leaving to tailrace b)
  - to convey water from dam to turbine c)
  - d) None

- b) to cool the space
- d) Temperature

d) heterogeneous system

- d) None

b) Entropy



Max. Marks: 70

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Marks: 14

- b) Engine
- d) none of the above

9) A condenser in a thermal power plant condenses steam coming out of

Boiler a)

b) Super-heater

**SLR-FM-613** 

Set P

- d) Turbine c) Economizer
- 10) In a four stroke cycle engine, number of revolutions of the crankshaft for completion of working cycle is \_\_\_\_
  - b) two a) one
  - c) three d) four
- Due to slip of belt, the velocity ratio of the belt drive \_\_\_\_\_. 11)
  - a) increase b) decreases
  - remains constant d) none c)
- 12) Property of material, which enables it to regain its original shape after deformation, when the external forces are removed, is known as \_\_\_\_\_.
  - Elasticity b) Plasticity a) Ductility C)
    - d) Toughness
- Gear drive is used for transmitting power when two shafts are \_\_\_\_\_. 13)
  - a) Parallel

- b) Intersecting
- c) Skew d) All of the above
- Which of the following is a mother of all the machine tools? 14)
  - Milling a)
  - Drilling c)

- b) Lathe
- d) None of these

04

## F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC MECHANICAL ENGINEERING**

Day & Date: Friday, 13-12-2019

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q.No.2 and Q.No.4 are short answer type question.

- 2) Q.No.3 and Q.No.5 long answer type question.
- 3) Neat diagram must be drawn whenever necessary.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of log tables and non-programmable single memory calculator is allowed.

#### Section – I

#### Q.2 Answer any five of the following

- State different statements of second law of thermodynamics. a)
- Compare BWR and PWR. b)
- Explain in brief point function and path function with suitable examples. c)
- d) Explain working of roots blower with neat sketch.
- Explain in brief working of double acting reciprocating pump. e)

Process

1-2

2-3

3-4

4-1

- Explain the working of Vapour compression refrigeration cycle. f)
- Derive an expression for work done in adiabatic process. g)

#### a) is compulsory. solve any two out of b) to e). Q.3

- Steam enters a steam turbine with a velocity of 60 m/s and enthalpy of 05 a) 2600 kJ/kg and leaves with a velocity of 100 m/s and enthalpy of 2150 kJ/kg. Heat lost from turbine to surrounding is 220kJ/min. Find power developed by turbine if steam flow rate is 5800 kg/hr.
- A certain quantity of air has volume 0.028m<sup>3</sup> at pressure of 1.25 bar and b) 04 25ºC. It is compressed to volume of 0.0042 m<sup>3</sup> according to law PV<sup>1.3</sup>=Constant. Find final temperature and work done during compression. Also determine reduction in pressure at constant volume required to bring system to its original temperature.
- A system undergoes a cycle consist of 4 processes. The heat and work 04 c) transfer are tabulated below. Prove that the table is consistent with first law of thermodynamics. Determine network and find thermal efficiency.

Q(kJ)

1770

-1650

-900

1040

W(kJ)

565

0

0

d) Ex	plain with neat sketch,	construction and working of Pelton turbine.
-------	-------------------------	---------------------------------------------

Draw a neat sketch of steam power plant. Explain function of air-pre 04 e) heater, economizer and super heater.

Max. Marks: 56

13

15

Set

Seat No.



#### Section – II

#### Q.4 Answer any five of the following.

- a) Show in the figure following terms associated with an I.C. engine.
  - 1) Bore
  - 2) Stroke
  - 3) Top dead center (T.D.C.)
  - 4) Bottom dead center (B.D.C.)
  - 5) Clearance volume
  - 6) Swept volume
- b) An air standard diesel cycle has a compression ratio of 16 and the heat transferred to the working fluid per cycle is 2000 KJ/kg. At the beginning of compression stroke the pressure is 1 bar and the temperature is 27°C. Calculate.-

Thermal efficiency

- c) What are the different modes of transmission of mechanical power?
- d) What is gear? Explain Worm and Worm wheel gear with neat sketch.
- e) Explain the different modes of failure of mechanical components.
- f) Write note on selection of material for engineering application.
- g) Compress Electric arc welding with gas welding.

#### Q.5 a) is compulsory and solve any two out of b) to d).

- a) An engine working on Otto cycle has a compression ratio of 8.
   Compression begins at 100 KPa and 15°C. The heat supplied per cycle is 2000 KJ/kg of air. Determine.
  - 1) Thermal efficiency
  - 2) Maximum Cycle temperature.
- b) Draw block diagram of lathe machine. Explain turning operation in brief. 04
- c) In open belt drive, two pulleys of 500 mm diameter are connected at distance of 2 m apart. The initial tension in the belt is 500 N if the coefficient of friction between the belt and pulley is 0.25. Find the power transmitted at 700 rpm. Also calculate the length of belt.
- d) Explain aesthetic consideration in design of mechanical component. 04

15

13

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Set

Marks: 14

Choose the correct alternatives from the options and rewrite the sentence. 14 Q.1

MCQ/Objective Type Questions

4) Make suitable assumptions, if necessary and mention them clearly.

5) Use of log tables and non-programmable single memory calculator is

**BASIC MECHANICAL ENGINEERING** 

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer

2) Neat diagrams must be drawn whenever necessary.

3) Figures to the right indicate full marks.

1) The penstock is used

allowed.

- to increase pressure energy of water leaving to tailrace a)
- to decrease pressure energy of water leaving to tailrace b)
- to convey water from dam to turbine c)
- d) None
- 2) A condenser in a thermal power plant condenses steam coming out of
  - Boiler b) Super-heater a) Economizer d) Turbine C)
- 3) In a four stroke cycle engine, number of revolutions of the crankshaft for completion of working cycle is \_\_\_\_
  - a) one b) two
  - C) three d) four
- Due to slip of belt, the velocity ratio of the belt drive \_\_\_\_ 4)
  - increase b) decreases a)
  - c) remains constant d) none

Property of material, which enables it to regain its original shape after 5) deformation, when the external forces are removed, is known as .

- a) Elasticity b) Plasticity
- c) Ductility d) Toughness
- 6) Gear drive is used for transmitting power when two shafts are \_\_\_\_\_.
  - a) Parallel b) Intersecting c) Skew
    - d) All of the above
- 7) Which of the following is a mother of all the machine tools?
  - b) Lathe
  - Drilling d) None of these c)
- 8) A system comprising of a single phase, is known as \_\_\_\_\_
  - open system a) homogeneous system C)

Milling

a)

- b) closed system
- d) heterogeneous system

## **SLR-FM-613**

F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019

book.

Day & Date: Friday, 13-12-2019

Time: 10:00 AM To 01:00 PM

**Duration: 30 Minutes** 

Seat No.

Max. Marks: 70

Set

9) For a closed system, the difference between the heat added to the system and work done by the gas, is equal to the change in \_\_\_\_\_.

- a) enthalpy
- c) internal energy
- b) Entropy
- d) Temperature
- 10) Heat-pump is used .
  - to heat space a) to convert heat into work C)
- b) to cool the space

**SLR-FM-613** 

Set | Q

- d) None
- 11) Universal gas constant of perfect gas \_\_\_\_\_.
  - increases with temperature a)
  - decreases with temperature b)
  - increases with increase in molecular weight c)
  - d) is always constant
- The internal energy of an ideal gas depends only on \_\_\_\_\_. 12)
  - b) Volume
  - d) none of the above
- Impeller is used in \_\_\_\_\_. 13)

pressure c) temperature

- a) centrifugal pump
- c) turbine

a)

- b) Engine
- d) none of the above
- Following is the impulse type water turbine \_\_\_\_\_ 14)
  - a) Pelton turbine
  - c) Kaplan turbine

- b) Francis turbine
- d) None

#### F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 BASIC MECHANICAL ENGINEERING

Day & Date: Friday, 13-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.No.2 and Q.No.4 are short answer type question.

- 2) Q.No.3 and Q.No.5 long answer type question.
- 3) Neat diagram must be drawn whenever necessary.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of log tables and non-programmable single memory calculator is allowed.

#### Section – I

#### Q.2 Answer any five of the following

- a) State different statements of second law of thermodynamics.
- **b)** Compare BWR and PWR.
- c) Explain in brief point function and path function with suitable examples.
- d) Explain working of roots blower with neat sketch.
- e) Explain in brief working of double acting reciprocating pump.
- f) Explain the working of Vapour compression refrigeration cycle.
- g) Derive an expression for work done in adiabatic process.

#### Q.3 a) is compulsory. solve any two out of b) to e).

- a) Steam enters a steam turbine with a velocity of 60 m/s and enthalpy of 2600 kJ/kg and leaves with a velocity of 100 m/s and enthalpy of 2150 kJ/kg. Heat lost from turbine to surrounding is 220kJ/min. Find power developed by turbine if steam flow rate is 5800 kg/hr.
- b) A certain quantity of air has volume 0.028m<sup>3</sup> at pressure of 1.25 bar and 25<sup>o</sup>C. It is compressed to volume of 0.0042 m<sup>3</sup> according to law PV<sup>1.3</sup>=Constant. Find final temperature and work done during compression. Also determine reduction in pressure at constant volume required to bring system to its original temperature.
- c) A system undergoes a cycle consist of 4 processes. The heat and work transfer are tabulated below. Prove that the table is consistent with first law of thermodynamics. Determine network and find thermal efficiency.

Process	Q(kJ)	W(kJ)
1-2	1770	565
2-3	-1650	0
3-4	-900	-305
4-1	1040	0

- d) Explain with neat sketch, construction and working of Pelton turbine.
   04
   e) Draw a neat sketch of steam power plant. Explain function of air-pre
   04
- e) Draw a neat sketch of steam power plant. Explain function of air-pre heater, economizer and super heater.

Max. Marks: 56

15

13

**SLR-FM-613** 

Seat No.

#### Section – II

#### Q.4 Answer any five of the following.

- a) Show in the figure following terms associated with an I.C. engine.
  - 1) Bore
  - 2) Stroke
  - 3) Top dead center (T.D.C.)
  - 4) Bottom dead center (B.D.C.)
  - 5) Clearance volume
  - 6) Swept volume
- b) An air standard diesel cycle has a compression ratio of 16 and the heat transferred to the working fluid per cycle is 2000 KJ/kg. At the beginning of compression stroke the pressure is 1 bar and the temperature is 27°C. Calculate.-

Thermal efficiency

- c) What are the different modes of transmission of mechanical power?
- d) What is gear? Explain Worm and Worm wheel gear with neat sketch.
- e) Explain the different modes of failure of mechanical components.
- f) Write note on selection of material for engineering application.
- g) Compress Electric arc welding with gas welding.

#### Q.5 a) is compulsory and solve any two out of b) to d).

- a) An engine working on Otto cycle has a compression ratio of 8.
   O5 Compression begins at 100 KPa and 15°C. The heat supplied per cycle is 2000 KJ/kg of air. Determine.
  - 1) Thermal efficiency
  - 2) Maximum Cycle temperature.
- b) Draw block diagram of lathe machine. Explain turning operation in brief. 04
- c) In open belt drive, two pulleys of 500 mm diameter are connected at distance of 2 m apart. The initial tension in the belt is 500 N if the coefficient of friction between the belt and pulley is 0.25. Find the power transmitted at 700 rpm. Also calculate the length of belt.
- d) Explain aesthetic consideration in design of mechanical component. 04

15

13

# SLR-FM-613 Set Q

Seat No.

### F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC MECHANICAL ENGINEERING**

Day & Date: Friday, 13-12-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Neat diagrams must be drawn whenever necessary.
- 3) Figures to the right indicate full marks.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of log tables and non-programmable single memory calculator is allowed.

## **MCQ/Objective Type Questions**

**Duration: 30 Minutes** 

1)

Q.1

Marks: 14

14

-	a) c)	pressure temperature	b) d)	Volume none of the above
2)	Imp a) c)	eller is used in centrifugal pump turbine	b) d)	Engine none of the above
3)	Foll a) c)	owing is the impulse type water Pelton turbine Kaplan turbine	turbi b) d)	ne Francis turbine None
4)	The a) b) c) d)	e penstock is used to increase pressure energy of to decrease pressure energy of to convey water from dam to tur None	wate wat rbine	er leaving to tailrace er leaving to tailrace e
5)	Ac	ondenser in a thermal power pla	nt co	ondenses steam coming out of
	a) c)	Boiler Economizer	b) d)	Super-heater Turbine
6)	In a com a) c)	four stroke cycle engine, numbe ppletion of working cycle is one three	er of  b) d)	revolutions of the crankshaft for two four
7)	Due a) c)	e to slip of belt, the velocity ratio increase remains constant	of th b) d)	e belt drive decreases none
8)	Pro	perty of material, which enables	it to	regain its original shape after

deformation, when the external forces are removed, is known as \_\_\_\_\_.

- Elasticity a)
- Ductility C)

- b) Plasticity
- d) Toughness

Max. Marks: 70

Set

- Choose the correct alternatives from the options and rewrite the sentence. The internal energy of an ideal gas depends only on \_

- 9) Gear drive is used for transmitting power when two shafts are \_\_\_\_\_.
  - a) Parallel C) Skew

a)

- b) Intersecting
- d) All of the above

.

- Which of the following is a mother of all the machine tools? 10)
  - Milling b) Lathe
  - Drilling c) d) None of these
- 11) A system comprising of a single phase, is known as \_
  - a) open system b) closed system
  - d) heterogeneous system c) homogeneous system
- 12) For a closed system, the difference between the heat added to the system and work done by the gas, is equal to the change in \_\_\_\_\_.
  - enthalpy a)
  - internal energy C)
- d) Temperature
- 13) Heat-pump is used \_\_\_\_\_.
  - a) to heat space c) to convert heat into work
- Universal gas constant of perfect gas \_\_\_\_\_. 14)
  - increases with temperature a)
    - decreases with temperature b)
    - increases with increase in molecular weight c)
    - is always constant d)

- Set R

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- b) to cool the space
- d) None

b) Entropy

## F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 BASIC MECHANICAL ENGINEERING

Day & Date: Friday, 13-12-2019 Time: 10:00 AM To 01:00 PM

Seat

No.

**Instructions:** 1) Q.No.2 and Q.No.4 are short answer type question.

- 2) Q.No.3 and Q.No.5 long answer type question.
- 3) Neat diagram must be drawn whenever necessary.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of log tables and non-programmable single memory calculator is allowed.

#### Section – I

#### Q.2 Answer any five of the following

- a) State different statements of second law of thermodynamics.
- **b)** Compare BWR and PWR.
- c) Explain in brief point function and path function with suitable examples.
- d) Explain working of roots blower with neat sketch.
- e) Explain in brief working of double acting reciprocating pump.
- f) Explain the working of Vapour compression refrigeration cycle.
- g) Derive an expression for work done in adiabatic process.

#### Q.3 a) is compulsory. solve any two out of b) to e).

- a) Steam enters a steam turbine with a velocity of 60 m/s and enthalpy of 2600 kJ/kg and leaves with a velocity of 100 m/s and enthalpy of 2150 kJ/kg. Heat lost from turbine to surrounding is 220kJ/min. Find power developed by turbine if steam flow rate is 5800 kg/hr.
- b) A certain quantity of air has volume 0.028m<sup>3</sup> at pressure of 1.25 bar and 25<sup>o</sup>C. It is compressed to volume of 0.0042 m<sup>3</sup> according to law PV<sup>1.3</sup>=Constant. Find final temperature and work done during compression. Also determine reduction in pressure at constant volume required to bring system to its original temperature.
- c) A system undergoes a cycle consist of 4 processes. The heat and work transfer are tabulated below. Prove that the table is consistent with first law of thermodynamics. Determine network and find thermal efficiency.

Process	Q(kJ)	W(kJ)
1-2	1770	565
2-3	-1650	0
3-4	-900	-305
4-1	1040	0

- d) Explain with neat sketch, construction and working of Pelton turbine.
   04
   e) Draw a neat sketch of steam power plant. Explain function of air-pre
   04
- e) Draw a neat sketch of steam power plant. Explain function of air-pre heater, economizer and super heater.

Max. Marks: 56

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13

15

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#### Section – II

#### Q.4 Answer any five of the following.

- a) Show in the figure following terms associated with an I.C. engine.
  - 1) Bore
  - 2) Stroke
  - 3) Top dead center (T.D.C.)
  - 4) Bottom dead center (B.D.C.)
  - 5) Clearance volume
  - 6) Swept volume
- b) An air standard diesel cycle has a compression ratio of 16 and the heat transferred to the working fluid per cycle is 2000 KJ/kg. At the beginning of compression stroke the pressure is 1 bar and the temperature is 27°C. Calculate.-

Thermal efficiency

- c) What are the different modes of transmission of mechanical power?
- d) What is gear? Explain Worm and Worm wheel gear with neat sketch.
- e) Explain the different modes of failure of mechanical components.
- f) Write note on selection of material for engineering application.
- g) Compress Electric arc welding with gas welding.

#### Q.5 a) is compulsory and solve any two out of b) to d).

- a) An engine working on Otto cycle has a compression ratio of 8.
   O5 Compression begins at 100 KPa and 15°C. The heat supplied per cycle is 2000 KJ/kg of air. Determine.
  - 1) Thermal efficiency
  - 2) Maximum Cycle temperature.
- b) Draw block diagram of lathe machine. Explain turning operation in brief. 04
- c) In open belt drive, two pulleys of 500 mm diameter are connected at distance of 2 m apart. The initial tension in the belt is 500 N if the coefficient of friction between the belt and pulley is 0.25. Find the power transmitted at 700 rpm. Also calculate the length of belt.
- d) Explain aesthetic consideration in design of mechanical component. 04

15

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# SLR-FM-613 Set R

# F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC MECHANICAL ENGINEERING**

Day & Date: Friday, 13-12-2019 Time: 10:00 AM To 01:00 PM

Seat

No.

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer book.

- 2) Neat diagrams must be drawn whenever necessary.
- 3) Figures to the right indicate full marks.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of log tables and non-programmable single memory calculator is allowed.

#### **MCQ/Objective Type Questions**

**Duration: 30 Minutes** 

a)

- Choose the correct alternatives from the options and rewrite the sentence. 14 Q.1
  - 1) In a four stroke cycle engine, number of revolutions of the crankshaft for completion of working cycle is .

a)	one	 b)	two
C)	three	d)	four

2) Due to slip of belt, the velocity ratio of the belt drive \_\_\_\_\_.

- increase b) decreases
- C) remains constant d) none

Property of material, which enables it to regain its original shape after 3) deformation, when the external forces are removed, is known as \_\_\_\_\_.

- b) Plasticity a) Elasticity
- c) Ductility d) Toughness
- Gear drive is used for transmitting power when two shafts are \_\_\_\_\_. 4)
  - a) Parallel b) Intersecting
  - c) Skew d) All of the above
- Which of the following is a mother of all the machine tools? 5)
  - a) Milling b) Lathe
  - d) None of these c) Drilling

6) A system comprising of a single phase, is known as \_\_\_\_\_

- open system b) closed system a) c) homogeneous system d) heterogeneous system
- 7) For a closed system, the difference between the heat added to the system and work done by the gas, is equal to the change in \_\_\_\_\_.
  - a) enthalpy
  - c) internal energy

- b) Entropy
- d) Temperature
- 8) Heat-pump is used \_\_\_\_\_
  - a) to heat space
  - to convert heat into work c)
- b) to cool the space
- d) None

Max. Marks: 70

- - d) tour



Marks: 14

- 9) Universal gas constant of perfect gas \_\_\_\_\_.
  - a) increases with temperature
  - b) decreases with temperature
  - c) increases with increase in molecular weight
  - d) is always constant
- 10) The internal energy of an ideal gas depends only on \_\_\_\_\_.
  - a) pressure

- b) Volumed) none of the above
- c) temperature11) Impeller is used in \_\_\_\_\_.
- b) Engine
- a) centrifugal pump b) c) turbine d)
  - d) none of the above
- 12) Following is the impulse type water turbine \_\_\_\_\_
  - a) Pelton turbine
  - c) Kaplan turbine
- b) Francis turbine
- d) None
- 13) The penstock is used \_\_\_\_\_.
  - a) to increase pressure energy of water leaving to tailrace
  - b) to decrease pressure energy of water leaving to tailrace
  - c) to convey water from dam to turbine
  - d) None
- 14) A condenser in a thermal power plant condenses steam coming out of
  - a) Boiler
  - c) Economizer

- b) Super-heater
- d) Turbine

Set S

#### F.E. (Part – I) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC MECHANICAL ENGINEERING**

Day & Date: Friday, 13-12-2019 Time: 10:00 AM To 01:00 PM

Seat

No.

**Instructions:** 1) Q.No.2 and Q.No.4 are short answer type question.

- 2) Q.No.3 and Q.No.5 long answer type question.
- 3) Neat diagram must be drawn whenever necessary.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of log tables and non-programmable single memory calculator is allowed.

#### Section – I

#### Q.2 Answer any five of the following

- State different statements of second law of thermodynamics. a)
- b) Compare BWR and PWR.
- Explain in brief point function and path function with suitable examples. c)
- Explain working of roots blower with neat sketch. d)
- Explain in brief working of double acting reciprocating pump. e)
- Explain the working of Vapour compression refrigeration cycle. **f)**
- Derive an expression for work done in adiabatic process. g)

#### a) is compulsory. solve any two out of b) to e). Q.3

- Steam enters a steam turbine with a velocity of 60 m/s and enthalpy of 05 a) 2600 kJ/kg and leaves with a velocity of 100 m/s and enthalpy of 2150 kJ/kg. Heat lost from turbine to surrounding is 220kJ/min. Find power developed by turbine if steam flow rate is 5800 kg/hr.
- A certain quantity of air has volume 0.028m<sup>3</sup> at pressure of 1.25 bar and b) 04 25ºC. It is compressed to volume of 0.0042 m<sup>3</sup> according to law PV<sup>1.3</sup>=Constant. Find final temperature and work done during compression. Also determine reduction in pressure at constant volume required to bring system to its original temperature.
- c) A system undergoes a cycle consist of 4 processes. The heat and work transfer are tabulated below. Prove that the table is consistent with first law of thermodynamics. Determine network and find thermal efficiency.

Pro	cess	Q(kJ)	W(kJ)	
1	-2	1770	565	
2	-3	-1650	0	
3-4		-900	-305	
4	-1	1040	0	

- d) Explain with neat sketch, construction and working of Pelton turbine. 04
- Draw a neat sketch of steam power plant. Explain function of air-pre 04 e) heater, economizer and super heater.

Max. Marks: 56

Set

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# SLR-FM-613 Set S

#### Section – II

#### Q.4 Answer any five of the following.

- a) Show in the figure following terms associated with an I.C. engine.
  - 1) Bore
  - 2) Stroke
  - 3) Top dead center (T.D.C.)
  - 4) Bottom dead center (B.D.C.)
  - 5) Clearance volume
  - 6) Swept volume
- b) An air standard diesel cycle has a compression ratio of 16 and the heat transferred to the working fluid per cycle is 2000 KJ/kg. At the beginning of compression stroke the pressure is 1 bar and the temperature is 27°C. Calculate.-

Thermal efficiency

- c) What are the different modes of transmission of mechanical power?
- d) What is gear? Explain Worm and Worm wheel gear with neat sketch.
- e) Explain the different modes of failure of mechanical components.
- f) Write note on selection of material for engineering application.
- g) Compress Electric arc welding with gas welding.

#### Q.5 a) is compulsory and solve any two out of b) to d).

- An engine working on Otto cycle has a compression ratio of 8. Compression begins at 100 KPa and 15°C. The heat supplied per cycle is 2000 KJ/kg of air. Determine.
  - 1) Thermal efficiency
  - 2) Maximum Cycle temperature.
- b) Draw block diagram of lathe machine. Explain turning operation in brief. 04
- c) In open belt drive, two pulleys of 500 mm diameter are connected at distance of 2 m apart. The initial tension in the belt is 500 N if the coefficient of friction between the belt and pulley is 0.25. Find the power transmitted at 700 rpm. Also calculate the length of belt.
- d) Explain aesthetic consideration in design of mechanical component. 04

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05

Seat No.						Set	Ρ
	F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019						
Day & Time:	Date 10:00	: Friday,22-11-2 ) AM To 01:00 P	019 M		Ν	/lax. Marks	3: 70
Instru	iction	s: 1) Q. No. 1 is book.	compulsory and sh	ould	be solved in first 30 minu	ites in ans <sup>,</sup>	wer
		2) Figures to	the right indicate ful	l ma	rks.		
-		N	ICQ/Objective T	уре	Questions		
Durati	on: 30	0 Minutes				Marks	3: 14
Q.1	Choo sente	ese the correct a ence.	alternatives from th	ne o	ptions and rewrite the		14
	1)	If the differential	l equation $(x^4e^x - m)$	xy <sup>2</sup> )	$dx + 4x^2ydy = 0$ is exact	then	
		the value of $m =$	=	Ь)	4		
		c) $-1$		d)	-4 -2		
	2)	$\int \frac{dy}{dx} = x^2 + y^2 y$	with $v(0) = 1$ then P	ícarc	l's first approximation is v	<b>/</b> 4 =	
	-	a) $x^3$		b)	$x^3$	ı	
		$1 + x + \frac{1}{3}$		ý	$x + \frac{1}{3}$		
		c) $1 + x - \frac{x^3}{3}$		d)	None		
	3)	$\frac{\pi}{2}$ 1					
	·	$\int \int r \sin \theta d\theta dr$	· =				
		ο ο a) <sup>1</sup>		b)	1		
		c) $\frac{1}{4}$		d)	r 1		
		6 		ч)	2		
	4) The volume obtained by resolving the area bounded by one arc of the curve $y = \sin x$ about the x-axis is						
		a) $\pi^2$		b)	$\frac{\pi^2}{2}$		
		C) $\frac{\pi^2}{3}$		d)	$\frac{\frac{2}{\pi^2}}{\frac{4}{2}}$		
	5)	Divided differen	ce formula is used v	vhen	data are		
		<ul><li>a) equally space</li><li>c) Heterogene</li></ul>	ced	b) d)	not equally spaced		
	6)	The length of th	e arc of the curve v	$= x^{\dagger}$	from $x = 0$ to $x = 3$ is		
	-,	a) 5		b)	2√3		
		c) $\sqrt{5}$		d)	3√2		
	7)	In the integral $\int_{C}$	$\int_{0}^{1} \int_{0}^{y} \int_{0}^{x^{2}y} f(x, y, z) dx$	dydz	r integration is taken		
		a) first w.r.t. z	then w.r.t. y then w.	r.t. x			
b) first w.r.t. z then w.r.t. x then w.r.t. y c) first w.r.t x then w.r.t y then w.r.t z							

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			Set P
8)	The Orthogonal trajectories of the fa a) $x^2 - y^2 = c$ c) $x = cy$	amily b) d)	y of curves $xy = a$ is $x^2 + y^2 = c$ $y^2 = 4cx$
9)	The solution of the differential equation $xy = c$ c) $x^2y^2 = c$	tion : b) d)	x dx + y dy = 0 is x + y = c $x^{2} + y^{2} = c$
10)	The value of $\int_0^\infty e^{-x^4} dx$ is a) $\frac{1}{2} \left[ \frac{1}{3} \right]$ c) $\frac{1}{4} \left[ \frac{1}{3} \right]$	b) d)	$\frac{1}{4} \begin{bmatrix} \frac{1}{4} \\ \frac{1}{3} \end{bmatrix} \begin{bmatrix} \frac{1}{4} \end{bmatrix}$
11)	$\int_{0}^{1} \int_{0}^{1} dx dy$ <b>a</b> ) $\frac{1}{2}$	b)	$\frac{1}{4}$
	c) 1	d)	$\frac{3}{2}$
12)	If the density $\rho$ at any point varies a then $\rho = $	s the	e distance of the point from y axis
	a) K.x	b)	K.xy

c) K.y d) K(x+y)

13) A double point is called a node if the two tangents there at are \_\_\_\_\_.

- a) Coincident b) Imaginary
- c) real and distinct d) none of these
- 14) For the fourth order Runge-Kutta method which of the following is correct ?

a) 
$$K_1 = \frac{h}{2}f(x_0, y_0)$$

- b)  $K_2 = hf(x_0 + h, y_0 + k)$
- c)  $K_3 = hf(x_0 + h, y_0 + k_2)$
- d)  $K_4 = hf(x_0 + h, y_0 + k_3)$

ENGINEERING MATHEMATICS – II							
Day & Date: Friday,22-11-2019 Max. Marks: 56 Time: 10:00 AM To 01:00 PM							
Instructions: 1) Q. No. 2 is compulsory. Solve any two questions from Q. No. 3 & 5 in							
		2) Q. No. 7 is compulsory. Solve any two questions from Q. No. 6, 8, 9 in					
		section II					
	<ul><li>3) Figures to the right indicate full marks.</li><li>4) Use of calculators is allowed.</li></ul>						
Q.2	a)	Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x = 4 from the following table:					
		X 0 1 2 3 4					
	<b>b</b> )	y   7   17   45   103   203	05				
	5)	Find $\frac{dy}{dx}$ and $\frac{dy}{dx^2}$ at x = 1.76 from the following table:	05				
		x 1.76 1.78 1.80 1.82 1.84 1.86					
03	<b>2</b> )	$\int y = 0.3022  0.3732  0.3733  0.3031  0.3004  0.3003$	03				
<b>Q</b> .J	b)	Solve $y(xy + e^{-})ax - e^{-}ay = 0$ Solve $\frac{dy}{dx} + y = x^2y^6$	03				
	c)	Solve $(2x - 6y - 3)dx - (x - 3y + 6)dy = 0$	03				
Q.4	a)	Find the curve in which the subnormal varies as the square of the radius 03					
	b)	vector Find the orthogonal trajectory of family of cardioid $r = a(1 + \cos \theta)$ 03					
	c)	When a switch is closed, the current built up in an electric circuit is given by <b>04</b>					
		$L\frac{di}{dt} + Ri = E$ if $L = 640, R = 250, E = 500, and i = 0$ when $t = 0$ .					
о г	Show the current will approach 2 amp. When $t \rightarrow \infty$						
Q.5	Atte	<b>itempt any two.</b> (i) Use Picard's method solve $\frac{dy}{dt} = 1 + y^2$ given $y(0) = 0$ up to third <b>0</b>					
	,	approximations. Hence find the value v at x=0.2					
		ii) Solve Using Taylor's method $\frac{dy}{dx} - x = y$ , $y(0) = 1$ Hence find y at x					
		=0.2					
		Solve $\frac{dy}{dx} = 1 - y$ , $y(0) = 0$ at $x = 0.2$ in two steps using modified Euler'					
	b)	method Use Runge-Kutta method to an approximate value of v at x= 0.2 given that 03					
	,	with $\frac{dy}{dx} = \frac{y-x}{dx}$ with $y(0) = 1$ . Take $h = 0.2$					
	dx y+x Section - II						
Q.6	a)	Evaluate $\int_{0}^{2} x^{4} (8 - x^{3})^{-\frac{1}{3}} dx$	03				
	b)	Evaluate $\int_0^\infty \frac{x^5}{5x} dx$ 03					
	c)	Evaluate $\int_0^1 (x^{\alpha} - 1)(\log x)^{-1} dx, \alpha \ge 0$ <b>0</b>					

# F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019

Seat

No.

#### Q

## Q

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		Set	Ρ
Q.7	a)	Change the order of integration and evaluate $\int_0^\infty \int_0^x e^{\frac{-x^2}{y}} x  dx  dy$ .	04
	b)	Evaluate $\int_{-1}^{1} \int_{0}^{z} \int_{x-z}^{x+z} dy dx dz$	03
	c)	Evaluate by changing to polar co-ordinates $\int_0^a \int_0^{\sqrt{a^2 - x^2}} \sin\left[\frac{\pi}{a^2}(a^2 - x^2 - y^2)\right] dxdy.$	03
Q.8	a)	Find by double integration the area between the curve $y^2 = 4ax$ and $x^2 = 4ay$ .	03
	b)	In a lamina in the form of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ density at any point varies as product of its distance from axis of ellipse Find the mass	03
	c)	The curve $r = a(1 + \cos \theta)$ revolves about the initial line find volume generated.	03
Q.9	a)	Trace any two of following curves with full justification. i) $r = a \cos 3\theta$ ii) $x = t + \sin t$ , $y = 1 - \cos t$ iii) $xy^2 = a^2(a - x)$	06
	b)	Find the length of the the cardioid $r = a(1 - \cos \theta)$ lying inside the circle	03



Seat No.				Set Q		
		F.E. (Part – II) (Old) (CGPA) E	Exar тнг	mination Nov/Dec-2019		
Day & Time:	Day & Date: Friday,22-11-2019 Max. Marks: 70 Time: 10:00 AM To 01:00 PM					
Instru	ction	<b>s:</b> 1) Q. No. 1 is compulsory and shook.	ould	be solved in first 30 minutes in answer		
		2) Figures to the right indicate ful	l ma	rks.		
Durati		MCQ/Objective T	уре	Questions		
Duratio	on: 30			Marks: 14		
Q.1 (	sente	ence.	ne o	ptions and rewrite the 14		
	1)	The Orthogonal trajectories of the fa a) $x^2 - y^2 = c$ c) $x = cy$	amily b) d)	y of curves $xy = a$ is $x^2 + y^2 = c$ $y^2 = 4cx$		
2	2)	The solution of the differential equat a) $xy = c$ c) $x^2y^2 = c$	tion z b) d)	x dx + y dy = 0 is x + y = c $x^{2} + y^{2} = c$		
3	3)	The value of $\int_0^\infty e^{-x^4} dx$ is				
		a) $\frac{1}{2} \left[ \frac{1}{3} \right]$	b)	$\frac{1}{4}\left[\frac{1}{4}\right]$		
		C) $\frac{1}{4} \left[ \frac{1}{3} \right]$	d)	$\frac{1}{3} \begin{bmatrix} \frac{1}{4} \end{bmatrix}$		
2	4)	$\int_{0}^{1} \int_{0}^{1} dx  dy$				
		a) $\frac{1}{2}$	b)	$\frac{1}{4}$		
		c) 1	d)	$\frac{3}{2}$		
Ę	5) If the density $\rho$ at any point varies as the distance of the point from y axis					
		a) K.x c) K.y	b) d)	K.xy K(x+y)		
6	6)	<ul><li>A double point is called a node if the</li><li>a) Coincident</li><li>c) real and distinct</li></ul>	e two b) d)	tangents there at are Imaginary none of these		
7	7)	For the fourth order Runge-Kutta me a) $K_1 = \frac{h}{2} f(x_0, y_0)$	etho b)	d which of the following is correct ? $K_2 = hf(x_0 + h, y_0 + k)$		
		c) $K_3 = hf(x_0 + h, y_0 + k_2)$	d)	$K_4 = hf(x_0 + h, y_0 + k_3)$		
8	8)	If the differential equation $(x^4e^x - m)$	xy <sup>2</sup> )	$dx + 4x^2ydy = 0$ is exact then		
		a) 1 c) $-1$	b) d)	-4 -2		


			Set
9)	If $\frac{dy}{dx} = x^2 + y^2$ with $y(0) = 1$ then Pi a) $1 + x + \frac{x^3}{3}$ c) $1 + x - \frac{x^3}{3}$	card b) d)	I's first approximation is $y_1 = $ $x + \frac{x^3}{3}$ None
10)	$\int_{0}^{\frac{\pi}{2}} \int_{0}^{1} r \sin \theta d\theta dr = \underline{\qquad}.$	b)	1
	c) $\frac{\frac{4}{4}}{\frac{1}{6}}$	d)	$r$ $\frac{1}{2}$
11)	The volume obtained by resolving the curve $y = \sin x$ about, the x-axis is _ a) $\pi^2$ c) $\frac{\pi^2}{3}$	b) d)	The bounded by one arc of the $\frac{\pi^2}{\frac{2}{\frac{\pi^2}{4}}}$ .
12)	Divided difference formula is used w a) equally spaced c) Heterogeneous	/hen b) d)	data are not equally spaced none of these
13)	The length of the arc of the curve y = a) 5 c) $\sqrt{5}$	= x f b) d)	from $x = 0$ to $x = 3$ is $2\sqrt{3}$ $3\sqrt{2}$
14)	In the integral $\int_0^1 \int_0^y \int_0^{x^2y} f(x, y, z) dx dx$ a) first w.r.t. z then w.r.t. y then w.r	dydz ∵t. x	r integration is taken

- b) first w.r.t. z then w.r.t. x then w.r.t. y
  c) first w.r.t.x then w.r.t. y then w.r.t. z
  d) first w.r.t. y then w.r.t. z then w.r.t. x

Q

Day a Time	& Da : 10:	te: Friday,22-11-2019 Max. Marks: 00 AM To 01:00 PM	: 56				
Instr	uctio	<ul> <li>&gt;ns: 1) Q. No. 2 is compulsory. Solve any two questions from Q. No. 3 &amp; 5 in Section I.</li> <li>2) Q. No. 7 is compulsory. Solve any two questions from Q. No. 6, 8, 9 in section II</li> <li>3) Figures to the right indicate full marks.</li> <li>4) Use of calculators is allowed.</li> </ul>					
Q.2	a)	Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x = 4 from the following table: $\begin{array}{c c} \hline X & 0 & 1 & 2 & 3 & 4 \\ \hline y & 7 & 17 & 45 & 103 & 203 \\ \hline \end{array}$					
	b)	Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x = 1.76 from the following table: x       1.76       1.78       1.80       1.82       1.84       1.86         y       0.9822       0.9782       0.9738       0.9691       0.9604       0.9585	05				
Q.3	a) b) c)	Solve $y(xy + e^x)dx - e^x dy = 0$ Solve $\frac{dy}{dx} + y = x^2y^6$ Solve $(2x - 6y - 3)dx - (x - 3y + 6)dy = 0$	03 03 03				
Q.4	c) a) b) c)	Solve $(2x - 6y - 5)ax - (x - 3y + 6)ay = 0$ Find the curve in which the subnormal varies as the square of the radius vector Find the orthogonal trajectory of family of cardioid $r = a(1 + \cos \theta)$ When a switch is closed, the current built up in an electric circuit is given by $L\frac{di}{dt} + Ri = E$ if $L = 640$ , $R = 250$ , $E = 500$ , and $i = 0$ when $t = 0$ .					
Q.5	Attea) b)	<ul> <li>i) Use Picard's method solve dy/dx = 1 + y<sup>2</sup>, given y(0) = 0 up to third approximations. Hence find the value y at x=0.2</li> <li>ii) Solve Using Taylor's method dy/dx - x = y, y(0) = 1 Hence find y at x = 0.2</li> <li>iii) Solve dy/dx = 1 - y, y(0) = 0 at x = 0.2 in two steps using modified Euler' method</li> <li>Use Runge-Kutta method to an approximate value of y at x= 0.2 given that 03</li> </ul>					
		with $\frac{1}{dx} = \frac{1}{y+x}$ with $y(0) = 1$ . Take $h = 0.2$ Section – II					
Q.6	a)	Evaluate $\int_{0}^{2} x^{4} (8 - x^{3})^{-\frac{1}{3}} dx$	03				
	b)	Evaluate $\int_0^\infty \frac{x^5}{5^x} dx$	03				
	c)	Evaluate $\int_0^1 (x^{\alpha} - 1)(\log x)^{-1} dx, \alpha \ge 0$	03				

# F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 ENGINEERING MATHEMATICS – II

Seat

No.

**Q.3 a)** Solve 
$$y(xy + e^x)dx - e^x dy = 0$$

### Q.

- 6
- 3

# SLR-FM-614

Set

Q

		Set	Q
Q.7	a)	Change the order of integration and evaluate $\int_0^\infty \int_0^x e^{\frac{-x^2}{y}} x  dx  dy$ .	04
	b)	Evaluate $\int_{-1}^{1} \int_{0}^{z} \int_{x-z}^{x+z} dy dx dz$	03
	C)	Evaluate by changing to polar co-ordinates	03
		$\int_0^a \int_0^{\sqrt{a^2 - x^2}} \sin\left[\frac{\pi}{a^2}(a^2 - x^2 - y^2)\right] dx dy.$	
Q.8	a)	Find by double integration the area between the curve $y^2 = 4ax$ and	03
		$x^2 = 4ay.$	02
	b)	In a lamina in the form of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ density at any point varies as	03
		product of its distance from axis of ellipse Find the mass.	
	C)	The curve $r = a(1 + \cos \theta)$ revolves about the initial line find volume	03
		generated.	
Q.9	a)	Trace any two of following curves with full justification.	06
		1) $r = a \cos 3\theta$	
		ii) $x = t + \sin t, y = 1 - \cos t$	
		iii) $xy^2 = a^2(a - x)$	
	b)	Find the length of the the cardioid $r = a(1 - \cos \theta)$ lying inside the circle	03
		$r = cos \theta$ .	

Seat No.						Set	R
		F.E. (Part – II	) (Old) (CGPA)	Exa	mination Nov/Dec-20	019	
Day & Time:	Date 10:00	: Friday,22-11-2 AM To 01:00 P	019 M	АТП		Max. Marks	s: 70
Instru	iction	<b>is:</b> 1) Q. No. 1 is book.	compulsory and s	should	be solved in first 30 min	utes in ans	wer
					nks.		
Durati	on: 3	0 Minutes		туре		Marks	s: 14
Q.1	Choo sente	ese the correct a ence.	alternatives from	the o	ptions and rewrite the		14
	1)	<ul><li>a) equally spa</li><li>c) Heterogene</li></ul>	ced cous	b) d)	not equally spaced none of these		
	2)	The length of th a) 5 c) $\sqrt{5}$	e arc of the curve	y = x b) d)	from $x = 0$ to $x = 3$ is $2\sqrt{3}$ $3\sqrt{2}$		
	3)	In the integral $\int_{0}^{2}$ a) first w.r.t. z b) first w.r.t. z c) first w.r.t.x t d) first w.r.t. y	$\int_{0}^{1} \int_{0}^{y} \int_{0}^{x^{2}y} f(x, y, z) dx$ then w.r.t. y then y then w.r.t. x then y hen w.r.t. y then y then w.r.t. z then y	<i>lxdyd:</i> w.r.t. x w.r.t. y y.r.t. z w.r.t. x	z integration is taken		
	4)	The Orthogonal a) $x^2 - y^2 = c$ c) $x = cy$	trajectories of the	family b) d)	y of curves $xy = a$ is $x^2 + y^2 = c$ $y^2 = 4cx$		
:	5)	The solution of t a) $xy = c$ c) $x^2y^2 = c$	the differential equ	uation b) d)	x dx + y dy = 0 is x + y = c $x^2 + y^2 = c$	_•	
	6)	The value of $\int_{0}^{\infty}$ a) $\frac{1}{2} \left[ \frac{1}{3} \right]$ c) $\frac{1}{4} \left[ \frac{1}{2} \right]$	$e^{-x^4}dx$ is	b) d)	$\frac{1}{4} \begin{bmatrix} 1\\ 4 \end{bmatrix}$ $\frac{1}{2} \begin{bmatrix} 1\\ 4 \end{bmatrix}$		
	7)	$\int_{0}^{1} \int_{0}^{1} dx dy$		b)	1		
		c) $\frac{1}{2}$		d)	$\frac{1}{4}$ $\frac{3}{2}$		
	8)	If the density $\rho$ a	at any point varies	as the	e distance of the point fro	m y axis	

the	n $\rho$ =		
a)	K.x	b)	K.xy
c)	K.y	d)	K(x+y)

			SLR-FM-614
			Set R
9)	<ul><li>A double point is called a node if the</li><li>a) Coincident</li><li>c) real and distinct</li></ul>	e two b) d)	o tangents there at are Imaginary none of these
10)	For the fourth order Runge-Kutta me a) $K_1 = \frac{h}{2} f(x_0, y_0)$	etho b)	d which of the following is correct ? $K_2 = hf(x_0 + h, y_0 + k)$
11)	c) $K_3 = hf(x_0 + h, y_0 + k_2)$ If the differential equation $(x^4e^x - m)$ the value of $m =$	a) xy <sup>2</sup> )	$K_4 = hf(x_0 + h, y_0 + k_3)$ $dx + 4x^2ydy = 0$ is exact then
	a) 1 c) -1	b) d)	-4 -2
12)	If $\frac{dy}{dx} = x^2 + y^2$ with $y(0) = 1$ then Pi	card	I's first approximation is $y_1 = $
	a) $1 + x + \frac{x^3}{3}$	b)	$x + \frac{x^3}{3}$
	c) $1 + x - \frac{x^3}{3}$	d)	None
13)	$\int_{0}^{\frac{\pi}{2}} \int_{0}^{1} r \sin \theta d\theta  dr = \underline{\qquad}.$		
	$a) \frac{1}{2}$	b)	<u>1</u>
	c) $\frac{4}{6}$	d)	$r \frac{1}{2}$
14)	The volume obtained by resolving the curve $y = \sin x$ about, the x-axis is _	he ar	rea bounded by one arc of the $\frac{1}{2}$ .
	a) π <sup>2</sup>	D)	$\frac{n}{2}$

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

Instr	ucti	Section I				
		2) Q. No. 7 is compulsory. Solve any two questions from Q. No. 6, 8, 9 in				
		section II				
		<ul><li>4) Use of calculators is allowed.</li></ul>				
Q.2	a)	Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x = 4 from the following table:	04			
		X 0 1 2 3 4				
		y 7 17 45 103 203				
	b)	Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x = 1.76 from the following table:	05			
		x         1.76         1.78         1.80         1.82         1.84         1.86           y         0.9822         0.9782         0.9738         0.9691         0.9604         0.9585				
Q.3	a)	Solve $v(xy + e^x)dx - e^xdy = 0$	03			
4.0	b)	Solve $\frac{dy}{dt} + y = x^2 y^6$	03			
	c)	Solve $(2x - 6y - 3)dx - (x - 3y + 6)dy = 0$	03			
Q.4	.4 a) Find the curve in which the subnormal varies as the square of the radius					
	b)	Find the orthogonal trajectory of family of cardioid $r = a(1 + \cos \theta)$	03			
	c)	When a switch is closed, the current built up in an electric circuit is given by	04			
		$L\frac{dt}{dt} + Ri = E$ if $L = 640, R = 250, E = 500, and i = 0$ when $t = 0$ .				
	• • •	Show the current will approach 2 amp. When $t \rightarrow \infty$				
Q.5	Att	empt any two.	06			
	u)	Use Picard's method solve $\frac{1}{dx} = 1 + y^2$ , given $y(0) = 0$ up to third approximations. Hence find the value v at x=0.2	00			
		ii) Solve Using Taylor's method $\frac{dy}{dy} - x = y y(0) = 1$ Hence find y at x				
		=0.2				
		iii) Solve $\frac{dy}{dx} = 1 - y$ , $y(0) = 0$ at $x = 0.2$ in two steps using modified Euler'				
		method				
	b)	Use Runge-Kutta method to an approximate value of y at $x = 0.2$ given that	03			
		with $\frac{dy}{dx} = \frac{y}{y+x}$ with $y(0) = 1$ . Take $h = 0.2$				
		Section - II				
Q.6	a)	Evaluate $\int_{0}^{2} x^{4} (8 - x^{3})^{-\frac{1}{3}} dx$	03			
	b)	Evaluate $\int_0^\infty \frac{x^5}{5x} dx$	03			
	c)	Evaluate $\int_{0}^{1} (x^{\alpha} - 1)(\log x)^{-1} dx, \alpha \ge 0$	03			
		- <b>v</b>				

F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 ENGINEERING MATHEMATICS – II

Day & Date: Friday,22-11-2019

Time: 10:00 AM To 01:00 PM

Seat

No.

41 . ...la no fi Inst 4

### Q.3

### Q.5

- 6
- 3
- Q.6
  - 3

# SLR-FM-614

Set R

Max. Marks: 56

		Set	R
Q.7	a)	Change the order of integration and evaluate $\int_0^\infty \int_0^x e^{\frac{-x^2}{y}} x  dx  dy$ .	04
	b)	Evaluate $\int_{-1}^{1} \int_{0}^{z} \int_{x-z}^{x+z} dy dx dz$	03
	c)	Evaluate by changing to polar co-ordinates	03
		$\int_0^a \int_0^{\sqrt{a^2 - x^2}} \sin\left[\frac{\pi}{a^2}(a^2 - x^2 - y^2)\right] dx dy.$	
Q.8	a)	Find by double integration the area between the curve $y^2 = 4ax$ and $y^2 = 4ax$	03
		$x^2 = 4ay$ .	03
	b)	In a lamina in the form of ellipse $\frac{1}{a^2} + \frac{1}{b^2} = 1$ density at any point varies as	
	c)	The curve $r = a(1 + \cos \theta)$ revolves about the initial line find volume	03
Q.9	a)	Trace any two of following curves with full justification.	06
		i) $r = a \cos 3\theta$	
		ii) $x = t + \sin t, y = 1 - \cos t$	
	<b>b</b> )	III) $xy^2 = a^2(a - x)$ Find the length of the the cordicid $x = a(1 - acc 0)$ , lying incide the circle	02
	D)	Find the length of the the cardiold $r = a(1 - \cos \theta)$ lying inside the circle	03
		$I = a \cos \theta$ .	

Seat No.			S	et	S			
F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 ENGINEERING MATHEMATICS – II								
Day & Time:	Date: Friday,22-11-20 10:00 AM To 01:00 P	019 M	Max. M	arks	3: 70			
Instru	ctions: 1) Q. No. 1 is book.	compulsory and should	be solved in first 30 minutes in	ansv	wer			
	2) Figures to	the right indicate full ma	rks.					
Duratia	Minutes	ICQ/Objective Type	Questions					
	on: 30 Minutes	stornotives from the e	IV	arks	5:14 14			
Q.1 (	sentence.	alternatives from the o	phons and rewrite the		14			
1	) The value of $\int_0^\infty$	$e^{-x^4}dx$ is						
	a) $\frac{1}{2}\left[\frac{1}{3}\right]$	b)	$\frac{1}{4}\begin{bmatrix} 1\\4 \end{bmatrix}$					
	C) $\frac{1}{4} \left[ \frac{1}{3} \right]$	d)	$\frac{1}{3}\left[\frac{1}{4}\right]$					
2	$\int \int \int dx  dy$							
	<b>a)</b> $\frac{1}{2}$	b)	$\frac{1}{4}$					
	c) 1	d)	$\frac{3}{2}$					
3	B) If the density $\rho$ a then $\rho$ =	at any point varies as the	e distance of the point from y ax	is				
	a) K.x	b) d)	K.xy K(x+v)					
Z	<ul> <li>A double point is</li> </ul>	s called a node if the two	tangents there at are	_				
	a) Coincident c) real and dis	tinct d)	Imaginary none of these	.•				
5	5) For the fourth or	der Runge-Kutta metho	d which of the following is corre	ct ?				
	a) $K_1 = \frac{h}{2}f(x_0,$	<i>y</i> <sub>0</sub> ) b)	$K_2 = hf(x_0 + h, y_0 + k)$					
	$C)  K_3 = hf(x_0 - x_0)$	$(+ h, y_0 + k_2)$ d)	$K_4 = hf(x_0 + h, y_0 + k_3)$					
6	<ul> <li>If the differential the value of m =</li> </ul>	equation (x <sup>4</sup> e <sup>x</sup> – mxy <sup>2</sup> )	$dx + 4x^2ydy = 0$ is exact then					
	a) 1 c) -1	b) d)	-4 -2					
7	') If $\frac{dy}{dx} = x^2 + y^2$ w	with $y(0) = 1$ then Picard	I's first approximation is $y_1 = \_$					
	a) $1 + x + \frac{x^3}{2}$	b)	$x + \frac{x^3}{3}$					
	c) $1+x-\frac{x^3}{3}$	d)	None					

Set S

### Set 8) $r\sin\theta d\theta dr =$ \_\_\_\_ ŏ b) $\frac{1}{r}$ d) $\frac{1}{2}$ a) 1 4 1 c) 9) The volume obtained by resolving the area bounded by one arc of the curve $y = \sin x$ about, the x-axis is \_ $\frac{\frac{\pi^2}{2}}{\frac{\pi^2}{4}}$ a) $\pi^2$ b) c) $\frac{\pi^2}{3}$ d) Divided difference formula is used when data are \_ 10) b) not equally spaced a) equally spaced c) Heterogeneous d) none of these 11) The length of the arc of the curve y = x from x = 0 to x = 3 is \_\_\_\_\_. b) $2\sqrt{3}$ a) 5 d) $3\sqrt{2}$ c) $\sqrt{5}$ In the integral $\int_0^1 \int_0^y \int_0^{x^2 y} f(x, y, z) dx dy dz$ integration is taken \_\_\_\_\_. 12) a) first w.r.t. z then w.r.t. y then w.r.t. x b) first w.r.t. z then w.r.t. x then w.r.t. y c) first w.r.t.x then w.r.t. y then w.r.t. z d) first w.r.t. y then w.r.t. z then w.r.t. x 13) The Orthogonal trajectories of the family of curves xy = a is \_\_\_\_\_. b) $x^2 + y^2 = c$ a) $x^2 - y^2 = c$ d) $v^2 = 4cx$ c) x = cy

- 14) The solution of the differential equation x dx + y dy = 0 is \_\_\_\_\_.
  - a) xy = cc)  $x^2y^2 = c$ b) x + y = cd)  $x^2 + y^2 = c$

Set

Max. Marks: 56

## F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **ENGINEERING MATHEMATICS – II**

Day & Date: Friday, 22-11-2019 Time: 10:00 AM To 01:00 PM

Seat

No.

Instructions: 1) Q. No. 2 is compulsory. Solve any two questions from Q. No. 3 & 5 in Section I.

- 2) Q. No. 7 is compulsory. Solve any two questions from Q. No. 6, 8, 9 in section II
- Figures to the right indicate full marks.
- 4) Use of calculators is allowed.

**Q.2** a) Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at x = 4 from the following table:

Х	0	1	2	3	4
y	7	17	45	103	203

**b)** Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at x = 1.76 from the following table:

ил	uл					
х	1.76	1.78	1.80	1.82	1.84	1.86
У	0.9822	0.9782	0.9738	0.9691	0.9604	0.9585

**Q.3** a) Solve 
$$y(xy + e^x)dx - e^x dy = 0$$

**b)** Solve 
$$\frac{dy}{dx} + y = x^2 y^6$$

c) Solve 
$$(2x - 6y - 3)dx - (x - 3y + 6)dy = 0$$

- Q.4 a) Find the curve in which the subnormal varies as the square of the radius 03 vector 03
  - **b)** Find the orthogonal trajectory of family of cardioid  $r = a(1 + \cos \theta)$ 04

c) When a switch is closed, the current built up in an electric circuit is given by  $L\frac{di}{dt} + Ri = E$  if L = 640, R = 250, E = 500, and i = 0 when t = 0. Show the current will approach 2 amp. When  $t \rightarrow \infty$ 

### Q.5 Attempt any two.

- Use Picard's method solve  $\frac{dy}{dx} = 1 + y^2$ , given y(0) = 0 up to third **a)** i) approximations. Hence find the value y at x=0.2
  - Solve Using Taylor's method  $\frac{dy}{dx} x = y$ , y(0) = 1 Hence find y at x ii)
  - Solve  $\frac{dy}{dx} = 1 y$ , y(0) = 0 at x = 0.2 in two steps using modified Euler' iii)
- **b)** Use Runge-Kutta method to an approximate value of y at x = 0.2 given that 03 with  $\frac{dy}{dx} = \frac{y-x}{y+x}$  with y(0) = 1. Take h = 0.2

### Section - II

- **Q.6** a) Evaluate  $\int_{0}^{2} x^{4} (8 x^{3})^{-\frac{1}{3}} dx$ b) Evaluate  $\int_{0}^{\infty} \frac{x^{5}}{5^{x}} dx$ 03 03 03
  - **c)** Evaluate  $\int_{0}^{1} (x^{\alpha} 1)(\log x)^{-1} dx, \alpha \ge 0$

04

05

03 03

03

		Set	t S
Q.7	a)	Change the order of integration and evaluate $\int_0^\infty \int_0^x e^{\frac{-x^2}{y}} x  dx  dy$ .	04
	b)	Evaluate $\int_{-1}^{1} \int_{0}^{z} \int_{x-z}^{x+z} dy dx dz$	03
	C)	Evaluate by changing to polar co-ordinates	03
		$\int_0^a \int_0^{\sqrt{a^2 - x^2}} \sin\left[\frac{\pi}{a^2}(a^2 - x^2 - y^2)\right] dx dy.$	
Q.8	a)	Find by double integration the area between the curve $y^2 = 4ax$ and	03
		$x^2 = 4ay.$	02
	b)	In a lamina in the form of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ density at any point varies as	03
	,	product of its distance from axis of ellipse Find the mass.	
	c)	The curve $r = a(1 + \cos \theta)$ revolves about the initial line find volume	03
~ ~	,	generated.	~~~
Q.9	a)	I race any two of following curves with full justification.	06
		1) $r = a \cos 3\theta$	
		1) $x = t + \sin t, y = 1 - \cos t$	
		iii) $xy^2 = a^2(a - x)$	

**b)** Find the length of the the cardioid  $r = a(1 - \cos \theta)$  lying inside the circle **03**  $r = a\cos \theta$ .

Day & Date: Saturday, 23-11-2019 Time: 10:00 AM To 01:00 PM	Max. Marks: 70
<ul> <li>Instructions: 1) Q. No. 1 is compulsory it should be solved in first 30 Book.</li> <li>2) Assume suitable data, if necessary and mention it closed of non-programmable calculator is allowed.</li> <li>4) Marks to the right hand indicate full marks.</li> </ul>	minutes in answer early.

F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC CIVIL ENGINEERING** 

### MCQ/Objective Type Questions

**Duration: 30 Minutes** Marks: 14 Q.1 Choose the correct alternatives from the options and rewrite the sentence. 1) Quadrantal bearing can be reckoned from a) East line North line b) c) Either from north or south d) West line 2) Principle of surveying 'working from whole to part' prevents \_\_\_\_\_. a) Linear error b) Angular error c) Accumulation of errors d) Chaining 3) Sprinkler irrigation is adopted for \_\_\_\_\_ areas. b) Level Uneven a) c) Hilly d) Desert The highest point of road surface is called \_ 4) a) Crown Camber b) c) Gradient d) Berm 5) Which of the following reference direction is used in a geodetic surveying? a) True b) Magnetic c) Arbitrary d) None of these If back bearing of line is 105°, its Fore Bearing is \_\_\_\_\_. 6) a) 345<sup>°</sup>  $5^{0}$ b) 355<sup>0</sup> c) 285<sup>0</sup> d) Which of the following is not sub-branch of civil Engineering? 7) a) Fluid mechanics Structural engineering b) c) Environmental engineering Thermal engineering d) Concrete is weak in \_\_\_\_\_. 8) a) Tension b) Strain c) Compression d) Stress 9) Process of covering rough wall surfaces with mortar to obtain even, smooth, and durable surface is called as \_\_\_\_\_. Pointing a) b) Plastering c) Curing

d)

Racking

# **SLR-FM-615**



10)	This is not a type of deep foundation a) Wall footing c) Pile Foundation	b) d)	 Pier Foundation Well Foundation
11)	Final setting time of ordinary Portlan a) 60 min c) 300 min	d cen b) d)	nent is 30 min 600 min
12)	The Minimum area requirement for h a) 9.5 m <sup>2</sup> c) 10.5 m <sup>2</sup>	abita b) d)	ble room is 8.5 m <sup>2</sup> 11.5 m <sup>2</sup>
13)	Kitchen should have aspect. a) Eastern c) Southern	b) d)	Western Northern
14)	<ul><li>Earthquake proof construction is bui</li><li>a) quality materials</li><li>c) I.S.codes</li></ul>	lt by u b) d)	using good construction methods all of these

Page **2** of **16** 

**SLR-FM-615** 

Set P

## Seat No.

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 BASIC CIVIL ENGINEERING

Day & Date: Saturday, 23-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Question No.2 is compulsory in section-I. solve any two question from Q. No. 3 to Q. No.5.

- 2) Question No.6 is compulsory in section-II. solve any two question from Q. No. 7 to Q. No.9.
- 3) Figures to the right indicate full marks.

### Section – I

- **Q.2 a)** Explain briefly relevance of Civil engineering to Allied fields.
  - **b)** State the principles of surveying and explain any one.
  - c) A 20 m chain was found after chaining 1500 m, to be 10 cm too long. The same chain at the end of the work after chaining total length of 2900 m was found to be 18 cm too long. What is the total distance chained if the chain was correct at the commencement of the work?
- **Q.3 a)** What do you mean by local attraction?
  - **b)** Following bearings were observed while running a closed traverse PQRSP **07** 
    - 1) Find out included angles.

Q.6

2) Find out corrected bearings.

Line	F.B.	B.B
PQ	124°30'	304°30'
QR	68°15'	246°00'
RS	310° 30'	135°15'
SP	200°15'	17°45'

# Q.4 a)What are the methods of irrigation? Describe one of it.03b)Explain road section in cutting with neat sketches.03

- c) Enlist different types of Bench Marks and write their suitability.
- **Q.5** a) Define Contour and write any two characteristics of contours.

b) The following consecutive readings were taken with a level and 5.0 m
 leveling staff at a common interval of 20.0 m.
 0.385, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625, 2.005, 3.110, 4.485.
 The reduced level of the first pt. was 208.125.
 Enter the readings in a tabular form and reduce the level by Rise and fall method. Apply usual arithmetic checks. Show specimen calculations.
 Calculate gradient of the line joining 1st and last station.

### Section – II

a)	Differentiate between:	06
	1) Load bearing structure and Framed structure	
	2) Shallow and deep foundation	
b)	What are the criterion for earthquake resistant design of structures?	04

19

Set

Ρ

Max. Marks: 56

02

03

02

03

Set P	
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06 to st 03
04 05
05 04

Instr	uction	<b>is:</b> 1	) Q. No. 1 is compulsory it shoul Book.	d be s	solved in first 30 minutes in a
			<ul> <li>2) Assume suitable data, if necess</li> <li>3) Use of non-programmable calc</li> <li>4) Marks to the right hand indicate</li> </ul>	sary a ulator e full n	nd mention it clearly. is allowed. narks.
			MCQ/Objective Ty	vpe C	uestions
Durat	tion: 3	0 Mi	nutes	-	1
Q.1	Choo	ose t	the correct alternatives from th	e opt	ions and rewrite the
	1)	Cor a) c)	ncrete is weak in Tension Compression	b) d)	Strain Stress
	2)	Pro smo a) c)	cess of covering rough wall surfa ooth, and durable surface is calle Pointing Curing	ices w d as _ b) d)	rith mortar to obtain even,  Plastering Racking
	3)	Thi a) c)	s is not a type of deep foundation Wall footing Pile Foundation	b) d)	 Pier Foundation Well Foundation
	4)	Fina a) c)	al setting time of ordinary Portlan 60 min 300 min	d cerr b) d)	nent is 30 min 600 min
	5)	Th∉ a) c)	e Minimum area requirement for h 9.5 m <sup>2</sup> 10.5 m <sup>2</sup>	nabital b) d)	ble room is 8.5 m <sup>2</sup> 11.5 m <sup>2</sup>
	6)	Kito a) c)	chen should have aspect. Eastern Southern	b) d)	Western Northern
	7)	Ear a) c)	thquake proof construction is bui quality materials I.S.codes	lt by u b) d)	sing good construction methods all of these

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC CIVIL ENGINEERING**

Day & Date: Saturday, 23-11-2019

Time: 10:00 AM To 01:00 PM

n answer

- 8) Quadrantal bearing can be reckoned from \_ \_\_\_·
  - a) East line North line b) Either from north or south d) West line c)
- Principle of surveying 'working from whole to part' prevents \_\_\_\_\_. 9)
  - a) Linear error c) Accumulation of errors
- b) Angular error
- d) Chaining

Seat No.



Set

Q

Marks: 14

### 10) Sprinkler irrigation is adopted for \_\_\_\_\_ areas.

- a) Level b) Uneven
- c) Hilly d) Desert
- 11) The highest point of road surface is called \_\_\_\_\_.
  - a) Crown b) Camber
  - c) Gradient d) Berm
- 12) Which of the following reference direction is used in a geodetic surveying?
  - a) True b) Magnetic
  - c) Arbitrary d) None of these
- 13) If back bearing of line is  $105^{\circ}$ , its Fore Bearing is \_\_\_\_\_. a)  $345^{\circ}$  b)  $5^{\circ}$ 
  - c)  $285^{\circ}$  d)  $355^{\circ}$
- 14) Which of the following is not sub-branch of civil Engineering?
  - a) Fluid mechanics
- b) Structural engineering
- c) Environmental engineering c
- d) Thermal engineering

**SLR-FM-615** 

Set Q

Set

Q

Seat	
No.	

Q.6

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 BASIC CIVIL ENGINEERING

Day & Date: Saturday, 23-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Question No.2 is compulsory in section-I. solve any two question from Q. No. 3 to Q. No.5.

- 2) Question No.6 is compulsory in section-II. solve any two question from Q. No. 7 to Q. No.9.
- 3) Figures to the right indicate full marks.

### Section – I

- **Q.2 a)** Explain briefly relevance of Civil engineering to Allied fields.
  - **b)** State the principles of surveying and explain any one.
  - c) A 20 m chain was found after chaining 1500 m, to be 10 cm too long. The same chain at the end of the work after chaining total length of 2900 m was found to be 18 cm too long. What is the total distance chained if the chain was correct at the commencement of the work?
- **Q.3 a)** What do you mean by local attraction?
  - b) Following bearings were observed while running a closed traverse PQRSP 07
    - 1) Find out included angles.
    - 2) Find out corrected bearings.

Line	F.B.	B.B
PQ	124°30'	304°30'
QR	68°15'	246°00'
RS	310° 30'	135°15'
SP	200°15'	17°45'

# Q.4 a) What are the methods of irrigation? Describe one of it. b) Explain road section in cutting with neat sketches. 03

- c) Enlist different types of Bench Marks and write their suitability.
- **Q.5** a) Define Contour and write any two characteristics of contours.
  - b) The following consecutive readings were taken with a level and 5.0 m
    leveling staff at a common interval of 20.0 m.
    0.385, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625, 2.005, 3.110, 4.485.
    The reduced level of the first pt. was 208.125.
    Enter the readings in a tabular form and reduce the level by Rise and fall method. Apply usual arithmetic checks. Show specimen calculations.
    Calculate gradient of the line joining 1st and last station.

### Section – II

a)	Differentiate between:	06
-	1) Load bearing structure and Framed structure	
	2) Shallow and deep foundation	
b)	What are the criterion for earthquake resistant design of structures?	04

Max. Marks: 56

03

03

02

03

Set	Q	

Q.7	a) b)	<ul> <li>Certain plot has dimensions as 50 x 30 m. where F.S.I. of 1.5 is permissible. 50 m side of the plot is facing a road. If a G+1 structure is to be built on this plot, how much area can be built on ground floor and first floor if margins on front and back side is 3 m and on sides 2 m. Discuss in brief any one of the following planning principles.</li> <li>1) Aspect</li> <li>2) Prospect</li> </ul>	06 03
Q.8	a) b)	Explain water-cement ratio and its effect on the strength of concrete. Give types of concrete. Discuss the suitability of each.	04 05
Q.9	a) b)	Write a short note on GPS and its application in various fields. Write a short note on Energy Efficient Building.	05 04

Seat	
No.	

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 BASIC CIVIL ENGINEERING

Day & Date: Saturday, 23-11-2019

Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Marks: 14

14

Set

R

Instructions: 1) Q. No. 1 is compulsory it should be solved in first 30 minutes in answer Book.

- 2) Assume suitable data, if necessary and mention it clearly.
- 3) Use of non-programmable calculator is allowed.
- 4) Marks to the right hand indicate full marks.

### MCQ/Objective Type Questions

**Duration: 30 Minutes** 

Q.1	Choose the correct alternatives from the options and rewrite the
	sentence.

- 1) Which of the following reference direction is used in a geodetic surveying?
  - a) True b) Magnetic
  - c) Arbitrary d) None of these
- 2) If back bearing of line is 105°, its Fore Bearing is \_\_\_\_\_.
  a) 345°
  b) 5°
  c= 0
  - c)  $285^{\circ}$  d)  $355^{\circ}$

### 3) Which of the following is not sub-branch of civil Engineering?

- a) Fluid mechanicsc) Environmental engineering
- b) Structural engineering
- Concrete is weak in \_\_\_\_\_.
- d) Thermal engineering

a) Tension

4)

- a) Tensionb) Strainc) Compressiond) Stress
- 5) Process of covering rough wall surfaces with mortar to obtain even, smooth, and durable surface is called as \_\_\_\_\_.
  - a) Pointing b) Plastering
  - c) Curing d) Racking
- 6) This is not a type of deep foundation \_\_\_\_\_.
  a) Wall footing \_\_\_\_\_\_ b) Pier Foundation
  - c) Pile Foundation d) Well Foundation
- 7) Final setting time of ordinary Portland cement is \_
  - a) 60 min b) 30 min
  - c) 300 min d) 600 min
- 8) The Minimum area requirement for habitable room is \_\_\_\_\_.
  - a)  $9.5 \text{ m}^2$  b)  $8.5 \text{ m}^2$ c)  $10.5 \text{ m}^2$  d)  $11.5 \text{ m}^2$
- 9) Kitchen should have \_\_\_\_\_ aspect.
  - a) Eastern b) Western
  - c) Southern d) Northern

Set R

- 10) Earthquake proof construction is built by using \_\_\_\_\_. b)
  - a) quality materials
- good construction methods d)
- c) I.S.codes
- all of these
- 11) Quadrantal bearing can be reckoned from \_
  - a) East line c) Either from north or south
    - b) North line d) West line
- Principle of surveying 'working from whole to part' prevents \_\_\_\_\_. 12)
  - a) Linear error Angular error b) c) Accumulation of errors
    - Chaining d)
- 13) Sprinkler irrigation is adopted for \_\_\_\_\_ areas.
  - a) Level b) Uneven
  - c) Hilly d) Desert
- 14) The highest point of road surface is called \_\_\_\_ \_\_·
  - a) Crown b) Camber
  - c) Gradient d) Berm

Seat	
No.	

Q.6

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 BASIC CIVIL ENGINEERING

Day & Date: Saturday, 23-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Question No.2 is compulsory in section-I. solve any two question from Q. No. 3 to Q. No.5.

- 2) Question No.6 is compulsory in section-II. solve any two question from Q. No. 7 to Q. No.9.
- 3) Figures to the right indicate full marks.

### Section – I

- **Q.2 a)** Explain briefly relevance of Civil engineering to Allied fields.
  - **b)** State the principles of surveying and explain any one.
  - c) A 20 m chain was found after chaining 1500 m, to be 10 cm too long. The same chain at the end of the work after chaining total length of 2900 m was found to be 18 cm too long. What is the total distance chained if the chain was correct at the commencement of the work?
- **Q.3 a)** What do you mean by local attraction?
  - b) Following bearings were observed while running a closed traverse PQRSP 07
    - 1) Find out included angles.
    - 2) Find out corrected bearings.

Line	F.B.	B.B
PQ	124°30'	304°30'
QR	68°15'	246°00'
RS	310° 30'	135°15'
SP	200°15'	17°45'

# Q.4a)What are the methods of irrigation? Describe one of it.03b)Explain road section in cutting with neat sketches.03

- c) Enlist different types of Bench Marks and write their suitability.
- **Q.5** a) Define Contour and write any two characteristics of contours.

b) The following consecutive readings were taken with a level and 5.0 m
 leveling staff at a common interval of 20.0 m.
 0.385, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625, 2.005, 3.110, 4.485.
 The reduced level of the first pt. was 208.125.
 Enter the readings in a tabular form and reduce the level by Rise and fall method. Apply usual arithmetic checks. Show specimen calculations.
 Calculate gradient of the line joining 1st and last station.

### Section – II

a)	) Differentiate between:	
	1) Load bearing structure and Framed structure	
	2) Shallow and deep foundation	
b)	What are the criterion for earthquake resistant design of structures?	04
5)	What are the chtenoir for earthquake resistant design of structures:	0

Max. Marks: 56

Set

R

02

03

02

03

Set	R	

. of 1.5 is <b>06</b> G+1 structure is to bund floor and first ides 2 m. siples. <b>03</b>
th of concrete. 04 05
is fields. 05 04

Spri	nkler irrigation is adopted for	a	reas.
a)	Level	b)	Uneven
c)	Hilly	d)	Desert
The	highest point of road surface is	called	
a)	Crown	b)	Camber
c)	Gradient	d)	Berm

b)

d)

Angular error

Chaining

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 1) This is not a type of deep foundation a) Wall footing **Pier Foundation** b) c) Pile Foundation d) Well Foundation 2) Final setting time of ordinary Portland cement is a) 60 min b) 30 min c) 300 min d) 600 min 3) The Minimum area requirement for habitable room is \_\_\_\_\_. a)  $9.5 \, \text{m}^2$  $8.5 \, \text{m}^2$ b) c) 10.5 m<sup>2</sup> 11.5 m<sup>2</sup> d) Kitchen should have \_\_\_\_\_ aspect. 4) a) Eastern b) Western c) Southern d) Northern 5) Earthquake proof construction is built by using quality materials good construction methods a) b) c) I.S.codes d) all of these 6) Quadrantal bearing can be reckoned from a) East line North line b) c) Either from north or south d) West line Principle of surveying 'working from whole to part' prevents \_\_\_\_\_. 7)

**Duration: 30 Minutes** 

Seat

No.

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC CIVIL ENGINEERING** Max. Marks: 70

Day & Date: Saturday, 23-11-2019 Time: 10:00 AM To 01:00 PM

a) Linear error

8)

9)

c) Accumulation of errors

Instructions: 1) Q. No. 1 is compulsory it should be solved in first 30 minutes in answer Book.

- 2) Assume suitable data, if necessary and mention it clearly.
- 3) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Marks to the right hand indicate full marks.

Set S

Marks: 14



- c) Arbitrary d) None of these
- 11) If back bearing of line is 105°, its Fore Bearing is \_\_\_\_\_.
  - 345<sup>0</sup> 5<sup>0</sup> b) a) c)
    - 355<sup>0</sup> 285<sup>0</sup> d)
- Which of the following is not sub-branch of civil Engineering? 12)
  - a) Fluid mechanics

Structural engineering

**SLR-FM-615** 

Set S

- b) c) Environmental engineering d) Thermal engineering
- 13) Concrete is weak in \_\_\_\_\_.
- b) Strain
- a) Tension c) Compression d) Stress
- Process of covering rough wall surfaces with mortar to obtain even, 14) smooth, and durable surface is called as \_
  - a) Pointing Plastering b) Racking c) Curing d)

Seat	
No.	

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 BASIC CIVIL ENGINEERING

Day & Date: Saturday, 23-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) Question No.2 is compulsory in section-I. solve any two question from Q. No. 3 to Q. No.5.

- 2) Question No.6 is compulsory in section-II. solve any two question from Q. No. 7 to Q. No.9.
- 3) Figures to the right indicate full marks.

### Section – I

- **Q.2 a)** Explain briefly relevance of Civil engineering to Allied fields.
  - **b)** State the principles of surveying and explain any one.
  - c) A 20 m chain was found after chaining 1500 m, to be 10 cm too long. The same chain at the end of the work after chaining total length of 2900 m was found to be 18 cm too long. What is the total distance chained if the chain was correct at the commencement of the work?
- **Q.3 a)** What do you mean by local attraction?
  - b) Following bearings were observed while running a closed traverse PQRSP 07
    - 1) Find out included angles.
    - 2) Find out corrected bearings.

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# Q.4 a)What are the methods of irrigation? Describe one of it.03b)Explain road section in cutting with neat sketches.03

- c) Enlist different types of Bench Marks and write their suitability.
- **Q.5** a) Define Contour and write any two characteristics of contours.
  - b) The following consecutive readings were taken with a level and 5.0 m
     leveling staff at a common interval of 20.0 m.
     0.385, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625, 2.005, 3.110, 4.485.
     The reduced level of the first pt. was 208.125.
     Enter the readings in a tabular form and reduce the level by Rise and fall method. Apply usual arithmetic checks. Show specimen calculations.
     Calculate gradient of the line joining 1st and last station.

### Section – II

Q.6	a)	Differentiate between:	06
	-	1) Load bearing structure and Framed structure	
		2) Shallow and deep foundation	
	b)	What are the criterion for earthquake resistant design of structures?	04

Max. Marks: 56

Set

S

02

03

02

03

Set	S	

Q.7	a) b)	<ul> <li>Certain plot has dimensions as 50 x 30 m. where F.S.I. of 1.5 is permissible. 50 m side of the plot is facing a road. If a G+1 structure is to be built on this plot, how much area can be built on ground floor and first floor if margins on front and back side is 3 m and on sides 2 m. Discuss in brief any one of the following planning principles.</li> <li>1) Aspect</li> <li>2) Prospect</li> </ul>	06 03
Q.8	a) b)	Explain water-cement ratio and its effect on the strength of concrete. Give types of concrete. Discuss the suitability of each.	04 05
Q.9	a) b)	Write a short note on GPS and its application in various fields. Write a short note on Energy Efficient Building.	05 04

Seat	
No.	

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 BASIC ELECTRONICS & COMPUTER PROGRAMMING

Day & Date: Monday, 25-11-2019

Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

- 2) Draw neat labeled diagram whenever necessary.
- 3) Use of only non programmable calculator is allowed.
- 4) Assume suitable data wherever necessary.

### MCQ/Objective Type Questions

**Duration: 30 Minutes** 

### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- Rectifier efficiency of a full wave rectifier is \_\_\_\_\_\_
   a) 40.6%
   b) 48%
- c) 78% d) 81.2% LVDT is a \_\_\_\_\_ transducer. 2) a) resistive b) temperature c) passive d) active 3)  $(1110)_2 - (1001)_2 =$ \_\_\_\_\_. a) 1001 b) 0101 c) 0001 d) 1000 The knee voltage for germanium diode is \_ 4) a) 0.3 V 0.6 V b) c) 0.7 V d) 0.9 V 5) 2's compliment of 1111 is \_\_\_\_\_. a) 0101 b) 1000 c) 0001 d) none of these 6)  $\gamma$  is the symbol of current gain for configuration: a) CC CE b) c) CB d) none of these 7) Value of  $\beta$  is always . a) less than 1 b) greater than 1 c) equal to zero none of these d) Who developed the C Programming language? 8) a) Bjarne Stroustrup james Gosling b) c) Dennis Ritchie d) **Ray Boyce** 9) Which of the following is the valid C variable name? 1<sup>st</sup> a) For b) d) Num1 c) var name 10) & operator returns \_\_\_\_\_ of a variable. a) name b) memory address value d) none of the above c)

Max. Marks: 70

Marks: 14

Set P



- 11) Which of the following function is more appropriate for reading in a multiword string?
  - a) printf() b) scanf()
  - c) gets() d) puts()
- Standard ANSI C recognizes \_\_\_\_\_ number of keywords? 12) a) 30 b) 32 d) 36
  - c) 24
- What is the size of a char data type in C? 13)

a) -1

- a) 1 byte 2 bytes b)
- c) 3 bytes d) 4 bytes
- 14) If the two strings are identical, then strcmp() function returns \_\_\_\_\_.

- b)
- c) 0 d) YES

Set

## Seat No.

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 BASIC ELECTRONICS & COMPUTER PROGRAMMING

Day & Date: Monday, 25-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicates full marks.
- 3) Draw neat labeled diagram whenever necessary.
- 4) Use of only non programmable calculator is allowed.
- 5) Assume suitable data wherever necessary.

### Section – I

### Q.2 Solve any four questions.

- a) What is need of filter? Explain capacitor filter.
- b) Explain Zener as a voltage regulator.
- c) Explain transistor as a switch with circuit diagram.
- d) Explain types of strain gauges and also define gauge factor.
- e) Explain following gates with symbol, equation and truth table.
  - 1) EX-NOR
  - 2) OR
  - 3) NAND

### Q.3 Solve any two questions.

- a) Explain working principle of LVDT.
- **b)** Explain CE configuration of transistor with I/P and O/P characteristics.
- c) Perform following binary subtractions using 2's complement.
  - 1) (BC)<sub>16</sub> (AD)<sub>16</sub>
  - 2)  $(763)_8 (457)_8$

### Section – II

### Q.4 Attempt any four.

- a) What is Algorithm? Explain with example.
- **b)** What are the logical operators are used in C? Explain with example.
- c) Define Variable, Constant, Data Type and Array with example.
- **d)** Write a C program to find largest number among user entered three numbers.
- e) What is Pointer? Explain with example.

### Q.5 Attempt any two.

- a) What is string? Explain any four string-handling functions in C library.
- **b)** Write a program to display a factorial of a given number.
  - (e.g. Factorial of 4 = 4! = 1X2X3X4 = 24)
- c) Write a program to calculate summation of five array element.

Max. Marks: 56

12

16

16

# Set F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019

Day & Date: Monday, 25-11-2019

Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

**BASIC ELECTRONICS & COMPUTER PROGRAMMING** 

- 2) Draw neat labeled diagram whenever necessary.
- 3) Use of only non programmable calculator is allowed.
- Assume suitable data wherever necessary.

### MCQ/Objective Type Questions

**Duration: 30 Minutes** 

Seat

No.

### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

b)

d)

james Gosling

Ray Boyce

0101

1000

- 1) Who developed the C Programming language?
  - a) Bjarne Stroustrup
  - c) Dennis Ritchie
- Which of the following is the valid C variable name? 2)
  - 1<sup>st</sup> a) For b) Num1 c) var name d)
- 3) & operator returns \_\_\_\_\_ of a variable.
  - a) name memory address b)
    - c) value d) none of the above
- Which of the following function is more appropriate for reading in a multi-4) word string?
  - b) a) printf() scanf() c) gets() d) puts()
  - Standard ANSI C recognizes \_\_\_\_\_ number of keywords?
- 5) a) 30 b) 32
  - c) 24 d) 36

What is the size of a char data type in C? 6)

- a) 1 byte 2 bytes b) c) 3 bytes d) 4 bytes
- 7) If the two strings are identical, then strcmp() function returns \_\_\_\_\_. a) -1 1
  - b) 0 d) YES C)
- Rectifier efficiency of a full wave rectifier is 8)
  - a) 40.6% 48% b) d) 81.2% c) 78%
- 9) LVDT is a transducer. a) resistive b) temperature d) active c) passive
- 10)  $(1110)_2 - (1001)_2 = \_$ \_\_\_\_\_. 1001 b) a) c) 0001 d)

Max. Marks: 70

Marks: 14

Q

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11)	The knee voltage for germanium	diode is	
	\ <u>001</u>	• •	0 0 1 /

a)	0.3 V	b)	0.6 V
c)	0.7 V	d)	0.9 V

## 12) 2's compliment of 1111 is \_\_\_\_\_.

- a) 0101 b) 1000
- c) 0001 d) none of these

13)	$\gamma$ is the symbol of current g	ain for configuration:
-	a) CC	b) CE

- c) CB d) none of these
- 14) Value of  $\beta$  is always \_\_\_\_\_.
  - a) less than 1
  - c) equal to zero
- b) greater than 1
- d) none of these

### Seat No.

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 BASIC ELECTRONICS & COMPUTER PROGRAMMING

Day & Date: Monday, 25-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicates full marks.
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- 4) Use of only non programmable calculator is allowed.
- 5) Assume suitable data wherever necessary.

### Section – I

### Q.2 Solve any four questions.

- a) What is need of filter? Explain capacitor filter.
- b) Explain Zener as a voltage regulator.
- c) Explain transistor as a switch with circuit diagram.
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### Section – II

### Q.4 Attempt any four.

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- **b)** What are the logical operators are used in C? Explain with example.
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- **d)** Write a C program to find largest number among user entered three numbers.
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- **b)** Write a program to display a factorial of a given number.
  - (e.g. Factorial of 4 = 4! = 1X2X3X4 = 24)
- c) Write a program to calculate summation of five array element.

Max. Marks: 56

12

16

16

Seat	
No.	
No.	

## F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC ELECTRONICS & COMPUTER PROGRAMMING**

Day & Date: Monday, 25-11-2019

Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

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- 3) Use of only non programmable calculator is allowed.
- 4) Assume suitable data wherever necessary.

### MCQ/Objective Type Questions

**Duration: 30 Minutes** 

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) 2's compliment of 1111 is .
  - a) 0101 b) 1000
  - 0001 c) d) none of these
- 2)  $\gamma$  is the symbol of current gain for configuration:
  - a) CC b) CE
    - c) CB d) none of these
- 3) Value of  $\beta$  is always \_\_\_\_\_. a) less than 1 b)
  - greater than 1 c) equal to zero none of these d)
- 4) Who developed the C Programming language?
  - a) Bjarne Stroustrup c) Dennis Ritchie
    - **Ray Boyce** d)

b)

- Which of the following is the valid C variable name? 5)
  - 1<sup>st</sup> a) For b) d) Num1 c) var name
- 6) & operator returns \_\_\_\_\_ of a variable.
  - a) name memory address b) c) value d) none of the above
- Which of the following function is more appropriate for reading in a multi-7) word string?
  - a) printf() b) scanf() c) gets() d) puts()
- Standard ANSI C recognizes number of keywords? 8)
  - a) 30 b) 32 c) 24 d) 36
- 9) What is the size of a char data type in C? a) 1 byte 2 bytes b)
  - c) 3 bytes d) 4 bytes
- If the two strings are identical, then strcmp() function returns \_\_\_\_\_. 10)
  - -1 a) b) 1 YES
  - c) 0 d)

Max. Marks: 70

Marks: 14



james Gosling

Set R

Rectifier efficiency of a full wave rectifier is \_ \_\_\_\_· 11) a) 40.6% b) 48% d) c) 78% 81.2% LVDT is a \_\_\_\_\_ transducer. 12) a) resistive b) temperature c) passive active d)  $(1110)_2 - (1001)_2 = \_$ 13) a) 1001 b) 0101 c) 0001 1000 d) The knee voltage for germanium diode is \_\_\_\_\_ 14) 0.6 V a) 0.3 V b) d) c) 0.7 V 0.9 V

SLR-FM-616

Set R

Set

R

## Seat No.

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 BASIC ELECTRONICS & COMPUTER PROGRAMMING

Day & Date: Monday, 25-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicates full marks.
- 3) Draw neat labeled diagram whenever necessary.
- 4) Use of only non programmable calculator is allowed.
- 5) Assume suitable data wherever necessary.

### Section – I

### Q.2 Solve any four questions.

- a) What is need of filter? Explain capacitor filter.
- b) Explain Zener as a voltage regulator.
- c) Explain transistor as a switch with circuit diagram.
- d) Explain types of strain gauges and also define gauge factor.
- e) Explain following gates with symbol, equation and truth table.
  - 1) EX-NOR
  - 2) OR
  - 3) NAND

### Q.3 Solve any two questions.

- a) Explain working principle of LVDT.
- **b)** Explain CE configuration of transistor with I/P and O/P characteristics.
- c) Perform following binary subtractions using 2's complement.
  - 1) (BC)<sub>16</sub> (AD)<sub>16</sub>
  - 2) (763)<sub>8</sub> \_ (457)<sub>8</sub>

### Section – II

### Q.4 Attempt any four.

- a) What is Algorithm? Explain with example.
- **b)** What are the logical operators are used in C? Explain with example.
- c) Define Variable, Constant, Data Type and Array with example.
- **d)** Write a C program to find largest number among user entered three numbers.
- e) What is Pointer? Explain with example.

### Q.5 Attempt any two.

- a) What is string? Explain any four string-handling functions in C library.
- **b)** Write a program to display a factorial of a given number.
  - (e.g. Factorial of 4 = 4! = 1X2X3X4 = 24)
- c) Write a program to calculate summation of five array element.

Max. Marks: 56

12

16

16
Seat	
No.	

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 **BASIC ELECTRONICS & COMPUTER PROGRAMMING**

Day & Date: Monday, 25-11-2019

Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in answer Book.

- 2) Draw neat labeled diagram whenever necessary.
- 3) Use of only non programmable calculator is allowed.
- Assume suitable data wherever necessary.

### MCQ/Objective Type Questions

**Duration: 30 Minutes** 

#### Q.1 Choose the correct alternatives from the options and rewrite the sentence. 14

- 1) & operator returns of a variable.
  - a) name b) memory address c) value
    - none of the above d)

b)

d)

temperature

active

- 2) Which of the following function is more appropriate for reading in a multiword string?
  - a) printf() b) scanf() d) puts() c) gets()
- 3) Standard ANSI C recognizes \_\_\_\_\_ number of keywords?
  - a) 30 b) 32 36 d)
- c) 24
- What is the size of a char data type in C? 4)
  - a) 1 byte 2 bytes b) d) 4 bytes
  - c) 3 bytes
- 5) If the two strings are identical, then strcmp() function returns .
  - a) -1 b) 1 0 d) YES c)

6) Rectifier efficiency of a full wave rectifier is

- a) 40.6% 48% b) c) 78% d) 81.2%
- LVDT is a \_\_\_\_\_ transducer. 7)
  - a) resistive c) passive
- 8)  $(1110)_2 - (1001)_2 =$ \_\_\_\_\_. a) 1001 b) 0101
  - c) 0001 d) 1000
- 9) The knee voltage for germanium diode is \_ 0.6 V
  - a) 0.3 V b) c) 0.7 V d) 0.9 V
- 2's compliment of 1111 is \_\_\_\_\_. 10) a) 0101 b) 1000 c) 0001 d) none of these

Max. Marks: 70

Set

S

Marks: 14

- 11)  $\gamma$  is the symbol of current gain for configuration: \_\_\_\_\_.
  - a) CC c) CB

- b) d)
- Value of  $\beta$  is always \_\_\_\_\_. 12) a) less than 1
  - b) greater than 1
  - none of these c) equal to zero d)
- Who developed the C Programming language? 13)
  - a) Bjarne Stroustrup james Gosling b)
  - c) Dennis Ritchie d) **Ray Boyce**
- Which of the following is the valid C variable name? 14)
  - a) For c) var name

- 1<sup>st</sup> b)
- d) Num1

- CE
- SLR-FM-616 Set S
- none of these

## Seat No.

### F.E. (Part – II) (Old) (CGPA) Examination Nov/Dec-2019 BASIC ELECTRONICS & COMPUTER PROGRAMMING

Day & Date: Monday, 25-11-2019 Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.

- 2) Figures to the right indicates full marks.
- 3) Draw neat labeled diagram whenever necessary.
- 4) Use of only non programmable calculator is allowed.
- 5) Assume suitable data wherever necessary.

#### Section – I

#### Q.2 Solve any four questions.

- a) What is need of filter? Explain capacitor filter.
- b) Explain Zener as a voltage regulator.
- c) Explain transistor as a switch with circuit diagram.
- d) Explain types of strain gauges and also define gauge factor.
- e) Explain following gates with symbol, equation and truth table.
  - 1) EX-NOR
  - 2) OR
  - 3) NAND

#### Q.3 Solve any two questions.

- a) Explain working principle of LVDT.
- **b)** Explain CE configuration of transistor with I/P and O/P characteristics.
- c) Perform following binary subtractions using 2's complement.
  - 1) (BC)<sub>16</sub> (AD)<sub>16</sub>
  - 2) (763)<sub>8</sub> \_ (457)<sub>8</sub>

#### Section – II

#### Q.4 Attempt any four.

- a) What is Algorithm? Explain with example.
- **b)** What are the logical operators are used in C? Explain with example.
- c) Define Variable, Constant, Data Type and Array with example.
- **d)** Write a C program to find largest number among user entered three numbers.
- e) What is Pointer? Explain with example.

#### Q.5 Attempt any two.

- a) What is string? Explain any four string-handling functions in C library.
- **b)** Write a program to display a factorial of a given number.
  - (e.g. Factorial of 4 = 4! = 1X2X3X4 = 24)
- c) Write a program to calculate summation of five array element.

Max. Marks: 56

12

16

16

12

Seat	
No.	

F.E. (Part - II) (Old) (CGPA) Examination Nov/Dec-2019 **ENGINEERING GRAPHICS** 

Day & Date: Tuesday, 26-11-2019 Time: 10:00 AM To 02:00 PM

**Instructions:** 1) All questions are compulsory.

- 2) Q.1 is objective type, return objective answer sheet to junior supervisor after first 40 minutes.
- Retain all construction lines.
- 4) Assume suitable data if required and mention it.
- 5) All dimensions are in mm
- 6) Return all answer sheets to the junior supervisor irrespective of their use.
- 7) Figures to the right indicate full marks.

#### Section I

#### Q.1 Solve any FOUR: (Objective Type)

- Complete projections of Line AB, 70 mm long, having point B 50 mm above 03 a) HRP, having bearing of S40Ewith respect to A. [Refer figure (a)]
- Complete projections of Line PQ, having grade 60%. Find Bearing of Line. b) 03 [Refer figure (b)]
- Complete projections of Line PQ, perpendicular to Line AB. Find true length 03 C) of PQ.[Refer figure (c)] 04
- Find strike and Dip of Plane PQR[ Refer figure (d)] d)
- Complete projections of parallelogram ABCD. [Refer figure (e)] e)
- Draw front view of plane ABC having strike of S60W and dips 45<sup>0</sup>NW.[Refer **f**) 04 figure (f)]

#### Q.2 Solve the following:

- A line MN has grade 75% w.r.t. M, its bearing w.r.t. M is S45<sup>0</sup>E and its front a) 04 view length is 60 mm. Draw the projections of line MN and find its true angle with VP. Point M is 15 mm above H.P and 15 mm in front of VP.
- Line AB,50 mm long has bearing of S45<sup>0</sup>E and gradient of 100%. Draw its 03 b) elevation and plan. Point A is 15 mm above HP and 15 mm in front of VP.
- Find the inclination of triangular plane PQR with VP. The coordinates of the C) 04 points are: P (30,50,110), Q (50,20,140), R (90,70,100)
- Q.3 A thin rectangular plate PQRS having sides PQ=RS=40 mm and QR= PS=70 07 mm is resting on one of its small sides PQ on HP. Its top view appears as square of sides 40 mm. Draw the projections of plate when PQ makes an angle of  $40^{\circ}$ with VP.
- Q.4 A pentagonal prism side of base 50mm and height 80mm is held on a corner of 10 its base on HP. The axis of the prism makes 50<sup>°</sup> with HP and 40<sup>°</sup> with VP. Draw the projections of the prism.

#### OR

A square pyramid, side of base 40 mm and axis length 60 mm is kept on HP on 10 one of its base corners, in such a way that its axis makes 300 with HP and 450 with VP. Draw the projections of the pyramid keeping apex away from the observer.

03

Set

Set P

#### Section II

- Q.5 Figure shows a pictorial view of an object. Draw following views by using first14 angle projection method
  - a) Sectional elevation in the direction of 'X' along A-B
  - b) Left hand side view
  - c) Plan



Q.6 A tetrahedron with all sides 50mm rest on one of its corner in HP and tilts to have 07 axis 45<sup>0</sup> to HP and parallel to VP. It is cut by section plane inclined to HP in such way that top view of section appears as trapezium with parallel sides 8mm and 36mm. Complete projection. Also find angle made by cutting plane with HP.

OR

A cone of base circle diameter 50mm axis 75mm is lying on ground on one of its generator with its axis parallel to VP. It cut by horizontal section plane 20mm above ground. Draw Front view, sectional top view and true shape of section.

Page 3 of 3





A Hexagonal pyramid side of base 30 mm and axis 70 mm long is resting on base in HRP with a side parallel to FRP. It is cut by an auxiliary inclined plane passing through extreme right hand corner of base and inclined at 45<sup>0</sup> to HRP. Draw front view, top view and development of lateral surfaces of cut hexagonal pyramid.