Seat No. SLR-BT – 1 Set P

F.Y. B.Tech. (Semester – I) (CBCS) Examination, 2018 ENGINEERING MATHEMATICS – I (New)

Day and Date : Monday, 3-12-2018 Time : 10.00 a.m. to 1.00 p.m.

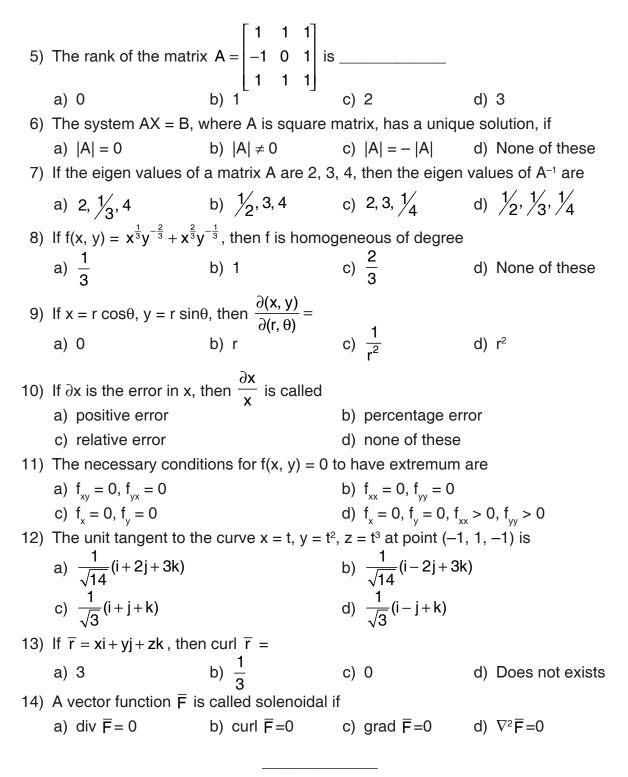
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- Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks: 14 Choose the correct answer : $(14 \times 1 = 14)$ 1. 1) The nth derivative of $\frac{1}{x}$ is ______ a) $\frac{(-1)^{n}n!}{x^{n+1}}$ b) $\frac{(-1)^{n}n!}{x^{n}}$ c) $\frac{(-1)^{n}(n-1)!}{x^{n}}$ d) $\frac{(-1)^{n}(n-1)!}{x^{n+1}}$ 2) If $y = \sin^{-1}x$, then x =_____ a) $1+y+\frac{y^2}{21}+\frac{y^3}{21}+...$ b) $1-y+\frac{y^2}{21}-\frac{y^3}{21}+...$ c) $y - \frac{y^3}{21} + \frac{y^5}{51}$... d) $y + \frac{y^3}{21} + \frac{y^5}{51} + ...$ 3) If $y = x \sin x$, then $y_n =$ _____ b) $x \sin\left(x + \frac{n\pi}{2}\right)$ a) $\sin\left(x+n\frac{\pi}{2}\right)$ c) $x\cos\left(x+n\frac{\pi}{2}\right)+n\cos\left(x+(n-1)\frac{\pi}{2}\right)$ d) $x\sin\left(x+n\frac{\pi}{2}\right)+n\sin\left(x+(n-1)\frac{\pi}{2}\right)$ 4) The expansion of e^x in powers of (x - 1) is b) $e\left[1+(x-1)+\frac{(x-1)^2}{2!}+...\infty\right]$ a) $1+(x-1)+\frac{(x-1)^2}{2!}+...\infty$ c) e $1-(x-1)+\frac{(x-1)^2}{2!}...\infty$ d) None of these **P.T.O.**

Max. Marks : 70



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SECTION - I

- 2. Solve any three of the following :
 - a) Find the nth derivative of $\frac{x^2}{2x^2 + 7x + 6}$.
 - b) Expand $\tan^{-1}x$ in powers of (x 1) upto the term containing fourth degree.
 - c) Evaluate $\lim_{x\to 0} \frac{x^2 + 2\cos x 2}{x\sin^3 x}.$ c) Evaluate $\lim_{x \to 0} x \sin^3 x$ d) Find the rank of the matrix by reducing to normal form $\begin{bmatrix} 1 & 3 & 4 & 5 \\ 3 & 2 & 5 & 2 \\ 2 & -1 & 1 & -3 \end{bmatrix}$.
 - e) Examine whether the following vectors are linearly independent or dependent. If dependent, then find the relation between them. [2, -1, 3, 2], [1, 3, 4, 2], [3, -5, 2, 2].
- Solve any three of the following : 3.
 - a) Prove that $\sin^{-1}\left(\frac{2x}{1+x^2}\right) = 2\left[x \frac{x^3}{3} + \frac{x^5}{5}...\right]$. b) Evaluate $\lim_{x \to 1} \left[\frac{x}{x-1} \frac{1}{\log x}\right]$.

 - c) Find the values of λ and μ for which the system x + y + z = 6; x + 2y + 3z = 10; $x + 2y + \lambda z = \mu$ has :
 - i) a unique solution
 - ii) infinitely many solution
 - iii) no solution.
 - d) Find the characteristic equation of the matrix and obtain A^{-1} where $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$.
 - e) Verify the Lagrange's mean value theorem for the function f(x) = x(x 1) (x in (0, ½).

SLR-BT – 1

 $(3 \times 3 = 9)$

Marks: 56

 $(3 \times 3 = 9)$

-3-

 $(2 \times 5 = 10)$

 $(3 \times 3 = 9)$

 $(3 \times 3 = 9)$

- 4. Solve any two of the following :
 - a) Find eigen values and corresponding eigen vector of the matrix A, where

$$\mathbf{A} = \begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}.$$

- b) If $y = e^{a \cos^{-1}x}$, prove that $(1 x^2) y_{n+2} (2n+1)xy_{n+1} (n^2+a^2)y_n = 0$.
- c) Expand e^xsinx in ascending powers of x upto x⁴.

5. Solve any three :

a) If
$$u = x^2y + y^2z + z^2x$$
, prove that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = 6(x + y + z)$.

b) If $u = f\left(\frac{x-y}{xy}, \frac{z-x}{zx}\right)$, prove that $x^2 \frac{\partial u}{\partial x} + y^2 \frac{\partial u}{\partial y} + z^2 \frac{\partial u}{\partial z} = 0$.

c) If
$$u = 3x + 2y - z$$
, $v = x - 2y + z$, $w = x(x + 2y - z)$, find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$

- d) Divide 75 into three parts such that their product is maximum.
- e) Find the rate of change of $\phi = xy + yz + zx$ at (1, -1, 2) in the direction of the normal to the surface $x^2 + y^2 = z + 4$.
- 6. Solve any three :
 - a) If $u = e^x (x \cos y y \sin y)$, prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial v^2} = 0$.
 - b) If $u = x^2 + y^2 + z^2$, $x = e^t$, $y = e^t$ sint, $z = e^t$ cost, find $\frac{du}{dt}$ in terms of t.
 - c) Find the possible percentage error in computing the parallel resistance r of three resistances r_1 , r_2 , r_3 from the formula $\frac{1}{r} = \frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}$, if r_1 , r_2 , r_3 are each in error by 1%.
 - d) Find the angle between the surfaces $x^2 + y^2 + z^2 = 12$ and $x^2 + y^2 z = 6$ at (2, -2, 2).
 - e) A particle moves along the curve $x = e^{-t}$, $y = 2 \cos 2t$, $z = 2\sin 3t$. Find the velocity and acceleration vectors and the magnitudes of velocity and acceleration at t = 0.
- 7. Solve any two :
 - a) If $u = \sin^{-1}\left[\frac{x+y}{\sqrt{x}+\sqrt{y}}\right]$, prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial u \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -\frac{\sin u \cos 2u}{4\cos^3 u}$.
 - b) Find the maxima and minima of $x^3 + 3xy^2 3x^2 3y^2 + 4$
 - c) Show that the vector $\overline{F} = (y^2 \cos x + z^3)i + (2y \sin x 4)j + (3xz^2 + z)k$ is irrotational and find its scalar potential.

 $(2 \times 5 = 10)$

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks: 14 Choose the correct answer : $(14 \times 1 = 14)$ 1) If $f(x, y) = x^{\frac{1}{3}}y^{-\frac{2}{3}} + x^{\frac{2}{3}}y^{-\frac{1}{3}}$, then f is homogeneous of degree a) $\frac{1}{3}$ b) 1 c) $\frac{2}{3}$ d) None of these 2) If $x = r \cos\theta$, $y = r \sin\theta$, then $\frac{\partial(x, y)}{\partial(r, \theta)} =$ c) $\frac{1}{r^2}$ a) 0 d) r² b) r 3) If ∂x is the error in x, then $\frac{\partial x}{x}$ is called a) positive error b) percentage error c) relative error d) none of these 4) The necessary conditions for f(x, y) = 0 to have extremum are a) $f_{xy} = 0, f_{yx} = 0$ b) $f_{xx} = 0, f_{yy} = 0$ d) $f_{y} = 0, f_{y} = 0, f_{yy} > 0, f_{yy} > 0$ c) $f_{v} = 0, f_{v} = 0$ 5) The unit tangent to the curve x = t, $y = t^2$, $z = t^3$ at point (-1, 1, -1) is a) $\frac{1}{\sqrt{14}}(i+2j+3k)$ b) $\frac{1}{\sqrt{14}}(i-2j+3k)$ d) $\frac{1}{\sqrt{3}}(i-j+k)$ c) $\frac{1}{\sqrt{3}}(i+j+k)$

Max. Marks: 70

6)	If $\overline{r} = xi + yj + zk$, then	r = 1				
	a) 3	b) $\frac{1}{3}$	c)	0	d)	Does not exists
7)	A vector function \overline{F} is	called solenoidal it	f			
	a) div F=0	b) curl F=0	c)	grad F=0	d)	$\nabla^2 \overline{F} = 0$
8)	The n th derivative of -	is				
	a) $\frac{(-1)^n n!}{x^{n+1}}$	b) $\frac{(-1)^n n!}{x^n}$	c)	$\frac{(-1)^{n}(n-1)!}{x^{n}}$	d)	$\frac{(-1)^n(n-1)!}{x^{n+1}}$
9)	If $y = \sin^{-1}x$, then $x = \frac{1}{2}$					
	a) $1+y+\frac{y^2}{2!}+\frac{y^3}{3!}+$		b)	$1-y+\frac{y^2}{2!}-\frac{y^3}{3!}$	+	
	c) $y - \frac{y^3}{3!} + \frac{y^5}{5!} \dots$		d)	$y + \frac{y^3}{3!} + \frac{y^5}{5!} +$	•	
10)	If $y = x \sin x$, then $y_n =$					
	a) $\sin\left(x+n\frac{\pi}{2}\right)$		b)	$x\sin\left(x+\frac{n\pi}{2}\right)$		
	c) $x \cos\left(x + n\frac{\pi}{2}\right) + n$	$\cos\left(x+(n-1)\frac{\pi}{2}\right)$	d)	$x\sin\left(x+n\frac{\pi}{2}\right)$	⊦ns	$in\left(x+(n-1)\frac{\pi}{2}\right)$
11)	The expansion of e^x in	n powers of $(x - 1)$	is _			_
	a) $1+(x-1)+\frac{(x-1)^2}{2!}$		b)	$e \left 1 + (x - 1) + \frac{(x - 1)}{2} \right $	x – 1 2!	$\frac{)^2}{2} + \infty$
	c) $e\left[1-(x-1)+\frac{(x-1)}{2!}\right]$	$\begin{bmatrix} 1)^2 \\ \dots \\ \dots \\ \end{bmatrix}$	d)	None of these		
12)		1				
,	The rank of the matrix					
	a) 0	b) 1	c)	2	d)	3
13)	The system $AX = B$, w		nat	rix, has a unique	e so	lution, if
	a) A = 0	b) A ≠ 0	c)	A = - A	d)	None of these
14)	If the eigen values of	a matrix A are 2, 3,	4,	then the eigen	valu	ies of A ⁻¹ are
	a) 2, 1/3, 4	b) 1/2, 3, 4	c)	2, 3, 1⁄4	d)	$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$

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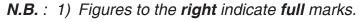
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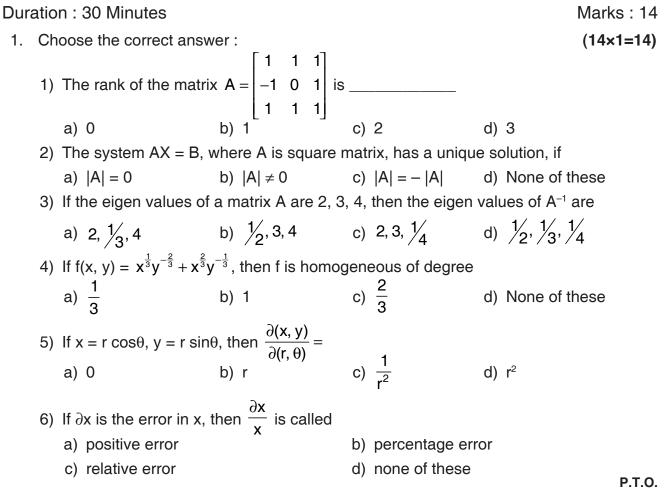
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MCQ/Objective Type Questions



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7) The necessary conditions for f(x, y) = 0 to have extremum are a) $f_{xy} = 0, f_{yx} = 0$ b) $f_{xx} = 0, f_{yy} = 0$ d) $f_x = 0, f_y = 0, f_{xx} > 0, f_{yy} > 0$ c) $f_{v} = 0, f_{v} = 0$ 8) The unit tangent to the curve x = t, $y = t^2$, $z = t^3$ at point (-1, 1, -1) is b) $\frac{1}{\sqrt{14}}(i-2j+3k)$ a) $\frac{1}{\sqrt{14}}(i+2j+3k)$ c) $\frac{1}{\sqrt{3}}(i+j+k)$ d) $\frac{1}{\sqrt{3}}(i-j+k)$ 9) If $\overline{r} = xi + yj + zk$, then curl $\overline{r} =$ b) $\frac{1}{2}$ a) 3 c) 0 d) Does not exists 10) A vector function \overline{F} is called solenoidal if b) curl F=0 a) div $\overline{F} = 0$ c) grad F=0 d) $\nabla^2 \overline{F} = 0$ 11) The nth derivative of $\frac{1}{x}$ is _____ a) $\frac{(-1)^n n!}{x^{n+1}}$ b) $\frac{(-1)^n n!}{x^n}$ c) $\frac{(-1)^n (n-1)!}{x^n}$ d) $\frac{(-1)^n (n-1)!}{x^{n+1}}$ 12) If $y = \sin^{-1}x$, then x =a) $1+y+\frac{y^2}{21}+\frac{y^3}{21}+...$ b) $1-y+\frac{y^2}{21}-\frac{y^3}{21}+...$ c) $y - \frac{y^3}{3!} + \frac{y^5}{5!} \dots$ d) $y + \frac{y^3}{2!} + \frac{y^5}{5!} + ...$ 13) If $y = x \sin x$, then $y_n = _$ b) $x \sin\left(x + \frac{n\pi}{2}\right)$ a) $\sin\left(x+n\frac{\pi}{2}\right)$ c) $x\cos\left(x+n\frac{\pi}{2}\right)+n\cos\left(x+(n-1)\frac{\pi}{2}\right)$ d) $x\sin\left(x+n\frac{\pi}{2}\right)+n\sin\left(x+(n-1)\frac{\pi}{2}\right)$ 14) The expansion of e^x in powers of (x - 1) is b) e $1+(x-1)+\frac{(x-1)^2}{2!}+...\infty$ a) $1+(x-1)+\frac{(x-1)^2}{2!}+...\infty$ c) e $1-(x-1)+\frac{(x-1)^2}{2!}...\infty$ d) None of these

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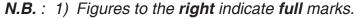
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 - b) Find the maxima and minima of $x^3 + 3xy^2 3x^2 3y^2 + 4$.
 - c) Show that the vector $\overline{F} = (y^2 \cos x + z^3)i + (2y \sin x 4)j + (3xz^2 + z)k$ is irrotational and find its scalar potential.

 $(2 \times 5 = 10)$

Seat No.

> F.Y. B.Tech. (Semester – I) (CBCS) Examination, 2018 ENGINEERING MATHEMATICS – I (New)

Day and Date : Monday, 3-12-2018 Time : 10.00 a.m. to 1.00 p.m.



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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks: 14 Choose the correct answer : $(14 \times 1 = 14)$ 1) If ∂x is the error in x, then $\frac{\partial x}{x}$ is called a) positive error b) percentage error c) relative error d) none of these 2) The necessary conditions for f(x, y) = 0 to have extremum are a) $f_{xy} = 0, f_{yx} = 0$ b) $f_{xx} = 0, f_{yy} = 0$ d) $f_x = 0, f_y = 0, f_{xx} > 0, f_{yy} > 0$ c) $f_{v} = 0, f_{v} = 0$ 3) The unit tangent to the curve x = t, $y = t^2$, $z = t^3$ at point (-1, 1, -1) is b) $\frac{1}{\sqrt{14}}(i-2j+3k)$ a) $\frac{1}{\sqrt{14}}(i+2j+3k)$ c) $\frac{1}{\sqrt{3}}(i+j+k)$ d) $\frac{1}{\sqrt{3}}(i-j+k)$ 4) If $\overline{r} = xi + yj + zk$, then curl $\overline{r} =$ b) $\frac{1}{3}$ c) 0 a) 3 d) Does not exists 5) A vector function \overline{F} is called solenoidal if a) div $\overline{F} = 0$ b) curl $\overline{F}=0$ c) grad $\overline{F}=0$ d) $\nabla^2 \overline{F}=0$

SLR-BT – 1

Max. Marks: 70

Seat No.

> F.Y. B.Tech. (Semester – I) (CBCS) Examination, 2018 ENGINEERING MATHEMATICS – I (New)

Day and Date : Monday, 3-12-2018 Time : 10.00 a.m. to 1.00 p.m.

> N.B.: 1) Figures to the right indicate full marks. 2) Use of calculator is allowed.

SECTION - I

- 2. Solve any three of the following :
 - a) Find the nth derivative of $\frac{x^2}{2x^2 + 7x + 6}$.
 - b) Expand $\tan^{-1}x$ in powers of (x 1) upto the term containing fourth degree.
 - c) Evaluate $\lim_{x\to 0} \frac{x^2 + 2\cos x 2}{x\sin^3 x}.$ c) Evaluate $\lim_{x \to 0} x \sin^3 x$ d) Find the rank of the matrix by reducing to normal form $\begin{bmatrix} 1 & 3 & 4 & 5 \\ 3 & 2 & 5 & 2 \\ 2 & -1 & 1 & -3 \end{bmatrix}$.
 - e) Examine whether the following vectors are linearly independent or dependent. If dependent, then find the relation between them. [2, -1, 3, 2], [1, 3, 4, 2], [3, -5, 2, 2].
- Solve any three of the following : З.
 - a) Prove that $\sin^{-1}\left(\frac{2x}{1+x^2}\right) = 2\left[x \frac{x^3}{3} + \frac{x^5}{5}...\right]$. b) Evaluate $\lim_{x \to 1} \left[\frac{x}{x-1} \frac{1}{\log x}\right]$.

 - c) Find the values of λ and μ for which the system x + y + z = 6; x + 2y + 3z = 10; $x + 2y + \lambda z = \mu$ has :
 - i) a unique solution
 - ii) infinitely many solution
 - iii) no solution.
 - d) Find the characteristic equation of the matrix and obtain A^{-1} where $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$. e) Verify the Lagrange's mean value theorem for the function f(x) = x(x - 1) (x
 - in (0, ½).

SLR-BT – 1

 $(3 \times 3 = 9)$

Marks: 56

 $(3 \times 3 = 9)$

-3-

 $(2 \times 5 = 10)$

 $(3 \times 3 = 9)$

 $(3 \times 3 = 9)$

- 4. Solve any two of the following :
 - a) Find eigen values and corresponding eigen vector of the matrix A, where

$$\mathbf{A} = \begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}.$$

- b) If $y = e^{a \cos^{-1}x}$, prove that $(1 x^2) y_{n+2} (2n+1)xy_{n+1} (n^2+a^2)y_n = 0$.
- c) Expand e^xsinx in ascending powers of x upto x⁴.

5. Solve any three :

a) If
$$u = x^2y + y^2z + z^2x$$
, prove that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = 6(x + y + z)$.

b) If $u = f\left(\frac{x-y}{xy}, \frac{z-x}{zx}\right)$, prove that $x^2 \frac{\partial u}{\partial x} + y^2 \frac{\partial u}{\partial y} + z^2 \frac{\partial u}{\partial z} = 0$.

c) If
$$u = 3x + 2y - z$$
, $v = x - 2y + z$, $w = x(x + 2y - z)$, find $\frac{\partial(u, v, w)}{\partial(x, y, z)}$

- d) Divide 75 into three parts such that their product is maximum.
- e) Find the rate of change of $\phi = xy + yz + zx$ at (1, -1, 2) in the direction of the normal to the surface $x^2 + y^2 = z + 4$.
- 6. Solve any three :
 - a) If $u = e^x (x \cos y y \sin y)$, prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial v^2} = 0$.
 - b) If $u = x^2 + y^2 + z^2$, $x = e^t$, $y = e^t$ sint, $z = e^t$ cost, find $\frac{du}{dt}$ in terms of t.
 - c) Find the possible percentage error in computing the parallel resistance r of three resistances r_1 , r_2 , r_3 from the formula $\frac{1}{r} = \frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}$, if r_1 , r_2 , r_3 are each in error by 1%.
 - d) Find the angle between the surfaces $x^2 + y^2 + z^2 = 12$ and $x^2 + y^2 z = 6$ at (2, -2, 2).
 - e) A particle moves along the curve $x = e^{-t}$, $y = 2 \cos 2t$, $z = 2\sin 3t$. Find the velocity and acceleration vectors and the magnitudes of velocity and acceleration at t = 0.
- 7. Solve any two :
 - a) If $u = \sin^{-1}\left[\frac{x+y}{\sqrt{x}+\sqrt{y}}\right]$, prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial u \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = -\frac{\sin u \cos 2u}{4\cos^3 u}$.
 - b) Find the maxima and minima of $x^3 + 3xy^2 3x^2 3y^2 + 4$
 - c) Show that the vector $\overline{F} = (y^2 \cos x + z^3)i + (2y \sin x 4)j + (3xz^2 + z)k$ is irrotational and find its scalar potential.

 $(2 \times 5 = 10)$

Seat No.

F.Y. (B.Tech.) (Semester – I) (New CBCS) Examination, 2018 ENGINEERING MECHANICS

Day and Date : Wednesday, 5-12-2018 Time : 10.00 a.m. to 1.00 p.m

	Instructions : 1)	All questions are c	ompulsory.					
	2)	Q. No. 1 is comput	sory . It should be so	olved in first				
		30 minutes in Ans	wer Book Page No.	3. Each question carries	5			
		one mark.3) Answer MCQ/Objective type questions on Page No. 3						
	3)							
		•	,	Ω/R/S) on Top of Page.				
	,	•	t indicate full marks.					
	,			ry and mention it clearly	early.			
	6)	Use of nonprogram	mable calculator is a	allowed.				
1.	Choose the correct alternativ	ves.			14			
	 Resultant of two equa forces is 	I forces is equal to	o either of them, th	e angle between the				
	a) 0°	b) 60°	c) 90°	d) 120°				
	2) The resultant of two para	allel forces of magnit	tude P in same direc	tion will be				
	a) P	b) 2P	c) √2P	d) Zero				
	 If a body is in equilibrium forces. 	under the action of	only three forces, the	ey can be				
	a) concurrent		b) non concurrent					
	c) unlike parallel		d) all of these					
	4) The process of finding th	ne components is ca	lled					
	a) Composition	b) Resolution	c) Idealization	d) Summation				
	5) The algebraic sum of the	e two forces forming	couple is always eq	ual to				
	a) Magnitude of the one	e force	b) Zero					
	c) Negative value		d) Positive value					



SLR-BT – 2

Max. Marks : 70

SLR-B	SLR-BT – 2 -2-					
6)	If the arm of a couple	is made half, its morr	ner	י זר	will	
	a) be half b) r			b) remains the same		
	c) be doubled		(d)	none of the above	ve
7)	If a body is in equilibri	um, resultant acting o	on	it i	is	
	a) minimum	b) maximum		c)	zero	d) negative
8)	A lift is moving upwa floor of the lift is	rds with an accelerat	tioı	า '	g'. The pressure	exerted by man on the
	a) Equal to his weigl	nt	b))	Zero	
	c) Double than his w	veight	С	I)	None of the abov	/e
9)	A ball is projected do to strike the ground, o		an	i ir	nitial velocity Va =	2 m/s. If it takes 1 sec
	a) 2.9 m	b) 4.9 m	C	;)	6.9 m	d) 9.81 m
10)	In projectile motion,	which of the following	g r	en	nains constant ?	
	a) Speed				Vertical compone	-
	c) Horizontal compo	nent of Velocity	C	I)	None of the abov	/e
11)	A body of mass 2 kg i the ground surface ?	s dropped from a heig	ght	0	f 10m. What is its	velocity when it strikes
	a) 14m/s	b) 9.81 m/s	C	;)	10 m/s	d) 5 m/s
12)	Large force acting on	a particle during a shoi	rt ir	nte	erval of time is know	wn as
	a) Impact		b))	Mega force	
	c) Impulsive force		С	I)	Nano force	
13)	Product of mass and	velocity is				
	a) Power	b) Moment	C	;)	Movement	d) Momentum
14)	D' Alembert's equation	on is application of N	ew	to	on's lav	v of motion.
	a) first			,	second	
	c) third		С	I)	none of these	

F.Y. (B.Tech.) (Semester – I) (New CBCS) Examination, 2018 ENGINEERING MECHANICS

-3-

Day and Date : Wednesday, 5-12-2018 Time : 10.00 a.m. to 1.00 p.m

Instructions :

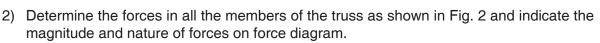
- : 1) All questions are compulsory.
 - 2) Figures to the **right** indicate **full** marks.
 - *3)* Assume suitable data if found **necessary** and mention it **clearly**.
 - 4) Use of nonprogrammable calculator is **allowed**.

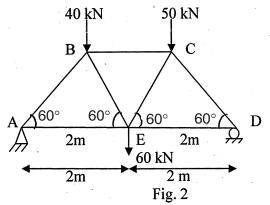
2. Solve any four.

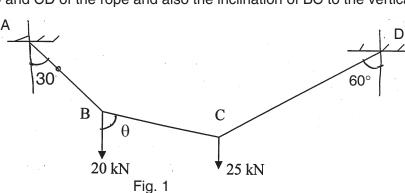
- a) State and explain principle of transmissibility.
- b) State and prove Lami's theorem.
- c) Explain system of forces.
- d) State and prove parallel axis theorem.
- e) Explain types of beam with neat sketches.
- f) Define angle of friction, angle of repose and cone of friction.

3. Solve any two :

1) A wire is fixed at A and D as shown in Fig. 1. Determine the tension in the segments AB, BC and CD of the rope and also the inclination of BC to the vertical.







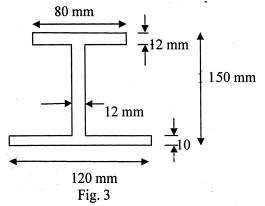
(3×4=12)

Marks: 56

 $(3 \times 4 = 12)$

3) Determine the polar moment of inertia about the centroidal axes of the I-section as shown in Fig. 3. Also determine the radii of gyration with respect to XX and YY axes.

-4-



4. Solve any four.

SLR-BT - 2

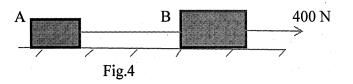
- a) Prove any two equations of rotary motion.
- b) State work-energy principle and its application.
- c) Obtain equations for horizontal range and maximum height reached by a projectile.
- d) Explain use of any two motion curves with neat sketches.
- e) State types of mechanical vibrations. Explain the term degree freedom.
- f) The rotation of fly wheel is governed by the equation $\omega = 3t^2 2t + 2$. After one second from the start the angular displacement was 4 radians. Determine the angular displacement and angular velocity of the fly wheel t = 3 seconds.

5. Solve any two.

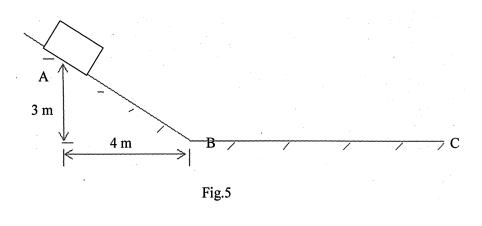
- A bullet is fired from a height of 120 m at a velocity of 360 kmph at an angle of 30° upwards. Neglecting air resistance, find
 - a) Total time of flight
 - b) Horizontal range of the bullet
 - c) Maximum height reached by the bullet.

2) Two blocks A and B weighing 200 N and 800 N are connected by a cable and they move along rough horizontal plane under the action of a force of 400 N applied to the 800 N weight as shown in fig. 4. The coefficient of friction between the sliding surface of the weights and the plane is 0.3. Use D' Alembert's principle and determine the acceleration of the weight and tension in the cable.

-5



3) A small block starts from rest at point A and slides down the inclined plane as shown in fig. 5. What distance along the horizontal plane will it travel before coming to rest? The coefficient of kinetic friction between the block of either plane is 0.3. Assume that the initial velocity with which it starts to move along BC is of the same magnitude as that gained in sliding from A to B.



Seat No.

F.Y. (B.Tech.) (Semester – I) (New CBCS) Examination, 2018 **ENGINEERING MECHANICS**

Day and Date : Wednesday, 5-12-2018 Time : 10.00 a.m. to 1.00 p.m

		Instructions :	2) 3) 4) 5)	one mark. Answer MCQ/Obj Don't forget to m Figures to the righ Assume suitable o	ulso swe iecti nent nt in data	ive type question tion, Q.P. Set (P/C dicate full marks.	3. Each question carries s on Page No. 3 only. Q/R/S) on Top of Page. ry and mention it clearly	
			6)	Use of nonprogram	nma	able calculator is a	llowed.	
1.	Cho	ose the correct altern	nativ	/es.				14
	1)	A lift is moving upw floor of the lift is a) Equal to his wei c) Double than his	ght		b)	'g'. The pressure of Zero None of the abov	exerted by man on the	
	2)	A ball is projected d to strike the ground,			an i	nitial velocity Va =	2 m/s. If it takes 1 sec	
		a) 2.9 m	b	o) 4.9 m	c)	6.9 m	d) 9.81 m	
	3)	In projectile motior a) Speed	n, wł	nich of the following	-	mains constant ? Vertical compone	nt of velocity	
		c) Horizontal comp	one	ent of Velocity	d)	None of the abov	e	
	4)	A body of mass 2 kg the ground surface a) 14m/s	?	dropped from a heig		of 10m. What is its 10 m/s	velocity when it strikes d) 5 m/s	
	5)	Large force acting or		,	,		,	
	0)	a) Impact	. ~ Ի			Mega force		
		c) Impulsive force			d)	Nano force		



Set

Max. Marks: 70

SLR-B	ST – 2	-2-		
6)	Product of mass and	velocity is		
	a) Power	b) Moment	c) Movement	d) Momentum
7)	D' Alembert's equation	on is application of N	ewton's la	w of motion.
	a) first		b) second	
	c) third		d) none of these	
8)	Resultant of two equipation forces is	ual forces is equal	to either of them, t	he angle between the
	a) 0°	b) 60°	c) 90°	d) 120°
9)	The resultant of two pa	arallel forces of mag	nitude P in same dire	ction will be
	a) P	b) 2P	c) √2P	d) Zero
10)	If a body is in equilibriu forces.	um under the action o	of only three forces, th	ney can be
	a) concurrent		b) non concurrent	
	c) unlike parallel		d) all of these	
11)	The process of finding	the components is c	called	
	a) Composition	b) Resolution	c) Idealization	d) Summation
12)	The algebraic sum of t	the two forces formin	g couple is always e	qual to
	a) Magnitude of the c	one force	b) Zero	
	c) Negative value		d) Positive value	
13)	If the arm of a couple i	is made half, its mon	nent will	
	a) be half		b) remains the sar	ne
	c) be doubled		d) none of the abo	ove
14)	If a body is in equilibrin	um, resultant acting o	on it is	
	a) minimum	b) maximum	c) zero	d) negative
	,	,	,	, 3

Marks: 56

F.Y. (B.Tech.) (Semester – I) (New CBCS) Examination, 2018 ENGINEERING MECHANICS

-3-

Day and Date : Wednesday, 5-12-2018 Time : 10.00 a.m. to 1.00 p.m

Instructions :

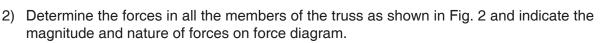
- : 1) All questions are compulsory.
 - 2) Figures to the **right** indicate **full** marks.
 - 3) Assume suitable data if found **necessary** and mention it **clearly**.
 - 4) Use of nonprogrammable calculator is **allowed**.

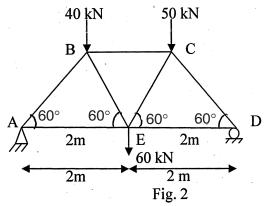
2. Solve any four.

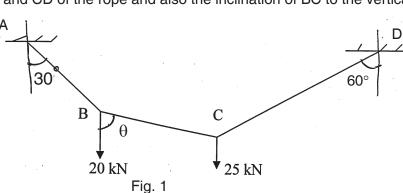
- a) State and explain principle of transmissibility.
- b) State and prove Lami's theorem.
- c) Explain system of forces.
- d) State and prove parallel axis theorem.
- e) Explain types of beam with neat sketches.
- f) Define angle of friction, angle of repose and cone of friction.

3. Solve any two :

1) A wire is fixed at A and D as shown in Fig. 1. Determine the tension in the segments AB, BC and CD of the rope and also the inclination of BC to the vertical.



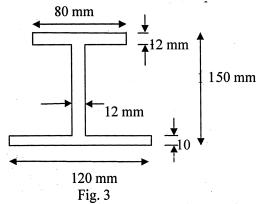




(3×4=12)

 $(3 \times 4 = 12)$

 Determine the polar moment of inertia about the centroidal axes of the I-section as shown in Fig. 3. Also determine the radii of gyration with respect to XX and YY axes.



4. Solve any four.

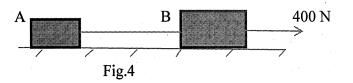
- a) Prove any two equations of rotary motion.
- b) State work-energy principle and its application.
- c) Obtain equations for horizontal range and maximum height reached by a projectile.
- d) Explain use of any two motion curves with neat sketches.
- e) State types of mechanical vibrations. Explain the term degree freedom.
- f) The rotation of fly wheel is governed by the equation $\omega = 3t^2 2t + 2$. After one second from the start the angular displacement was 4 radians. Determine the angular displacement and angular velocity of the fly wheel t = 3 seconds.

5. Solve any two.

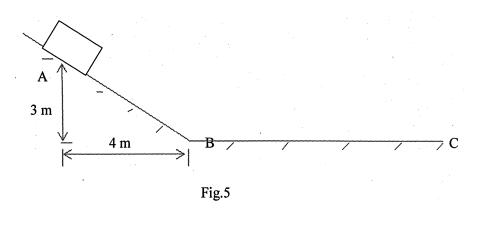
- A bullet is fired from a height of 120 m at a velocity of 360 kmph at an angle of 30° upwards. Neglecting air resistance, find
 - a) Total time of flight
 - b) Horizontal range of the bullet
 - c) Maximum height reached by the bullet.

2) Two blocks A and B weighing 200 N and 800 N are connected by a cable and they move along rough horizontal plane under the action of a force of 400 N applied to the 800 N weight as shown in fig. 4. The coefficient of friction between the sliding surface of the weights and the plane is 0.3. Use D' Alembert's principle and determine the acceleration of the weight and tension in the cable.

-5



3) A small block starts from rest at point A and slides down the inclined plane as shown in fig. 5. What distance along the horizontal plane will it travel before coming to rest? The coefficient of kinetic friction between the block of either plane is 0.3. Assume that the initial velocity with which it starts to move along BC is of the same magnitude as that gained in sliding from A to B.



Seat No.

F.Y. (B.Tech.) (Semester - I) (New CBCS) Examination, 2018 **ENGINEERING MECHANICS**

Day and Date : Wednesday, 5-12-2018 Time : 10.00 a.m. to 1.00 p.m

	Instructions :		All questions are compulsory .				
		2) Q. No. 1 is com					
			Answer Book Page	e No. 3. Each question carries			
		one mark.					
		,		estions on Page No. 3 only.			
		4) Figures to the r	-	et (P/Q/R/S) on Top of Page.			
		, .	-	cessary and mention it clearly.			
		6) Use of nonprog.					
		,					
1.	Choose the correct altern	natives.		1			
	1) The algebraic sum of	of the two forces forn	ning couple is alwa	ays equal to			
	a) Magnitude of the	one force	b) Zero				
	c) Negative value		d) Positive va	alue			
2) If the arm of a couple is made half, its moment will							
	a) be half		b) remains th	e same			
	c) be doubled		d) none of the	e above			
	3) If a body is in equilib	rium, resultant acting	g on it is				
	a) minimum	b) maximum	c) zero	d) negative			
	 A lift is moving upw floor of the lift is 	vards with an accele	ration 'g'. The pres	ssure exerted by man on the			
	a) Equal to his wei	ght	b) Zero				
	c) Double than his	weight	d) None of the	e above			
	,	ownward from 'A' wit , determine height h.	-	y Va = 2 m/s. If it takes 1 sec			
	a) 2.9 m	b) 4.9 m	c) 6.9 m	d) 9.81 m			



Max. Marks: 70

SLR-B	T – 2	-2-		
6)	In projectile motion,	which of the following	g remains constant ?	
	a) Speed		b) Vertical compor	nent of velocity
	c) Horizontal compo	nent of Velocity	d) None of the abo	ove
7)	A body of mass 2 kg is the ground surface ?	s dropped from a hei	ght of 10m. What is it	s velocity when it strikes
	a) 14m/s	b) 9.81 m/s	c) 10 m/s	d) 5 m/s
8)	Large force acting on a	a particle during a sho	rt interval of time is kno	own as
	a) Impact		b) Mega force	
	c) Impulsive force		d) Nano force	
9)	Product of mass and	velocity is		
	a) Power	b) Moment	c) Movement	d) Momentum
10)	D' Alembert's equation	on is application of N	ewton's la	w of motion.
	a) first		b) second	
	c) third		d) none of these	
11)	Resultant of two equ forces is	ual forces is equal	to either of them, t	the angle between the
	a) 0°	b) 60°	c) 90°	d) 120°
12)	The resultant of two pa	arallel forces of mag	nitude P in same dire	ection will be
	a) P	b) 2P	c) √2P	d) Zero
13)	If a body is in equilibriu forces.	um under the action o	of only three forces, t	hey can be
	a) concurrent		b) non concurrent	:
	c) unlike parallel		d) all of these	
14)	The process of finding	the components is c	called	
	a) Composition	b) Resolution	c) Idealization	d) Summation

Marks: 56

F.Y. (B.Tech.) (Semester – I) (New CBCS) Examination, 2018 ENGINEERING MECHANICS

Day and Date : Wednesday, 5-12-2018 Time : 10.00 a.m. to 1.00 p.m

Instructions :

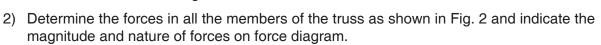
- : 1) All questions are compulsory.
 - 2) Figures to the **right** indicate **full** marks.
 - *3)* Assume suitable data if found **necessary** and mention it **clearly**.
 - 4) Use of nonprogrammable calculator is **allowed**.

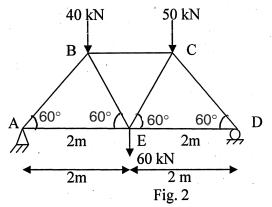
2. Solve **any four**.

- a) State and explain principle of transmissibility.
- b) State and prove Lami's theorem.
- c) Explain system of forces.
- d) State and prove parallel axis theorem.
- e) Explain types of beam with neat sketches.
- f) Define angle of friction, angle of repose and cone of friction.

3. Solve any two :

1) A wire is fixed at A and D as shown in Fig. 1. Determine the tension in the segments AB, BC and CD of the rope and also the inclination of BC to the vertical.



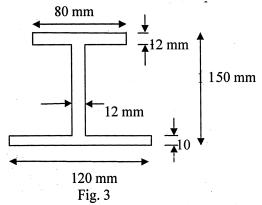


A
$$10^{-100}$$
 10^{-100} 10

(3×4=12)

 $(3 \times 4 = 12)$

3) Determine the polar moment of inertia about the centroidal axes of the I-section as shown in Fig. 3. Also determine the radii of gyration with respect to XX and YY axes.



4. Solve any four.

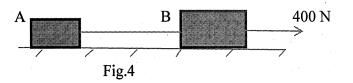
- a) Prove any two equations of rotary motion.
- b) State work-energy principle and its application.
- c) Obtain equations for horizontal range and maximum height reached by a projectile.
- d) Explain use of any two motion curves with neat sketches.
- e) State types of mechanical vibrations. Explain the term degree freedom.
- f) The rotation of fly wheel is governed by the equation $\omega = 3t^2 2t + 2$. After one second from the start the angular displacement was 4 radians. Determine the angular displacement and angular velocity of the fly wheel t = 3 seconds.

5. Solve any two.

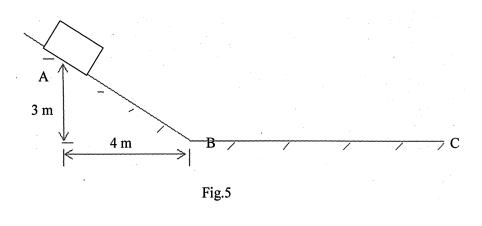
- A bullet is fired from a height of 120 m at a velocity of 360 kmph at an angle of 30° upwards. Neglecting air resistance, find
 - a) Total time of flight
 - b) Horizontal range of the bullet
 - c) Maximum height reached by the bullet.

2) Two blocks A and B weighing 200 N and 800 N are connected by a cable and they move along rough horizontal plane under the action of a force of 400 N applied to the 800 N weight as shown in fig. 4. The coefficient of friction between the sliding surface of the weights and the plane is 0.3. Use D' Alembert's principle and determine the acceleration of the weight and tension in the cable.

-5



3) A small block starts from rest at point A and slides down the inclined plane as shown in fig. 5. What distance along the horizontal plane will it travel before coming to rest? The coefficient of kinetic friction between the block of either plane is 0.3. Assume that the initial velocity with which it starts to move along BC is of the same magnitude as that gained in sliding from A to B.



1.

Seat No.

F.Y. (B.Tech.) (Semester – I) (New CBCS) Examination, 2018 ENGINEERING MECHANICS

Day and Date : Wednesday, 5-12-2018 Time : 10.00 a.m. to 1.00 p.m

	Instructions :	1)	All questions are d	All questions are compulsory.					
		2)	Q. No. 1 is compu	Iso	ry . It should be so	lved in first			
			30 minutes in Ans	swe	r Book Page No. 3	B. Each question carries			
			one mark.						
		3)	-			s on Page No. 3 only.			
			•	n't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page. Ires to the right indicate full marks.					
		,	•						
		,		able data if found necessary and mention it clearly .					
		6)	Use of nonprogram	grammable calculator is allowed .					
Cho	ose the correct alterr	nativ	/es.			1			
1)	In projectile motion	n, wl	nich of the following	ı rei	mains constant ?				
	a) Speed			b)	Vertical compone	nt of velocity			
	c) Horizontal comp	one	ent of Velocity	d)	None of the above	е			
2)	A body of mass 2 kg	is c	dropped from a heig	ht c	of 10m. What is its	velocity when it strikes			
	the ground surface '	?							
	a) 14m/s	b) 9.81 m/s	c)	10 m/s	d) 5 m/s			
3)	Large force acting or	nap	particle during a short	t inte	erval of time is know	ın as			
	a) Impact			b)	Mega force				
	c) Impulsive force			d)	Nano force				
4)	Product of mass an	id ve	elocity is						
	a) Power	b) Moment	c)	Movement	d) Momentum			
5)	D' Alembert's equa	tion	is application of Ne	wto	on's law	of motion.			
	a) first			b)	second				
	c) third			d)	none of these				



Set

Max. Marks: 70

S

SLR-B	ST – 2	-2-					
6)	Resultant of two equ forces is	ual forces is equal	to either of them,	the angle between the			
	a) 0°	b) 60°	c) 90°	d) 120°			
7)	The resultant of two pa	arallel forces of magn	nitude P in same dir	rection will be			
	a) P	b) 2P	c) √2P	d) Zero			
8)	If a body is in equilibriu forces.	im under the action o	f only three forces,	they can be			
	a) concurrent		b) non concurrer	nt			
	c) unlike parallel		d) all of these				
9)	The process of finding	the components is c	alled				
	a) Composition	b) Resolution	c) Idealization	d) Summation			
10) The algebraic sum of the two forces for			ming couple is always equal to				
	a) Magnitude of the o	ne force	b) Zero				
	c) Negative value		d) Positive value				
11) If the arm of a couple is made half, its moment will							
	a) be half		b) remains the sa	ame			
	c) be doubled		d) none of the at	Dove			
12)	If a body is in equilibriu	um, resultant acting o	on it is				
	a) minimum	b) maximum	c) zero	d) negative			
13)	A lift is moving upwa floor of the lift is	rds with an accelerat	ion 'g'. The pressu	re exerted by man on the			
	a) Equal to his weigh	t	b) Zero				
	c) Double than his w	eight	d) None of the ab	oove			
14)	A ball is projected dov	vnward from 'A' with	an initial velocity Va	a = 2 m/s. If it takes 1 sec			
	to strike the ground, d	_					
	a) 2.9 m	b) 4.9 m	c) 6.9 m	d) 9.81 m			

F.Y. (B.Tech.) (Semester – I) (New CBCS) Examination, 2018 ENGINEERING MECHANICS

Day and Date : Wednesday, 5-12-2018 Time : 10.00 a.m. to 1.00 p.m

Instructions :

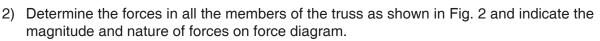
- : 1) All questions are compulsory.
 - 2) Figures to the **right** indicate **full** marks.
 - *3)* Assume suitable data if found **necessary** and mention it **clearly**.
 - 4) Use of nonprogrammable calculator is **allowed**.

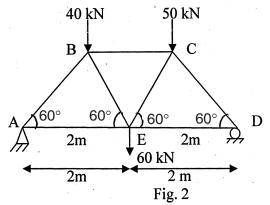
2. Solve any four.

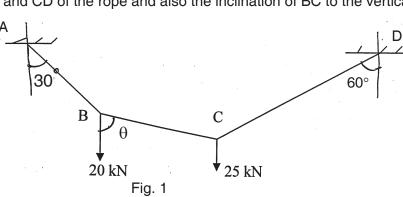
- a) State and explain principle of transmissibility.
- b) State and prove Lami's theorem.
- c) Explain system of forces.
- d) State and prove parallel axis theorem.
- e) Explain types of beam with neat sketches.
- f) Define angle of friction, angle of repose and cone of friction.

3. Solve any two :

1) A wire is fixed at A and D as shown in Fig. 1. Determine the tension in the segments AB, BC and CD of the rope and also the inclination of BC to the vertical.







(3×4=12)

(2×8=16)

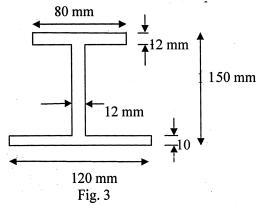
Marks : 56

-3-

 $(3 \times 4 = 12)$

3) Determine the polar moment of inertia about the centroidal axes of the I-section as shown in Fig. 3. Also determine the radii of gyration with respect to XX and YY axes.

-4-



4. Solve any four.

SLR-BT - 2

- a) Prove any two equations of rotary motion.
- b) State work-energy principle and its application.
- c) Obtain equations for horizontal range and maximum height reached by a projectile.
- d) Explain use of any two motion curves with neat sketches.
- e) State types of mechanical vibrations. Explain the term degree freedom.
- f) The rotation of fly wheel is governed by the equation $\omega = 3t^2 2t + 2$. After one second from the start the angular displacement was 4 radians. Determine the angular displacement and angular velocity of the fly wheel t = 3 seconds.

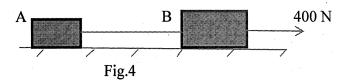
5. Solve any two.

- A bullet is fired from a height of 120 m at a velocity of 360 kmph at an angle of 30° upwards. Neglecting air resistance, find
 - a) Total time of flight
 - b) Horizontal range of the bullet
 - c) Maximum height reached by the bullet.

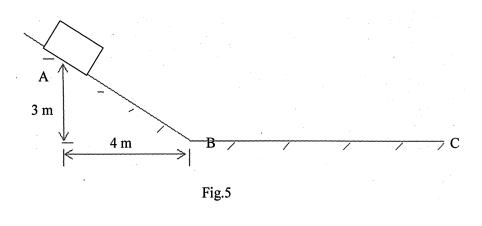
(2×8=16)

2) Two blocks A and B weighing 200 N and 800 N are connected by a cable and they move along rough horizontal plane under the action of a force of 400 N applied to the 800 N weight as shown in fig. 4. The coefficient of friction between the sliding surface of the weights and the plane is 0.3. Use D' Alembert's principle and determine the acceleration of the weight and tension in the cable.

-5



3) A small block starts from rest at point A and slides down the inclined plane as shown in fig. 5. What distance along the horizontal plane will it travel before coming to rest? The coefficient of kinetic friction between the block of either plane is 0.3. Assume that the initial velocity with which it starts to move along BC is of the same magnitude as that gained in sliding from A to B.



F.Y. (B.Tech.) (Semester-I) (New CBCS) Examination, 2018 **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

Day and Date : Friday, 7-12-2018 Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

1. Choose the correct answer : 14 1) The impedance of purely inductive circuit is given by b) $Z = -j X_1$ d) $Z = j X_{i}$ c) $Z = -i X_{c}$ a) Z = R – jX 2) For a balanced three phase system the total apperent power consumed is given by a) $V_{ph}I_{ph}cos\theta$ b) $V_{ph}I_{ph}sin\theta$ c) $3V_{ph}I_{ph}$ d) 3V, I, 3) The A transformer having 100 primary turns is connected to a 250 V a.c. supply for a secondary voltage of 400 V, the number of secondary turns should be a) 1600 b) 250 c) 400 d) 1250 4) The ______ through all the parts of the series magnetic circuit is same. b) reluctance c) mmf a) flux d) current 5) Best suitable magnetic material for construction of transformer core is a) Silicon steel b) Hard steel c) Silicon steel sheet laminations d) Hard steel sheet laminations 6) Three identical resistances connected in star consume 400 W. If these three resistances are connected in delta across the same supply, the power consumed will a) 4000 W b) 6000 W c) 8000 W d) 12000 W 7) In series R-C circuit, supply voltages is 50 V and voltage across resistor is 30 V voltage across capacitor is a) 40 V b) 80 V c) 20 V d) None of the abvoe **P.T.O.**

SLR-BT - 3

Max. Marks: 70

Set

Marks: 14

8)	$(1110)_2 - (1101)_2 =$	=		
	a) 1101		c) 0001	d) 1000
9)	In bridge rectifier, if	input voltage is V_{ms}	·	
	a) 2V _m	b) V _m	c) $\frac{V_m}{\sqrt{2}}$	d) $\frac{V_m}{2}$
10)	Zener diode can be	e used as	$\sqrt{2}$	L
	a) Regulator	b) Filter	c) Amplifier	d) Oscillator
11)	Material used for L	.ED is		
	a) GaAs		b) CdSe	
	c) PbS		d) None of the ab	ove
12)	The ratio of collect	or current to base	current is	
	a) α	b) β	C) γ	d) θ
13)	A transistor connect	cted in common ba	ase configuration h	as
	a) High input and	low output resista	nce	
	b) Low input and le	•		
	c) High input and	•		
	d) Low input and h	high output resista	nce	
14)	LVDT consists of _			
	a) One, one	b) Two, two	c) Two, one	d) One, two

Marks: 56

 $(4 \times 4 = 16)$

-3-

Seat	
No.	

F.Y. (B.Tech.) (Semester-I) (New CBCS) Examination, 2018 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Day and Date : Friday, 7-12-2018 Time : 10.00 a.m. to 1.00 p.m.

SECTION - I

2. Solve any four :

- a) Define and derive expression for RMS value of sinusoidal alternating quantity.
- b) State and explain Kirchhoff's laws with sign conventions and enlist its applications.
- c) An iron ring of mean length 50 cms has an air gap of 1 mm and a winding of 200 turns. If the permeability of iron is 300 when a current of 1 A flows through the coil, find the flux density.
- d) Discuss about mutually induced emf. And give one example of electrical device and explain its working principle.
- e) Derive the formula for delta connected resistance using star connection.
- f) A sinusoidal alternating voltage has an r.m.s. value of 200 V and a frequency of 50 Hz. It crosses the zero axis in a positive direction when t = 0. Determine the time when voltage first reaches the instantaneous value of 200V.

3. Solve any two :

- a) Compare electric and magnetic circuit with their similarities and dissimilarities.
- b) Derive relation between line and phase voltages and currents in balanced star connected 3 phase load.
- c) The voltage applied to a circuit is $v = 100 \sin (\omega t + 30^{\circ})$ and the current flowing in the circuit is i = 15 sin ($\omega t + 60^{\circ}$). Determine the impedance, resistance, reactance, power and the power factor of the circuit. Also draw phasor diagram.

(2×6=12)

 $(4 \times 4 = 16)$

 $(2 \times 6 = 12)$

SECTION - II

- 4. Solve any four :
 - a) Explain working of Bipolar junction transistor as an amplifier.
 - b) For bridge rectifier derive for :
 - i) Ripple factor
 - ii) Efficiency.
 - c) Perform subtraction using 2' complement :
 - i) (275)₈ (155)₈.
 - d) State and prove the Demorgan's theorem.
 - e) Explain capacitor filter with center tap rectifier.
 - f) Explain construction and working of LVDT.

5. Solve any two :

- a) Explain construction and operation of light emitting diode. Write applications of it and explain any one in detail.
- b) Explain unbonded and bonded strain gauge with neat diagram.
- c) Prove that :
 - i) $\left(A + \overline{B} + AB\right)\left(A + \overline{B}\right)\left(\overline{A}B\right) = 0$
 - ii) $\overline{A}\overline{C} + B\overline{C} + ABC + \overline{A}BC = \overline{A}\overline{C} + B$.

Seat No.

F.Y. (B.Tech.) (Semester-I) (New CBCS) Examination, 2018 **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

Day and Date : Friday, 7-12-2018 Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duratio	n : 30 Minutes			Marks : 1	4
1. Ch	oose the correct an	swer:		1	4
1)	(1110) ₂ - (1101) ₂ = a) 1101	b) 0110	c) 0001	d) 1000	
2)	In bridge rectifier, if	input voltage is V_{ms}	inwt then PIV acros	ss any diode will be	
3)	a) 2V _m Zener diode can be		c) $\frac{V_m}{\sqrt{2}}$	d) $\frac{V_m}{2}$	
0)	a) Regulator		c) Amplifier	d) Oscillator	
4)	Material used for L a) GaAs c) PbS	ED is	b) CdSed) None of the at	oove	
5)	The ratio of collecter a) α	or current to base b) β	current is c) γ	d) θ	
6)	A transistor connect a) High input and I b) Low input and I c) High input and I d) Low input and I	ow output resistar ow output resistan nigh output resista	nce Ince	nas	
7)	LVDT consists of _ a) One, one				
8)	The impedance of a) $Z = R - jX_L$			d) $Z = j X_{L}$	

SLR-BT – 3

Set

Max. Marks: 70

9) For a balanced three phase system the total apperent power consumed is given by

	a) $V_{ph}I_{ph}cos\theta$	b) $V_{ph}I_{ph}sin\theta$	c) 3V _{ph} I _{ph}	d) 3V _L I _L
10)	The A transformer	having 100 prima	ry turns is connec	ted to a 250 V a.c.
	supply for a secon should be	idary voltage of 4	00 V, the number	of secondary turns
	a) 1600	b) 250	c) 400	d) 1250
11)	The thro a) flux	bugh all the parts o b) reluctance	•	etic circuit is same. d) current
12)	Best suitable magr a) Silicon steel c) Silicon steel she		b) Hard steel	
13)	consumed will	re connected in de		e supply, the power
14)	In series R-C circu 30 V voltage acros	it, supply voltages	is 50 V and voltag	,
	a) 40 V		b) 80 V d) None of the sh	NO0

c) 20 V

d) None of the abvoe

Marks: 56

 $(4 \times 4 = 16)$

-3-

Seat	
No.	

F.Y. (B.Tech.) (Semester-I) (New CBCS) Examination, 2018 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Day and Date : Friday, 7-12-2018 Time : 10.00 a.m. to 1.00 p.m.

SECTION - I

2. Solve any four :

- a) Define and derive expression for RMS value of sinusoidal alternating quantity.
- b) State and explain Kirchhoff's laws with sign conventions and enlist its applications.
- c) An iron ring of mean length 50 cms has an air gap of 1 mm and a winding of 200 turns. If the permeability of iron is 300 when a current of 1 A flows through the coil, find the flux density.
- d) Discuss about mutually induced emf. And give one example of electrical device and explain its working principle.
- e) Derive the formula for delta connected resistance using star connection.
- f) A sinusoidal alternating voltage has an r.m.s. value of 200 V and a frequency of 50 Hz. It crosses the zero axis in a positive direction when t = 0. Determine the time when voltage first reaches the instantaneous value of 200V.

3. Solve any two :

- a) Compare electric and magnetic circuit with their similarities and dissimilarities.
- b) Derive relation between line and phase voltages and currents in balanced star connected 3 phase load.
- c) The voltage applied to a circuit is $v = 100 \sin (\omega t + 30^{\circ})$ and the current flowing in the circuit is i = 15 sin ($\omega t + 60^{\circ}$). Determine the impedance, resistance, reactance, power and the power factor of the circuit. Also draw phasor diagram.

(2×6=12)

 $(4 \times 4 = 16)$

 $(2 \times 6 = 12)$

SECTION - II

- 4. Solve any four :
 - a) Explain working of Bipolar junction transistor as an amplifier.
 - b) For bridge rectifier derive for :
 - i) Ripple factor
 - ii) Efficiency.
 - c) Perform subtraction using 2' complement :
 - i) (275)₈ (155)₈.
 - d) State and prove the Demorgan's theorem.
 - e) Explain capacitor filter with center tap rectifier.
 - f) Explain construction and working of LVDT.

5. Solve any two :

- a) Explain construction and operation of light emitting diode. Write applications of it and explain any one in detail.
- b) Explain unbonded and bonded strain gauge with neat diagram.
- c) Prove that :
 - i) $\left(A + \overline{B} + AB\right)\left(A + \overline{B}\right)\left(\overline{A}B\right) = 0$
 - ii) $\overline{A}\overline{C} + B\overline{C} + ABC + \overline{A}BC = \overline{A}\overline{C} + B$.

Seat No.

> F.Y. (B.Tech.) (Semester-I) (New CBCS) Examination, 2018 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Day and Date : Friday, 7-12-2018 Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes

- 1. Choose the correct answer :
 - 1) Best suitable magnetic material for construction of transformer core is
 - a) Silicon steel b) Hard steel
 - c) Silicon steel sheet laminations d) Hard steel sheet laminations
 - 2) Three identical resistances connected in star consume 400 W. If these three resistances are connected in delta across the same supply, the power consumed will
 - a) 4000 W b) 6000 W c) 8000 W d) 12000 W
 - In series R-C circuit, supply voltages is 50 V and voltage across resistor is 30 V voltage across capacitor is
 - a) 40 V b) 80 V c) 20 V d) None of the abvoe
 - 4) $(1110)_2 (1101)_2 =$ a) 1101 b) 0110 c) 0001 d) 1000

5) In bridge rectifier, if input voltage is V_{ms} inwt then PIV across any diode will be

	a) 2V _m	b) V _m	c)	$\frac{v_m}{\sqrt{2}}$	d) $\frac{\mathbf{v}_{m}}{2}$
6)	Zener diode can be	e used as		$\sqrt{2}$	Z
	a) Regulator	b) Filter	c)	Amplifier	d) Oscillator
7)	Material used for L	.ED is			
	a) GaAs		b)	CdSe	
	c) PbS		d)	None of the ab	ove
8)	The ratio of collect	or current to base	cu	rrent is	
	a) α	b) β	c)	γ	d) θ

SLR-BT – 3

Set

Max. Marks : 70

14

P.T.O.

Marks: 14

- 9) A transistor connected in common base configuration has
 - a) High input and low output resistance
 - b) Low input and low output resistance
 - c) High input and high output resistance
 - d) Low input and high output resistance
- 10) LVDT consists of ______ secondary and ______ primary winding. a) One, one b) Two, two c) Two, one d) One, two
- 11) The impedance of purely inductive circuit is given by a) $Z = R - jX_{L}$ b) $Z = -jX_{L}$ c) $Z = -jX_{C}$ d) $Z = jX_{L}$
- 12) For a balanced three phase system the total apperent power consumed is given by
 - a) $V_{ph}I_{ph}cos\theta$ b) $V_{ph}I_{ph}sin\theta$ c) $3V_{ph}I_{ph}$ d) $3V_{L}I_{L}$

 The A transformer having 100 primary turns is connected to a 250 V a.c. supply for a secondary voltage of 400 V, the number of secondary turns should be

- a) 1600 b) 250 c) 400 d) 1250
- 14) The ______ through all the parts of the series magnetic circuit is same.a) fluxb) reluctancec) mmfd) current

Marks: 56

 $(4 \times 4 = 16)$

-3-

Seat	
No.	

F.Y. (B.Tech.) (Semester-I) (New CBCS) Examination, 2018 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Day and Date : Friday, 7-12-2018 Time : 10.00 a.m. to 1.00 p.m.

SECTION - I

2. Solve any four :

- a) Define and derive expression for RMS value of sinusoidal alternating quantity.
- b) State and explain Kirchhoff's laws with sign conventions and enlist its applications.
- c) An iron ring of mean length 50 cms has an air gap of 1 mm and a winding of 200 turns. If the permeability of iron is 300 when a current of 1 A flows through the coil, find the flux density.
- d) Discuss about mutually induced emf. And give one example of electrical device and explain its working principle.
- e) Derive the formula for delta connected resistance using star connection.
- f) A sinusoidal alternating voltage has an r.m.s. value of 200 V and a frequency of 50 Hz. It crosses the zero axis in a positive direction when t = 0. Determine the time when voltage first reaches the instantaneous value of 200V.

3. Solve any two :

- (2×6=12)
- a) Compare electric and magnetic circuit with their similarities and dissimilarities.
- b) Derive relation between line and phase voltages and currents in balanced star connected 3 phase load.
- c) The voltage applied to a circuit is $v = 100 \sin (\omega t + 30^{\circ})$ and the current flowing in the circuit is i = 15 sin ($\omega t + 60^{\circ}$). Determine the impedance, resistance, reactance, power and the power factor of the circuit. Also draw phasor diagram.

 $(4 \times 4 = 16)$

 $(2 \times 6 = 12)$

SECTION - II

- 4. Solve any four :
 - a) Explain working of Bipolar junction transistor as an amplifier.
 - b) For bridge rectifier derive for :
 - i) Ripple factor
 - ii) Efficiency.
 - c) Perform subtraction using 2' complement :
 - i) (275)₈ (155)₈.
 - d) State and prove the Demorgan's theorem.
 - e) Explain capacitor filter with center tap rectifier.
 - f) Explain construction and working of LVDT.

5. Solve any two :

- a) Explain construction and operation of light emitting diode. Write applications of it and explain any one in detail.
- b) Explain unbonded and bonded strain gauge with neat diagram.
- c) Prove that :
 - i) $\left(A + \overline{B} + AB\right)\left(A + \overline{B}\right)\left(\overline{A}B\right) = 0$
 - ii) $\overline{A}\overline{C} + B\overline{C} + ABC + \overline{A}BC = \overline{A}\overline{C} + B$.

SLR-BT - 3

Max. Marks: 70

Seat No.

Set

F.Y. (B.Tech.) (Semester-I) (New CBCS) Examination, 2018 **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

Day and Date : Friday, 7-12-2018 Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14 1. Choose the correct answer : 14 1) Zener diode can be used as d) Oscillator a) Regulator b) Filter c) Amplifier 2) Material used for LED is a) GaAs b) CdSe d) None of the above c) PbS 3) The ratio of collector current to base current is **a**) α **b**) β **c)** γ **d**) θ 4) A transistor connected in common base configuration has a) High input and low output resistance b) Low input and low output resistance c) High input and high output resistance d) Low input and high output resistance 5) LVDT consists of ______ secondary and ______ primary winding. a) One, one b) Two, two c) Two, one d) One, two 6) The impedance of purely inductive circuit is given by b) Z = –j X, a) $Z = R - jX_{i}$ c) $Z = -j X_c$ d) $Z = i X_i$ For a balanced three phase system the total apperent power consumed is given by b) $V_{ph}I_{ph}sin\theta$ c) $3V_{ph}I_{ph}$ d) 3V,I, a) $V_{ph}I_{ph}cos\theta$ 8) The A transformer having 100 primary turns is connected to a 250 V a.c. supply for a secondary voltage of 400 V, the number of secondary turns should be a) 1600 b) 250 c) 400 d) 1250 **P.T.O.**

SLR-B	T – 3	-2-		
9)	The thr a) flux	•	of the series magr c) mmf	netic circuit is same. d) current
10)	Best suitable mag a) Silicon steel c) Silicon steel sh		construction of tran b) Hard steel d) Hard steel sh	
11)	three resistances a consumed will	are connected in d		me 400 W. If these ne supply, the power d) 12000 W
12)	In series R-C circu 30 V voltage acros a) 40 V c) 20 V		s is 50 V and volta b) 80 V d) None of the a	ge across resistor is bvoe
13)	(1110) ₂ - (1101) ₂ = a) 1101		c) 0001	d) 1000
14)	In bridge rectifier, if	input voltage is V_{m}	sinwt then PIV acro	ss any diode will be
	a) 2V _m	b) V _m	c) $\frac{V_m}{\sqrt{2}}$	d) $\frac{V_m}{2}$

Marks: 56

 $(4 \times 4 = 16)$

-3-

Seat	
No.	

F.Y. (B.Tech.) (Semester-I) (New CBCS) Examination, 2018 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Day and Date : Friday, 7-12-2018 Time : 10.00 a.m. to 1.00 p.m.

SECTION - I

2. Solve any four :

- a) Define and derive expression for RMS value of sinusoidal alternating quantity.
- b) State and explain Kirchhoff's laws with sign conventions and enlist its applications.
- c) An iron ring of mean length 50 cms has an air gap of 1 mm and a winding of 200 turns. If the permeability of iron is 300 when a current of 1 A flows through the coil, find the flux density.
- d) Discuss about mutually induced emf. And give one example of electrical device and explain its working principle.
- e) Derive the formula for delta connected resistance using star connection.
- f) A sinusoidal alternating voltage has an r.m.s. value of 200 V and a frequency of 50 Hz. It crosses the zero axis in a positive direction when t = 0. Determine the time when voltage first reaches the instantaneous value of 200V.

3. Solve any two :

- (2×6=12)
- a) Compare electric and magnetic circuit with their similarities and dissimilarities.
- b) Derive relation between line and phase voltages and currents in balanced star connected 3 phase load.
- c) The voltage applied to a circuit is $v = 100 \sin (\omega t + 30^{\circ})$ and the current flowing in the circuit is i = 15 sin ($\omega t + 60^{\circ}$). Determine the impedance, resistance, reactance, power and the power factor of the circuit. Also draw phasor diagram.

 $(4 \times 4 = 16)$

 $(2 \times 6 = 12)$

SECTION - II

- 4. Solve any four :
 - a) Explain working of Bipolar junction transistor as an amplifier.
 - b) For bridge rectifier derive for :
 - i) Ripple factor
 - ii) Efficiency.
 - c) Perform subtraction using 2' complement :
 - i) (275)₈ (155)₈.
 - d) State and prove the Demorgan's theorem.
 - e) Explain capacitor filter with center tap rectifier.
 - f) Explain construction and working of LVDT.

5. Solve any two :

- a) Explain construction and operation of light emitting diode. Write applications of it and explain any one in detail.
- b) Explain unbonded and bonded strain gauge with neat diagram.
- c) Prove that :
 - i) $\left(A + \overline{B} + AB\right)\left(A + \overline{B}\right)\left(\overline{A}B\right) = 0$
 - ii) $\overline{A}\overline{C} + B\overline{C} + ABC + \overline{A}BC = \overline{A}\overline{C} + B$.

Seat

No.

First Year B.Tech. (Semester – I) (CBCS) Examination, 2018 BASIC MECHANICAL ENGINEERING (New)

Day and Date : Monday, 10-12-2018 Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

1. Choose the correct answer :

Duration: 30 Minutes

1) Isothermal process is governed by

- a) Boyle's law b) Charle's law c) Joule's law d) Gay lussac's law
- 2) It is impossible to construct device operating in cycle will produce no effect other than heat transfer from colder body to hotter body
 - a) Kelvin Plank law b) Clausius law
 - c) Carnot theorem d) None
- 3) Which of the following is not property of system ?
 - a) Temperature b) Pressure
 - c) Volume d) Heat
- 4) The product of pressure and volume of a fixed amount of gas is approximately constant value is called
 - a) Boyle's law b) Charle's law
 - c) Joule's law d) Gay lussac's law
- 5) For low head and high discharge which pump is used
 - a) Centrifugal pump
- c) Vane pump
- 6) Steam turbines are used for
 - a) Electric generation
 - c) Large marine propulsion
- b) Direct drives for fans, compressor
- d) All of above

d) None

b) Reciprocating pump

SLR-BT – 4

Max. Marks: 70



Marks : 14

SLR-B	T – 4	-2-	
7)	Otto cycle is known as a) Constant pressure cycle c) Constant temperature cycle	· ·	
8)	Compression ratio for petrol enginea) 3 to 6b) 5 to 8	is c) 15 to 20 d) 20 to	o 30
9)	Type of belt arrangement used to tra opposite motion is a) Open belt c) Continuous belt	ansmit power between two sh b) Cross belt d) None	naft having
10)	Which of the following drive is assoca) Belt drivec) Gear drive	iated with slip phenomenon b) Chain drive d) None	?
11)	Property of material which enables to a) Toughness c) Malleability	o be drawn into wire is b) Hardness d) Ductility	
12)	Which of the following welding procea) Electric arc weldingc) Oxy-acetylene gas welding	b) Spot welding	e ?
13)	Which of the following is sliding parta) Tailstockc) Both a) and b)	of Lathe machine ? b) Headstock d) None	
14)	Strength of brazing joint as compare a) High c) Lower	ed to welded joint b) Same d) None	

Seat No.

First Year B.Tech. (Semester – I) (CBCS) Examination, 2018 BASIC MECHANICAL ENGINEERING (New)

Day and Date : Monday, 10-12-2018 Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Neat diagrams must be drawn whenever necessary.

- 2) Make **suitable** assumptions, if necessary and mention them **clearly**.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. No. 2 and Q. No. 4 are short answer type questions.
- 5) Q. No. 3 and Q. No. 5 are long answer type questions.
- 6) **Use** of log tables and non-programmable single memory calculator is **allowed**.

SECTION - I

- 2. Answer any five of the following :
 - a) Explain open and close thermodynamic system with suitable example.
 - b) A system consist of four process, the energy transfer in each process is tabulated below. Complete the table and determine the net-work of the cycle.

Process	Q(KW)	W(KW)	∆ u (KW)
1-2	35		30
2-3	25	-5	
3-4	-20		
4-1	0	12	

- c) State first law of thermodynamics with its limitations.
- d) Derive an expression of work done in Isothermal process.
- e) Explain centrifugal pump with the help of a neat sketch and mention need of priming.
- f) Differentiate between reciprocating and centrifugal pumps.
- g) Explain nuclear reactor in detail.
- 3. Solve **any one** out of **a**) and **b**) and solve **any two** out of **c**) to **f**) :
 - a) Air flows in a compressed at a rate of 0.75 kg/s. The air enters at 5.5 m/s velocity and 110 KPa pressure, 0.87 m³/kg volume and leaving at 3.5 m/s, 720 KPa and 0.20 m³/kg. The internal energy of the air leaving is 95 kJ/kg greater than that of entering. Cooling water is compressor jackets absorbs heat from air at rate of 65 kW.
 - i) Determine the rate of shaft work input to the air in kW.
 - ii) Find the ratio of inlet pipe diameter to outlet pipe diameter.
 - b) With the help of neat sketch, explain working of Hydroelectric power plant.

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SLR-BT – 4

(3×5=15)

Marks: 56

SLR-BT - 4

- c) 1.5 kg air at 15 bar and 0.25 m³ volume is expanded to volume 0.85 m³. Determine the final temperature, work done and heat transfer during the process. If expansion is at constant pressure. Take R = 0.287 kJ/kgk and Cv = 0.7 kJ/kgk for air.
- d) How pumps are classified ? Explain with the neat sketch the working centrifugal pump.
- e) With the help of neat sketch, explain working of Thermal (Steam) power plant.
- f) In a non-flow reversible process pressure and volume are related by P = V2 + (15/V)where P is pressure in Kpa and V is in m³. During the process volume changes from 1.3 m³ to 5.5 m³. The heat added during the process is 100 KJ. Find the change in internal energy during the process.

SECTION – II

- 4. Solve **any five** out of seven :
 - a) Compare S.I. and C.I. Engines.
 - b) Derive an expression for air standard efficiency of Otto cycle.
 - c) Explain in brief open and crossed belt drives.
 - d) Explain compound gear train with neat sketch.
 - e) Explain any three of the following properties of material in brief : 1) Strength
 - 2) Ductility
 - 3) Malleability 4) Hardness.
 - f) Describe the steps involved in design process.
 - g) Explain with neat sketch Electric Resistance welding.
- 5. Solve **any one** out of **a**) and **b**) and solve **any two** out of **c**) to **f**) :
 - a) An engine operates on air standard diesel cycle. The pressure and temperature at the beginning of compression are 100 kPa and 27°C. The compression ratio is 18. The heat added per kg of air is 1850 kJ. Determine maximum pressure, maximum temperature, thermal efficiency and net work done.
 - b) Draw neat sketch of a lathe machine showing its different elements and state the functions of headstock and tail stock.
 - c) Two pullevs having diameters 2 m and 1.5 m are separated by a distance of 5 m the initial tension in the belt is 3 kN. The coefficient of friction between the belt and the pulley is 0.3. Calcuate the power transmitted by the open belt, when smaller pulley rotates at 200 rpm.
 - d) Write note on 'aesthetic consideration' in design.
 - e) Explain the working of Horizontal Milling machine with neat sketch. 4
 - f) Explain with neat sketch brazing process. State its advantages, limitations and applications.

 $(3 \times 5 = 15)$

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Seat

No.

First Year B.Tech. (Semester – I) (CBCS) Examination, 2018 BASIC MECHANICAL ENGINEERING (New)

Day and Date : Monday, 10-12-2018 Time : 10.00 a.m. to 1.00 p.m.

Duration: 30 Minutes

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MCQ/Objective Type Questions

1.	Ch	oose the correct a	answer :			
	1)	Compression ratio	for petrol engine is	5		
		a) 3 to 6	b) 5 to 8	c)	15 to 20	d) 20 to 30
	2)	Type of belt arrange opposite motion is	gement used to trar	nsm	iit power betwee	n two shaft having
		a) Open belt		b)	Cross belt	
		c) Continuous be	lt	d)	None	
	3)	Which of the follow	ving drive is associa	ateo	d with slip pheno	menon?
		a) Belt drive		b)	Chain drive	
		c) Gear drive		d)	None	
	4)	Property of materi	al which enables to	be	drawn into wire	is
		a) Toughness		b)	Hardness	
		c) Malleability		d)	Ductility	
	5)	Which of the follow	ving welding proces	s r	equires external	pressure ?
		a) Electric arc we	lding	b)	Spot welding	
		c) Oxy-acetylene	gas welding	d)	None	
	6)	Which of the follow	ving is sliding part o	of La	athe machine ?	
		a) Tailstock		b)	Headstock	
		c) Both a) and b)		d)	None	

SLR-BT – 4



Max. Marks : 70

Marks : 14

SLR-B	T – 4	-2-
7)	Strength of brazing joint as compared a) High c) Lower	d to welded joint b) Same d) None
8)	Isothermal process is governed by	c) Joule's law d) Gay lussac's law
9)	It is impossible to construct device op than heat transfer from colder body to a) Kelvin Plank law c) Carnot theorem	perating in cycle will produce no effect other o hotter body b) Clausius law d) None
10)	Which of the following is not propertya) Temperaturec) Volume	of system ? b) Pressure d) Heat
11)	The product of pressure and volume constant value is called a) Boyle's law c) Joule's law	e of a fixed amount of gas is approximately b) Charle's law d) Gay lussac's law
12)	For low head and high discharge whi a) Centrifugal pump c) Vane pump	ch pump is used b) Reciprocating pump d) None
13)	Steam turbines are used for a) Electric generation c) Large marine propulsion	b) Direct drives for fans, compressord) All of above
14)	Otto cycle is known as a) Constant pressure cycle c) Constant temperature cycle	b) Constant volume cycled) None

Set Q

Seat No.

First Year B.Tech. (Semester – I) (CBCS) Examination, 2018 BASIC MECHANICAL ENGINEERING (New)

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SECTION - I

- 2. Answer any five of the following :
 - a) Explain open and close thermodynamic system with suitable example.
 - b) A system consist of four process, the energy transfer in each process is tabulated below. Complete the table and determine the net-work of the cycle.

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2-3	25	-5	
3-4	-20		
4-1	0	12	

- c) State first law of thermodynamics with its limitations.
- d) Derive an expression of work done in Isothermal process.
- e) Explain centrifugal pump with the help of a neat sketch and mention need of priming.
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- 3. Solve **any one** out of **a**) and **b**) and solve **any two** out of **c**) to **f**) :
 - a) Air flows in a compressed at a rate of 0.75 kg/s. The air enters at 5.5 m/s velocity and 110 KPa pressure, 0.87 m³/kg volume and leaving at 3.5 m/s, 720 KPa and 0.20 m³/kg. The internal energy of the air leaving is 95 kJ/kg greater than that of entering. Cooling water is compressor jackets absorbs heat from air at rate of 65 kW.
 - i) Determine the rate of shaft work input to the air in kW.
 - ii) Find the ratio of inlet pipe diameter to outlet pipe diameter.
 - b) With the help of neat sketch, explain working of Hydroelectric power plant.

(3×5=15)

Marks: 56

13

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SLR-BT - 4

- c) 1.5 kg air at 15 bar and 0.25 m³ volume is expanded to volume 0.85 m³. Determine the final temperature, work done and heat transfer during the process. If expansion is at constant pressure. Take R = 0.287 kJ/kgk and Cv = 0.7 kJ/kgk for air.
- d) How pumps are classified ? Explain with the neat sketch the working centrifugal pump.
- e) With the help of neat sketch, explain working of Thermal (Steam) power plant.
- f) In a non-flow reversible process pressure and volume are related by P = V2 + (15/V)where P is pressure in Kpa and V is in m³. During the process volume changes from 1.3 m³ to 5.5 m³. The heat added during the process is 100 KJ. Find the change in internal energy during the process.

SECTION – II

- 4. Solve **any five** out of seven :
 - a) Compare S.I. and C.I. Engines.
 - b) Derive an expression for air standard efficiency of Otto cycle.
 - c) Explain in brief open and crossed belt drives.
 - d) Explain compound gear train with neat sketch.
 - e) Explain any three of the following properties of material in brief : 1) Strength
 - 2) Ductility
 - 3) Malleability 4) Hardness.
 - f) Describe the steps involved in design process.
 - g) Explain with neat sketch Electric Resistance welding.
- 5. Solve **any one** out of **a**) and **b**) and solve **any two** out of **c**) to **f**) :
 - a) An engine operates on air standard diesel cycle. The pressure and temperature at the beginning of compression are 100 kPa and 27°C. The compression ratio is 18. The heat added per kg of air is 1850 kJ. Determine maximum pressure, maximum temperature, thermal efficiency and net work done.
 - b) Draw neat sketch of a lathe machine showing its different elements and state the functions of headstock and tail stock.
 - c) Two pullevs having diameters 2 m and 1.5 m are separated by a distance of 5 m the initial tension in the belt is 3 kN. The coefficient of friction between the belt and the pulley is 0.3. Calcuate the power transmitted by the open belt, when smaller pulley rotates at 200 rpm.
 - d) Write note on 'aesthetic consideration' in design.
 - e) Explain the working of Horizontal Milling machine with neat sketch. 4
 - f) Explain with neat sketch brazing process. State its advantages, limitations and applications.

 $(3 \times 5 = 15)$

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Seat No.

First Year B.Tech. (Semester – I) (CBCS) Examination, 2018 **BASIC MECHANICAL ENGINEERING (New)**

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MCQ/Objective Type Questions

Duration: 30 Minutes	Marks : 1
1. Choose the correct answer :	
1) For low head and high discharge wh	nich pump is used
a) Centrifugal pump	b) Reciprocating pump
c) Vane pump	d) None
2) Steam turbines are used for	
a) Electric generation	b) Direct drives for fans, compressor
c) Large marine propulsion	d) All of above
3) Otto cycle is known as	
a) Constant pressure cycle	b) Constant volume cycle
c) Constant temperature cycle	d) None
4) Compression ratio for petrol engine	is
a) 3 to 6 b) 5 to 8	c) 15 to 20 d) 20 to 30
 Type of belt arrangement used to tra opposite motion is 	ansmit power between two shaft having
a) Open belt	b) Cross belt
c) Continuous belt	d) None
6) Which of the following drive is assoc	ciated with slip phenomenon ?
a) Belt drive	b) Chain drive
c) Gear drive	d) None



Set

Max. Marks: 70

SLR-B	T – 4	-2-	
7)	Property of material which enables to a) Toughness c) Malleability	b)	e drawn into wire is) Hardness) Ductility
8)	Which of the following welding procesa) Electric arc weldingc) Oxy-acetylene gas welding	b)	requires external pressure ?) Spot welding) None
9)	Which of the following is sliding part ofa) Tailstockc) Both a) and b)	b)	∟athe machine ?) Headstock) None
10)	Strength of brazing joint as compared a) High c) Lower	b)	o welded joint) Same) None
11)	lsothermal process is governed by a) Boyle's law b) Charle's law	c)) Joule's law d) Gay lussac's law
12)	It is impossible to construct device op than heat transfer from colder body to a) Kelvin Plank law c) Carnot theorem	o hơ b)	ating in cycle will produce no effect other otter body) Clausius law) None
13)	Which of the following is not propertya) Temperaturec) Volume	b)	system ?) Pressure) Heat
14)	The product of pressure and volume constant value is called a) Boyle's law c) Joule's law	b)	a fixed amount of gas is approximately) Charle's law) Gay lussac's law

Seat No.

First Year B.Tech. (Semester – I) (CBCS) Examination, 2018 BASIC MECHANICAL ENGINEERING (New)

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 - ii) Find the ratio of inlet pipe diameter to outlet pipe diameter.
 - b) With the help of neat sketch, explain working of Hydroelectric power plant.

(3×5=15)

Marks: 56

13

5

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-3-

SLR-BT - 4

- c) 1.5 kg air at 15 bar and 0.25 m³ volume is expanded to volume 0.85 m³. Determine the final temperature, work done and heat transfer during the process. If expansion is at constant pressure. Take R = 0.287 kJ/kgk and Cv = 0.7 kJ/kgk for air.
- d) How pumps are classified ? Explain with the neat sketch the working centrifugal pump.
- e) With the help of neat sketch, explain working of Thermal (Steam) power plant.
- f) In a non-flow reversible process pressure and volume are related by P = V2 + (15/V)where P is pressure in Kpa and V is in m³. During the process volume changes from 1.3 m³ to 5.5 m³. The heat added during the process is 100 KJ. Find the change in internal energy during the process.

SECTION – II

- 4. Solve **any five** out of seven :
 - a) Compare S.I. and C.I. Engines.
 - b) Derive an expression for air standard efficiency of Otto cycle.
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 $(3 \times 5 = 15)$

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MCQ/Objective Type Questions

С	hoose the correct answer :		
1) Which of the following drive is associa	ated	d with slip phenomenon?
	a) Belt drive	b)	Chain drive
	c) Gear drive	d)	None
2) Property of material which enables to	be	drawn into wire is
	a) Toughness	b)	Hardness
	c) Malleability	d)	Ductility
3) Which of the following welding proces	s r	equires external pressure
	a) Electric arc welding	b)	Spot welding
	c) Oxy-acetylene gas welding	d)	None
4) Which of the following is sliding part o	f La	athe machine ?
	a) Tailstock	b)	Headstock
	c) Both a) and b)	d)	None
5) Strength of brazing joint as compared	to	welded joint
	a) High	b)	Same

- d) None
- 6) Isothermal process is governed by
 - a) Boyle's law b) Charle's law c) Joule's law d) Gay lussac's law

Duration: 30 Minutes

Seat

No.

1. Ch

- c) Lower

First Year B.Tech. (Semester – I) (CBCS) Examination, 2018 **BASIC MECHANICAL ENGINEERING (New)**

Day and Date : Monday, 10-12-2018 Time : 10.00 a.m. to 1.00 p.m.

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

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



Set

Max. Marks: 70

Marks: 14

SLR-BT – 4	-2-	
· ·	ruct device operating in cycle v colder body to hotter body b) Clausius law d) None	
8) Which of the following isa) Temperaturec) Volume	s not property of system ? b) Pressure d) Heat	
 9) The product of pressure constant value is called a) Boyle's law c) Joule's law 	e and volume of a fixed amou b) Charle's law d) Gay lussac's	,
10) For low head and high aa) Centrifugal pumpc) Vane pump	discharge which pump is used b) Reciprocatir d) None	
11) Steam turbines are usea) Electric generationc) Large marine propul	b) Direct drives	s for fans, compressor
12) Otto cycle is known asa) Constant pressure cc) Constant temperature		lume cycle
13) Compression ratio for pa) 3 to 6b) 5	etrol engine is to 8 c) 15 to 20	d) 20 to 30
14) Type of belt arrangeme opposite motion isa) Open beltc) Continuous belt	nt used to transmit power betv b) Cross belt d) None	veen two shaft having

Seat No.

First Year B.Tech. (Semester – I) (CBCS) Examination, 2018 BASIC MECHANICAL ENGINEERING (New)

Day and Date : Monday, 10-12-2018 Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Neat diagrams must be drawn whenever necessary.

- 2) Make **suitable** assumptions, if necessary and mention them **clearly**.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. No. 2 and Q. No. 4 are short answer type questions.
- 5) Q. No. 3 and Q. No. 5 are long answer type questions.
- 6) **Use** of log tables and non-programmable single memory calculator is **allowed**.

SECTION - I

- 2. Answer any five of the following :
 - a) Explain open and close thermodynamic system with suitable example.
 - b) A system consist of four process, the energy transfer in each process is tabulated below. Complete the table and determine the net-work of the cycle.

Process	Q(KW)	W(KW)	∆ u (KW)
1-2	35		30
2-3	25	-5	
3-4	-20		
4-1	0	12	

- c) State first law of thermodynamics with its limitations.
- d) Derive an expression of work done in Isothermal process.
- e) Explain centrifugal pump with the help of a neat sketch and mention need of priming.
- f) Differentiate between reciprocating and centrifugal pumps.
- g) Explain nuclear reactor in detail.
- 3. Solve **any one** out of **a**) and **b**) and solve **any two** out of **c**) to **f**) :
 - a) Air flows in a compressed at a rate of 0.75 kg/s. The air enters at 5.5 m/s velocity and 110 KPa pressure, 0.87 m³/kg volume and leaving at 3.5 m/s, 720 KPa and 0.20 m³/kg. The internal energy of the air leaving is 95 kJ/kg greater than that of entering. Cooling water is compressor jackets absorbs heat from air at rate of 65 kW.
 - i) Determine the rate of shaft work input to the air in kW.
 - ii) Find the ratio of inlet pipe diameter to outlet pipe diameter.
 - b) With the help of neat sketch, explain working of Hydroelectric power plant.

(3×5=15)

Marks: 56

5

5

13

-3-

SLR-BT - 4

- c) 1.5 kg air at 15 bar and 0.25 m³ volume is expanded to volume 0.85 m³. Determine the final temperature, work done and heat transfer during the process. If expansion is at constant pressure. Take R = 0.287 kJ/kgk and Cv = 0.7 kJ/kgk for air.
- d) How pumps are classified ? Explain with the neat sketch the working centrifugal pump.
- e) With the help of neat sketch, explain working of Thermal (Steam) power plant.
- f) In a non-flow reversible process pressure and volume are related by P = V2 + (15/V)where P is pressure in Kpa and V is in m³. During the process volume changes from 1.3 m³ to 5.5 m³. The heat added during the process is 100 KJ. Find the change in internal energy during the process.

SECTION – II

- 4. Solve **any five** out of seven :
 - a) Compare S.I. and C.I. Engines.
 - b) Derive an expression for air standard efficiency of Otto cycle.
 - c) Explain in brief open and crossed belt drives.
 - d) Explain compound gear train with neat sketch.
 - e) Explain any three of the following properties of material in brief : 1) Strength
 - 2) Ductility
 - 3) Malleability 4) Hardness.
 - f) Describe the steps involved in design process.
 - g) Explain with neat sketch Electric Resistance welding.
- 5. Solve **any one** out of **a**) and **b**) and solve **any two** out of **c**) to **f**) :
 - a) An engine operates on air standard diesel cycle. The pressure and temperature at the beginning of compression are 100 kPa and 27°C. The compression ratio is 18. The heat added per kg of air is 1850 kJ. Determine maximum pressure, maximum temperature, thermal efficiency and net work done.
 - b) Draw neat sketch of a lathe machine showing its different elements and state the functions of headstock and tail stock.
 - c) Two pullevs having diameters 2 m and 1.5 m are separated by a distance of 5 m the initial tension in the belt is 3 kN. The coefficient of friction between the belt and the pulley is 0.3. Calcuate the power transmitted by the open belt, when smaller pulley rotates at 200 rpm.
 - d) Write note on 'aesthetic consideration' in design.
 - e) Explain the working of Horizontal Milling machine with neat sketch. 4
 - f) Explain with neat sketch brazing process. State its advantages, limitations and applications.

 $(3 \times 5 = 15)$

4

4 4

4

13

5

5

4

4

Seat No.

F.Y. B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018 Time : 10.00 a.m. to 1.00 p.m.

- Instructions : 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
 - 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- **Constants :** 1) Avogadro's no., $N = 6.02 \times 10^{26}$ /k.mol.
 - 2) Velocity of light, $c = 3 \times 10^{8}$ m/sec.
 - 3) Charge of electron, $e = 1.6 \times 10^{-19} C$.

MCQ/Objective Type Questions

Duration : 30 Minutes

1. Choose the correct answer :

SECTION - I

1)	1) Donor type semiconductor is formed by adding impurity of valency			
	a) 5	b) 4	c) 3	d) 6
2) The atomic radius of	of FCC lattice is		
	a) √3a/4	b) √2a/4	c) a/2	d) a/4
3) A plane parallel to	one of the co-ordi	nate axes has an	intercept of
	a) 1	b) 0	C) ∞	d) none of these
4)) If f is the frequend magnetic field then			to a coil producing ates with the frequency
	a) f	b) f/2	c) 3f	d) 2f
5)) Optimum reverbera	ation time for musi	ic is	
	a) 1 to 2 second		b) 0 to 1 second	k
	c) 0.5 to 1 second		d) above 5 seco	ond

Total Marks : 70

Set P

SLR-BT – 5

Marks : 14

 $(14 \times 1 = 14)$

SLR-BT	_	5
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- 6) The Lorentz transformation equation for t' co-ordinate from s to s'
 - a) $t' = (t + vx/c^2)/\sqrt{1 v^2/c^2}$ b) $t' = (t - vx/c^2)/\sqrt{1 - v^2/c^2}$
 - c) $t' = (t vx)/\sqrt{1 v^2/c^2}$ d) $t' = (t + vx)/\sqrt{1 - v^2/c^2}$
- 7) Einstein's mass energy relation ($E = mc^2$) shows that
 - a) mass disappears to reappear as energy
 - b) energy disappears to reappear as mass
 - c) mass and energy are two different forms of the same entity
 - d) all the above statements are correct

SECTION - II

- 8) The resolving power of a grating is
 - a) $\lambda/d \lambda$ b) $d\lambda/\lambda$ c) nNd λ d) n(n + 1)
- 9) The specific rotation of a substance is _____ concentration of solution.
 - a) independent of b) directly proportional to
 - c) inversely proportional to d) none of these

10) Spontaneous emission process is represented by equation

a) $A + h\gamma \rightarrow A^*$ b) $A^* + h\gamma \rightarrow A + 2h\gamma$ c) $A^* \rightarrow A + h\gamma$ d) $A^* + h\gamma \rightarrow A + h\gamma$

11) LASER beam is

- a) Highly directional b) Extremely bright
- c) Monochromatic d) All of these

12) The fractional refractive index change (Δ) is given by

- a) $\Delta = n_1 n_2$ b) $\Delta = n_2 - n_1$
- c) $\Delta = n_1 n_2/n_1$ d) $\Delta = n_2 n_1/n_1$
- 13) The acceptance cone of fibre is equal to
 - a) $2 \times \text{acceptance angle}$ b) $3 \times \text{acceptance angle}$
 - c) acceptance angle d) none
- 14) The chirality of armchair CNT is
 - a) (a, b) b) (a, a) c) (a, 0) d) (0, b)

-3-

Seat No.

F.Y. B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018 Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Make suitable assumptions, if necessary.2) Figures to the right indicate full marks.

SECTION - I

- 2. Attempt **any six** of the following :
 - a) Classify conductor, insulator and semiconductor on the basis of energy band structure.
 - b) Explain with diagrams the position of Fermi level in
 - 1) P-type
 - 2) n-type semiconductors.
 - c) Define atomic radius and obtain its values for SC, BCC and FCC crystals.
 - d) State the properties of ultrasonic waves.
 - e) Derive an expression for Time dilation.
 - f) Derive the relation $E = mc^2$.
 - g) Determine the lattice constant for FCC lead crystal of radius 1.746A°. Also find the spacing of :
 - i) (111) planes
 - ii) (200) planes.
 - h) The reverberation time of a hall is 1.5 s and the area of interior surface is 3340 m². If the volume of the hall is 1200 m³. Find the absorption coefficient.
- 3. Attempt any two of the following :
 - a) What is Hall effect ? Derive the relation for Hall voltage and Hall coefficient.
 - b) Explain the term Miller indices. Derive the relation between lattice constant and interplaner spacing for cubic crystal.
 - c) State and explain the factors affecting the architectural acoustics and their remedies.

Marks : 56

10

Set P

18

- d) i) A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?
 - ii) The proper life of these π mesons is 2.5×10^{-8} sec. What is the velocity of π mesons if the observed mean life is 2.5×10^{-7} sec?

SECTION - II

- 4. Attempt any six of the following :
 - a) Derive an expression for the resolving power of a plane diffraction grating.
 - b) State and explain Malus law.
 - c) Explain in brief :
 - a) Metastable state
 - b) Pumping
 - c) Population inversion
 - d) Write any 5 applications of laser in different fields.
 - e) Describe the principle on which optical fiber works.
 - f) Explain different types of carbon nano tubes.
 - g) In an optical fiber the core material has refractive index 1.6 and refractive index of clad material is 1.3. What is the value of critical angle ? Also calculate the value of angle of acceptance.
 - h) An enclosure filled with helium is heated to 400 k. A beam of helium of atoms emerges out of the enclosure. Calculate the De Broglies wavelength corresponding to helium atoms. Mass of helium atom is 6.7×10^{-27} kg. Given (h = 6.634×10^{-34} J.s, k = 1.376×10^{-27} J/deg).
- 5. Attempt any two of the following :
 - a) i) Determine the grating element of a grating if when illuminated with light of wavelength 4000 A°, the second order spectrum is seen at an angle of 26°.
 - ii) Calculate the specific rotation if the plane of polarization is turned through 26.4° traversing 20 cm. length of 20% sugar solution.
 - b) Describe He-Ne laser with its construction and working.
 - c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
 - d) Explain in detail Davisson Germer experiment.

Seat No.

F.Y. B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

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- Constants : 1) Avogadro's no., $N = 6.02 \times 10^{26}$ /k.mol.
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 - 3) Charge of electron. $e = 1.6 \times 10^{-19} C$.

MCQ/Objective Type Questions

Duration : 30 Minutes

1. Choose the correct answer :

SECTION - I

1) A plane parallel to one of the co-ordinate axes has an intercept of

- a) 1 b) 0 **C**) ∞ d) none of these 2) If f is the frequency of alternating current supplied to a coil producing magnetic field then the rod kept in magnetic field vibrates with the frequency a) f b) f/2 c) 3f d) 2f 3) Optimum reverberation time for music is a) 1 to 2 second b) 0 to 1 second c) 0.5 to 1 second d) above 5 second The Lorentz transformation equation for t' co-ordinate from s to s' a) t' = $(t + vx/c^2)/\sqrt{1 - v^2/c^2}$ b) t' = $(t - vx/c^2)/\sqrt{1 - v^2/c^2}$
 - c) $t' = (t vx)/\sqrt{1 v^2/c^2}$ d) t' = $(t + vx)/\sqrt{1 - v^2/c^2}$

Marks: 14

 $(14 \times 1 = 14)$

Total Marks: 70

SLR-BT – 5

SLR-BT – 5 -2-						
5)	Einstein's mass energy relation ($E = mc^2$) shows that					
	a) mass disappears to reappear as energy					
	b) energy disappears to reappear as mass					
	c) mass and energ	y are two differen	nt fo	rms of the sar	ne entity	
d) all the above statements are correct						
6)	Donor type semiconductor is formed by adding impurity of valency					
	a) 5	b) 4	c)	3	d) 6	
7)	The atomic radius of					
	a) √3a/4	b) √2a/4	c)	a/2	d) a/4	
		SECTIO	N –	·		
8)	Spontaneous emission process is rep			presented by equation		
	a) A + hγ → A*		b)	b) $A^* + h\gamma \rightarrow A + 2h\gamma$		
	c) A* → A + hγ		d)	$A^* + h\gamma \rightarrow A$	+ hγ	
9)	LASER beam is					
	a) Highly directiona	al	b)	Extremely br	ight	
	c) Monochromatic		d)	All of these		
10)) The fractional refractive index change			 is given by 		
	a) $\Delta = n_1 - n_2$		-	$\Delta = n_2 - n_1$		
	c) $\Delta = n_1 - n_2 / n_1$		d) $\Delta = n_2 - n_1 / n_1$			
11)) The acceptance cone of fibre is equa					
	a) $2 \times \text{acceptance angle}$			b) $3 \times \text{acceptance angle}$		
	c) acceptance ang		d) none			
12)	The chirality of arm		,	()		
	a) (a, b)	b) (a, a)	C)	(a, 0)	d) (0, b)	
13)	The resolving powe		,			
	a) $\lambda/d \lambda$	b) $d\lambda/\lambda$,	nNdλ	, , , ,	
14)	The specific rotation solution.	on of a substance	e is	; 	concentration of	
	a) independent of		b)	directly propo	ortional to	
	c) inversely propor	tional to	d)	none of these	e	

Set Q

-3-

Seat No.

F.Y. B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

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SECTION - I

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 - b) Explain with diagrams the position of Fermi level in
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 - c) Define atomic radius and obtain its values for SC, BCC and FCC crystals.
 - d) State the properties of ultrasonic waves.
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 - f) Derive the relation $E = mc^2$.
 - g) Determine the lattice constant for FCC lead crystal of radius 1.746A°. Also find the spacing of :
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 - ii) (200) planes.
 - h) The reverberation time of a hall is 1.5 s and the area of interior surface is 3340 m². If the volume of the hall is 1200 m³. Find the absorption coefficient.
- 3. Attempt any two of the following :
 - a) What is Hall effect ? Derive the relation for Hall voltage and Hall coefficient.
 - b) Explain the term Miller indices. Derive the relation between lattice constant and interplaner spacing for cubic crystal.
 - c) State and explain the factors affecting the architectural acoustics and their remedies.

18

Set Q

18

- d) i) A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?
 - ii) The proper life of these π mesons is 2.5×10^{-8} sec. What is the velocity of π mesons if the observed mean life is 2.5×10^{-7} sec?

SECTION - II

- 4. Attempt any six of the following :
 - a) Derive an expression for the resolving power of a plane diffraction grating.
 - b) State and explain Malus law.
 - c) Explain in brief :
 - a) Metastable state
 - b) Pumping
 - c) Population inversion
 - d) Write any 5 applications of laser in different fields.
 - e) Describe the principle on which optical fiber works.
 - f) Explain different types of carbon nano tubes.
 - g) In an optical fiber the core material has refractive index 1.6 and refractive index of clad material is 1.3. What is the value of critical angle ? Also calculate the value of angle of acceptance.
 - h) An enclosure filled with helium is heated to 400 k. A beam of helium of atoms emerges out of the enclosure. Calculate the De Broglies wavelength corresponding to helium atoms. Mass of helium atom is 6.7×10^{-27} kg. Given (h = 6.634×10^{-34} J.s, k = 1.376×10^{-27} J/deg).
- 5. Attempt any two of the following :
 - a) i) Determine the grating element of a grating if when illuminated with light of wavelength 4000 A°, the second order spectrum is seen at an angle of 26°.
 - ii) Calculate the specific rotation if the plane of polarization is turned through 26.4° traversing 20 cm. length of 20% sugar solution.
 - b) Describe He-Ne laser with its construction and working.
 - c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
 - d) Explain in detail Davisson Germer experiment.

Total Marks: 70

F.Y. B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

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 - 2) Velocity of light, $c = 3 \times 10^8$ m/sec.
 - 3) Charge of electron. $e = 1.6 \times 10^{-19} C$.

MCQ/Objective Type Questions

Duration : 30 Minutes

1. Choose the correct answer :

SECTION - I

- 1) Einstein's mass energy relation ($E = mc^2$) shows that
 - a) mass disappears to reappear as energy
 - b) energy disappears to reappear as mass
 - c) mass and energy are two different forms of the same entity
 - d) all the above statements are correct
- 2) Donor type semiconductor is formed by adding impurity of valency
 - a) 5 b) 4 c) 3 d) 6
- 3) The atomic radius of FCC lattice is
 - a) √3a/4 b) √2a/4 c) a/2 d) a/4
- 4) A plane parallel to one of the co-ordinate axes has an intercept of
 - a) 1 b) 0 C) ∞ d) none of these



 $(14 \times 1 = 14)$

Marks: 14

SLR-BT – 5			-2-				
5)	•	•	• • • •	lied to a coil producing vibrates with the frequency			
	a) f	b) f/2	c) 3f	d) 2f			
6)	Optimum reverbe	Optimum reverberation time for music is					
	a) 1 to 2 second		b) 0 to 1 se	cond			
	c) 0.5 to 1 second		d) above 5	second			
7)	The Lorentz trans	sformation equa	tion for t' co-ordi	nate from s to s'			
	a) $t' = (t + vx/c^2)/($	$\sqrt{1 - v^2/c^2}$	b) t' = (t – v	$vx/c^{2})/\sqrt{1 - v^{2}/c^{2}}$			
	c) $t' = (t - vx)/\sqrt{1}$	$-v^{2}/c^{2}$	d) t' = (t + v	$(vx)/\sqrt{1 - v^2/c^2}$			
		SEC	TION – II				
8)	The chirality of a	rmchair CNT is					
,	a) (a, b)		c) (a, 0)	d) (0, b)			
9)	The resolving po	The resolving power of a grating is					
·	a) λ/d λ	b) dλ/λ		d) n(n + 1)			
10)	The specific rota solution.	ation of a substa	ance is	ce is concentration of			
	a) independent of	of	b) directly p	proportional to			
	c) inversely proportional to		d) none of	d) none of these			
11)	Spontaneous emission process is represented by equation						
	a) A + hγ → A*		b) A* + hγ -	→ A + 2hγ			
	c) A* → A + hγ		d) A* + hγ -	→ A + hγ			
12)	LASER beam is						
	a) Highly direction	onal	b) Extreme	ly bright			
	c) Monochromat	tic	d) All of the	ese			
13)) The fractional refractive index change (Δ) is given by			ı by			
	a) $\Delta = n_1 - n_2$		b) $\Delta = n_2 - $	n ₁			
	c) $\Delta = n_1 - n_2/n_1$		d) $\Delta = n_2 - $	n ₁ /n ₁			
14)	The acceptance	cone of fibre is e	equal to				
	a) 2 × acceptance	ce angle	b) 3×acce	ptance angle			
	c) acceptance a	ngle	d) none				

-3-

Seat No.

F.Y. B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

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SECTION - I

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Set R

18

- d) i) A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?
 - ii) The proper life of these π mesons is 2.5×10^{-8} sec. What is the velocity of π mesons if the observed mean life is 2.5×10^{-7} sec?

SECTION - II

- 4. Attempt any six of the following :
 - a) Derive an expression for the resolving power of a plane diffraction grating.
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 - c) Explain in brief :
 - a) Metastable state
 - b) Pumping
 - c) Population inversion
 - d) Write any 5 applications of laser in different fields.
 - e) Describe the principle on which optical fiber works.
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SLR-BT - 5

F.Y. B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

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 - 3) Charge of electron, $e = 1.6 \times 10^{-19} C$.

MCQ/Objective Type Questions

Duration : 30 Minutes

1. Choose the correct answer :

SECTION - I

- 1) The Lorentz transformation equation for t' co-ordinate from s to s'
 - a) $t' = (t + vx/c^2)/\sqrt{1 v^2/c^2}$ b) $t' = (t - vx/c^2)/\sqrt{1 - v^2/c^2}$ c) $t' = (t - vx)/\sqrt{1 - v^2/c^2}$ d) $t' = (t + vx)/\sqrt{1 - v^2/c^2}$
- 2) Einstein's mass energy relation ($E = mc^2$) shows that
 - a) mass disappears to reappear as energy
 - b) energy disappears to reappear as mass
 - c) mass and energy are two different forms of the same entity
 - d) all the above statements are correct
- 3) Donor type semiconductor is formed by adding impurity of valency
 - a) 5 b) 4 c) 3 d) 6
- 4) The atomic radius of FCC lattice is
 - a) $\sqrt{3a/4}$ b) $\sqrt{2a/4}$ c) a/2 d) a/4

Total Marks : 70

Marks : 14

 $(14 \times 1 = 14)$

P.T.O.

SLR-B	SLR-BT – 5 -2-				
5)	A plane parallel to	one of the co-ordi	inat	te axes has ar	n intercept of
	a) 1	b) 0	C))∞	d) none of these
6)	If f is the frequency of alternating current supplied to a coil producing magnetic field then the rod kept in magnetic field vibrates with the frequency				
	a) f	b) f/2	C)) 3f	d) 2f
7)	Optimum reverbera	ation time for mus	ic is	S	
	a) 1 to 2 second		b)) 0 to 1 secon	d
	c) 0.5 to 1 second		d)) above 5 sec	ond
		SECTIC	N -	- 11	
8)	The acceptance co	ne of fibre is equa	al to	0	
	a) $2 \times acceptance$	angle	b)) 3 × accepta	nce angle
	c) acceptance ang	le	d)) none	
9)	The chirality of arm	chair CNT is			
	a) (a, b)	b) (a, a)	C)) (a, 0)	d) (0, b)
10)	The resolving powe	er of a grating is			
	a) λ/d λ	b) dλ/λ	C)) nNdλ	d) n(n + 1)
11)	The specific rotation of a substance is concentration of solution.				
	a) independent of		b)) directly prop	ortional to
	c) inversely proportional to		d)	d) none of these	
12)	Spontaneous emiss	sion process is re	pre	esented by eq	uation
	a) A + hγ → A*		,	b) A* + hγ → A + 2hγ	
	c) A* → A + hγ		d)) A* + hγ → A	+ hγ
13)	LASER beam is				
	a) Highly directiona	al	,) Extremely b	right
	c) Monochromatic		d) All of these		
14)	The fractional refra	ctive index chang	lange (Δ) is given by		
	a) $\Delta = n_1 - n_2$) $\Delta = n_2 - n_1$	
	c) $\Delta = n_1 - n_2/n_1$		d)) $\Delta = n_2 - n_1/n_2$	1

-3-

Seat No.

F.Y. B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING PHYSICS

Day and Date : Wednesday, 12-12-2018 Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Make suitable assumptions, if necessary.2) Figures to the right indicate full marks.

SECTION - I

- 2. Attempt **any six** of the following :
 - a) Classify conductor, insulator and semiconductor on the basis of energy band structure.
 - b) Explain with diagrams the position of Fermi level in
 - 1) P-type
 - 2) n-type semiconductors.
 - c) Define atomic radius and obtain its values for SC, BCC and FCC crystals.
 - d) State the properties of ultrasonic waves.
 - e) Derive an expression for Time dilation.
 - f) Derive the relation $E = mc^2$.
 - g) Determine the lattice constant for FCC lead crystal of radius 1.746A°. Also find the spacing of :
 - i) (111) planes
 - ii) (200) planes.
 - h) The reverberation time of a hall is 1.5 s and the area of interior surface is 3340 m². If the volume of the hall is 1200 m³. Find the absorption coefficient.
- 3. Attempt any two of the following :
 - a) What is Hall effect ? Derive the relation for Hall voltage and Hall coefficient.
 - b) Explain the term Miller indices. Derive the relation between lattice constant and interplaner spacing for cubic crystal.
 - c) State and explain the factors affecting the architectural acoustics and their remedies.

18

18

- d) i) A rocket ship is 100 meter long on the ground. When it is in flight, its length is 99 meters to an observer on the ground. What is its speed ?
 - ii) The proper life of these π mesons is 2.5×10^{-8} sec. What is the velocity of π mesons if the observed mean life is 2.5×10^{-7} sec?

SECTION - II

- 4. Attempt any six of the following :
 - a) Derive an expression for the resolving power of a plane diffraction grating.
 - b) State and explain Malus law.
 - c) Explain in brief :
 - a) Metastable state
 - b) Pumping
 - c) Population inversion
 - d) Write any 5 applications of laser in different fields.
 - e) Describe the principle on which optical fiber works.
 - f) Explain different types of carbon nano tubes.
 - g) In an optical fiber the core material has refractive index 1.6 and refractive index of clad material is 1.3. What is the value of critical angle ? Also calculate the value of angle of acceptance.
 - h) An enclosure filled with helium is heated to 400 k. A beam of helium of atoms emerges out of the enclosure. Calculate the De Broglies wavelength corresponding to helium atoms. Mass of helium atom is 6.7×10^{-27} kg. Given (h = 6.634×10^{-34} J.s, k = 1.376×10^{-27} J/deg).
- 5. Attempt any two of the following :
 - a) i) Determine the grating element of a grating if when illuminated with light of wavelength 4000 A°, the second order spectrum is seen at an angle of 26°.
 - ii) Calculate the specific rotation if the plane of polarization is turned through 26.4° traversing 20 cm. length of 20% sugar solution.
 - b) Describe He-Ne laser with its construction and working.
 - c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
 - d) Explain in detail Davisson Germer experiment.

Seat No.

First Year B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING CHEMISTRY

Day and Date : Wednesday, 12-12-2018 Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes		Marks: 14
1. Choose correct option :		14
 During wet corrosion a) The anodic part undergoes oxida b) The cathodic part undergoes oxida c) The anodic part undergoes reduced d) Neither anodic nor cathodic part 	nges	
2) Metal at the top of electromotive sera) Most stableb) Least active		d) Most active
3) A suitable lubricant for watches isa) Greasec) Molybdenum disulphide	b) Graphite d) Palm oil	
4) Greases are not used to lubricatea) rail axel boxesc) bearings working at high temp.	b) gears d) watches	
 5) Desalination is a process of removir a) oil b) mineral acids c) common salt d) hardness from water 	ng	

SLR-BT – 6

Max. Marks: 70

Set P

Set P

6)	Water is hard when	n it contains				
	a) acid solution		b)	precipitate in s	uspension	
	c) dissolved sodiu	m salt	d)	dissolved Ca a	ind Mg salt	
7)	A reaction in which both are modified i		n s	keleton or the f	functional group or	
	a) addition reactionc) elimination reaction			substitution rearrangement		
8)	With increase in pe a) Decreases c) Increases	ercentage of carbo	b)	n metal, the har Do not change None of these		
9)	Glass used extensa) Soda glassc) Borosilicate gla		b)	erior laboratory a Potash glass Flint glass	apparatus is	
10)	The lowest boiling a) Heavy oil c) Diesel oil	fraction of crude c	b)	s Kerosene oil Gasoline or pe	trol	
11)	A good fuel should a) High moisture c c) Moderate ignition	content		Low calorific va High ash conte		
12)	Isoprene is a monoa) Natural rubberc) Starch	omer of		Synthetic rubbe PVC	er	
13)	The process of vul a) Soluble in water			ber Soft	d) More elastic	
14)	Which of the foll chromatography?	owing gas can r	not	be used as c	arrier gas in gas	
	a) Nitrogen	b) Argon	c)	Oxygen	d) All of these	

SLR-BT – 6

6) Water is hard when it contains

-2-

Seat No.

First Year B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING CHEMISTRY

-3-

Day and Date : Wednesday, 12-12-2018 Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Figures to the right indicates full marks.
2) Draw neat and labelled diagrams whenever necessary.

SECTION - I

2. Solve any four :

a) A sample of water on analysis was found to contain the following impurities in mg/lit., calculates temporary, permanent and total hardness of water in mg/lit.

Impurities	Amount	Mol. Wt.
Ca(HCO ₃) ₂	130	162
Mg(HCO ₃) ₂	115	146
CaSO ₄	60	136
MgCl ₂	45	111

- b) Explain the different types of aerators for treatment of water.
- c) How will you prepare Paracetamol ? Give its uses.
- d) Explain the mechanism of extreme pressure lubrication.
- e) Describe the nature of oxide film formed in oxidation corrosion.
- f) Explain the tinning process for prevention of corrosion.

3. Solve **any four** :

- a) Define BOD. How it is determined ?
- b) Explain the reverse osmosis process for treatment of hard water.
- c) What is addition reaction ? Explain with reaction.

16

Marks: 56

- d) Numerical Saponification value 10.8 grams of oil after saponification with 50 ml of N/2 alkaline KOH solution and on subsequent titration with N/2 HCI gave a titre value of 14 ml to the phenolphthalein end point. A blank experiment was conducted without taking the oil and on repeating the same procedure gave titre value 50 ml. Calculate the saponification value the oil. (Mol. wt. of KOH = 56).
- e) Selection of lubricants for (i) Cutting tools (ii) I.C. engine.
- f) Explain the weight loss method for measurement of rate of corrosion.

SECTION - II

4. Attempt **any four** :

- a) What is glass ? Explain general properties of glass.
- b) Calculate gross and net calorific value of a coal sample of coal having C = 83%, H = 7%, O = 2%, S = 1.5%, N = 2% and ash = 4.4%. (Take latent heat of steam = 587 cal/g).
- c) Explain refining of crude oil.
- d) Explain properties and applications of PVC and PET.
- e) Explain vulcanization of rubber. What are advantages of vulcanization ?
- f) Explain construction and working of gas liquid chromatography.

5. Attempt **any four** :

- a) Explain composition, properties and applications of steel.
- b) What is biodegradable polymer ? Write examples with applications.
- c) Explain comparison between solid and gaseous fuels.
- d) Explain construction and working of boys calorimeter.
- e) Calculate degree of polymerization of polyethene having molecular weight 18200. (Mol. Wt. of ethane = 28).
- f) What weight of CaCl₂ is required to prepare 0.1 N 500 ml solution and 0.2 M 500 ml solution. (Mol. Wt. of CaCl₂ = 111) ?

12

Seat No.

First Year B.Tech. (Semester – I) (New CBCS) Examination, 2018 **ENGINEERING CHEMISTRY**

Day and Date : Wednesday, 12-12-2018 Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes	Marks : 14
1. Choose correct option :	14
 With increase in percentage of carbonal carb	on in metal, the hardness b) Do not change d) None of these
2) Glass used extensively for making sa) Soda glassc) Borosilicate glass	superior laboratory apparatus is b) Potash glass d) Flint glass
3) The lowest boiling fraction of crude (a) Heavy oilc) Diesel oil	oil is b) Kerosene oil d) Gasoline or petrol
4) A good fuel should havea) High moisture contentc) Moderate ignition temperature	b) Low calorific valued) High ash content
5) Isoprene is a monomer ofa) Natural rubberc) Starch	b) Synthetic rubberd) PVC
6) The process of vulcanization makesa) Soluble in water b) Hard	c) Soft d) More elastic

Set

SLR-BT – 6

Max. Marks: 70

7) Which of the following gas can not be used as carrier gas in gas chromatography? a) Nitrogen b) Argon c) Oxygen d) All of these 8) During wet corrosion a) The anodic part undergoes oxidation b) The cathodic part undergoes oxidation c) The anodic part undergoes reduction d) Neither anodic nor cathodic part under goes any changes 9) Metal at the top of electromotive series is a) Most stable b) Least active c) Most noble d) Most active 10) A suitable lubricant for watches is a) Grease b) Graphite d) Palm oil c) Molybdenum disulphide 11) Greases are not used to lubricate a) rail axel boxes b) gears c) bearings working at high temp. d) watches 12) Desalination is a process of removing a) oil b) mineral acids c) common salt d) hardness from water 13) Water is hard when it contains a) acid solution b) precipitate in suspension d) dissolved Ca and Mg salt c) dissolved sodium salt 14) A reaction in which either the carbon skeleton or the functional group or both are modified is known as a) addition reaction b) substitution reaction c) elimination reaction d) rearrangement reaction

Seat No.

First Year B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING CHEMISTRY

Day and Date : Wednesday, 12-12-2018 Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Figures to the right indicates full marks.
2) Draw neat and labelled diagrams whenever necessary.

SECTION - I

2. Solve any four :

a) A sample of water on analysis was found to contain the following impurities in mg/lit., calculates temporary, permanent and total hardness of water in mg/lit.

Impurities	Amount	Mol. Wt.
Ca(HCO ₃) ₂	130	162
Mg(HCO ₃) ₂	115	146
CaSO ₄	60	136
MgCl ₂	45	111

- b) Explain the different types of aerators for treatment of water.
- c) How will you prepare Paracetamol ? Give its uses.
- d) Explain the mechanism of extreme pressure lubrication.
- e) Describe the nature of oxide film formed in oxidation corrosion.
- f) Explain the tinning process for prevention of corrosion.

3. Solve **any four** :

- a) Define BOD. How it is determined ?
- b) Explain the reverse osmosis process for treatment of hard water.
- c) What is addition reaction ? Explain with reaction.

16

12

Marks : 56

-3-

- d) Numerical Saponification value 10.8 grams of oil after saponification with 50 ml of N/2 alkaline KOH solution and on subsequent titration with N/2 HCI gave a titre value of 14 ml to the phenolphthalein end point. A blank experiment was conducted without taking the oil and on repeating the same procedure gave titre value 50 ml. Calculate the saponification value the oil. (Mol. wt. of KOH = 56).

-4-

- e) Selection of lubricants for (i) Cutting tools (ii) I.C. engine.
- f) Explain the weight loss method for measurement of rate of corrosion.

SECTION - II

4. Attempt **any four** :

- a) What is glass ? Explain general properties of glass.
- b) Calculate gross and net calorific value of a coal sample of coal having C = 83%, H = 7%, O = 2%, S = 1.5%, N = 2% and ash = 4.4%. (Take latent heat of steam = 587 cal/g).
- c) Explain refining of crude oil.
- d) Explain properties and applications of PVC and PET.
- e) Explain vulcanization of rubber. What are advantages of vulcanization ?
- f) Explain construction and working of gas liquid chromatography.

5. Attempt **any four** :

- a) Explain composition, properties and applications of steel.
- b) What is biodegradable polymer ? Write examples with applications.
- c) Explain comparison between solid and gaseous fuels.
- d) Explain construction and working of boys calorimeter.
- e) Calculate degree of polymerization of polyethene having molecular weight 18200. (Mol. Wt. of ethane = 28).
- f) What weight of CaCl₂ is required to prepare 0.1 N 500 ml solution and 0.2 M 500 ml solution. (Mol. Wt. of CaCl₂ = 111) ?

16

Seat No.

First Year B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING CHEMISTRY

Day and Date : Wednesday, 12-12-2018 Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes	Marks: 14
 Choose correct option : 1) Desalination is a process of removin a) oil 	14
b) mineral acidsc) common saltd) hardness from water	
2) Water is hard when it containsa) acid solutionc) dissolved sodium salt	b) precipitate in suspensiond) dissolved Ca and Mg salt
 3) A reaction in which either the carbon both are modified is known as a) addition reaction c) elimination reaction 	n skeleton or the functional group or b) substitution reaction d) rearrangement reaction
4) With increase in percentage of carbo a) Decreasesc) Increases	on in metal, the hardness b) Do not change d) None of these
 Glass used extensively for making s a) Soda glass 	uperior laboratory apparatus is b) Potash glass

c) Borosilicate glass d) Flint glass

Set **R**

Max. Marks: 70

SLR-BT – 6

SLR-BT – 6		2-
6)	The lowest boiling fraction of crude a) Heavy oil c) Diesel oil	e oil is b) Kerosene oil d) Gasoline or petrol
7)	A good fuel should have a) High moisture content c) Moderate ignition temperature	b) Low calorific valued) High ash content
8)	Isoprene is a monomer of a) Natural rubber c) Starch	b) Synthetic rubberd) PVC
9)	The process of vulcanization make a) Soluble in water b) Hard	es rubber c) Soft d) More elastic
10)	Which of the following gas can chromatography ? a) Nitrogen b) Argon	not be used as carrier gas in gas c) Oxygen d) All of these
11)	 During wet corrosion a) The anodic part undergoes oxid b) The cathodic part undergoes oxid c) The anodic part undergoes reduced d) Neither anodic nor cathodic part 	kidation uction
12)	Metal at the top of electromotive se a) Most stable b) Least active	
13)	A suitable lubricant for watches isa) Greasec) Molybdenum disulphide	b) Graphite d) Palm oil
14)	Greases are not used to lubricate a) rail axel boxes c) bearings working at high temp.	b) gears d) watches

Seat No.

First Year B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING CHEMISTRY

-3-

Day and Date : Wednesday, 12-12-2018 Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Figures to the right indicates full marks.2) Draw neat and labelled diagrams whenever necessary.

SECTION - I

2. Solve any four :

a) A sample of water on analysis was found to contain the following impurities in mg/lit., calculates temporary, permanent and total hardness of water in mg/lit.

Impurities	Amount	Mol. Wt.
Ca(HCO ₃) ₂	130	162
Mg(HCO ₃) ₂	115	146
CaSO ₄	60	136
MgCl ₂	45	111

- b) Explain the different types of aerators for treatment of water.
- c) How will you prepare Paracetamol ? Give its uses.
- d) Explain the mechanism of extreme pressure lubrication.
- e) Describe the nature of oxide film formed in oxidation corrosion.
- f) Explain the tinning process for prevention of corrosion.

3. Solve any four :

- a) Define BOD. How it is determined ?
- b) Explain the reverse osmosis process for treatment of hard water.
- c) What is addition reaction ? Explain with reaction.

16

Marks: 56

- d) Numerical Saponification value 10.8 grams of oil after saponification with 50 ml of N/2 alkaline KOH solution and on subsequent titration with N/2 HCl gave a titre value of 14 ml to the phenolphthalein end point. A blank experiment was conducted without taking the oil and on repeating the same procedure gave titre value 50 ml. Calculate the saponification value the oil. (Mol. wt. of KOH = 56).
- e) Selection of lubricants for (i) Cutting tools (ii) I.C. engine.
- f) Explain the weight loss method for measurement of rate of corrosion.

SECTION - II

4. Attempt **any four** :

- a) What is glass ? Explain general properties of glass.
- b) Calculate gross and net calorific value of a coal sample of coal having C = 83%, H = 7%, O = 2%, S = 1.5%, N = 2% and ash = 4.4%. (Take latent heat of steam = 587 cal/g).
- c) Explain refining of crude oil.
- d) Explain properties and applications of PVC and PET.
- e) Explain vulcanization of rubber. What are advantages of vulcanization ?
- f) Explain construction and working of gas liquid chromatography.

5. Attempt **any four** :

- a) Explain composition, properties and applications of steel.
- b) What is biodegradable polymer ? Write examples with applications.
- c) Explain comparison between solid and gaseous fuels.
- d) Explain construction and working of boys calorimeter.
- e) Calculate degree of polymerization of polyethene having molecular weight 18200. (Mol. Wt. of ethane = 28).
- f) What weight of CaCl₂ is required to prepare 0.1 N 500 ml solution and 0.2 M 500 ml solution. (Mol. Wt. of CaCl₂ = 111) ?

12

Seat No.

First Year B.Tech. (Semester – I) (New CBCS) Examination, 2018 **ENGINEERING CHEMISTRY**

Day and Date : Wednesday, 12-12-2018 Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective	Туре	Questions
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Duration	: 30 Minutes			Marks	s : 14
1. Choo	ose correct option :				14
a	 The lowest boiling fraction of crude of a) Heavy oil c) Diesel oil 		s Kerosene oil Gasoline or pet	rol	
a	A good fuel should ha a) High moisture cont c) Moderate ignition t	ent b)	Low calorific va High ash conte		
a	soprene is a monome a) Natural rubber c) Starch	b)	Synthetic rubbe PVC	er	
,	The process of vulcan a) Soluble in water b)		ober Soft	d) More elastic	
C	Which of the followi chromatography ? a) Nitrogen b)		be used as ca Oxygen	arrier gas in gas d) All of these	S
a b c	During wet corrosion a) The anodic part un b) The cathodic part un c) The anodic part un d) Neither anodic nor	undergoes oxidati dergoes reduction	on n	inges	Р.Т.О.

Set

Max. Marks: 70

SLR-BT – 6

SLR-BT - 6

d) Most active

- 7) Metal at the top of electromotive series is
 - a) Most stable b) Least active c) Most noble
- 8) A suitable lubricant for watches is
 - a) Grease b) Graphite
 - c) Molybdenum disulphide d) Palm oil
- 9) Greases are not used to lubricate
 - a) rail axel boxes b) gears
 - c) bearings working at high temp. d) watches
- 10) Desalination is a process of removing
 - a) oil
 - b) mineral acids
 - c) common salt
 - d) hardness from water
- Water is hard when it contains
 - a) acid solution
 - c) dissolved sodium salt
- b) precipitate in suspension
- d) dissolved Ca and Mg salt
- 12) A reaction in which either the carbon skeleton or the functional group or both are modified is known as
 - a) addition reaction
 - c) elimination reaction
- b) substitution reaction
- d) rearrangement reaction
- 13) With increase in percentage of carbon in metal, the hardness
 - a) Decreases

- b) Do not change d) None of these
- c) Increases
- 14) Glass used extensively for making superior laboratory apparatus is
 - a) Soda glass

b) Potash glass

c) Borosilicate glass

d) Flint glass

Seat No.

First Year B.Tech. (Semester – I) (New CBCS) Examination, 2018 ENGINEERING CHEMISTRY

Day and Date : Wednesday, 12-12-2018 Time : 10.00 a.m. to 1.00 p.m.

> Instructions : 1) Figures to the right indicates full marks. 2) Draw **neat** and labelled diagrams **whenever** necessary.

SECTION - I

2. Solve any four :

a) A sample of water on analysis was found to contain the following impurities in mg/lit., calculates temporary, permanent and total hardness of water in mg/lit.

Impurities	Amount	Mol. Wt.
Ca(HCO ₃) ₂	130	162
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MgCl ₂	45	111

- b) Explain the different types of aerators for treatment of water.
- c) How will you prepare Paracetamol? Give its uses.
- d) Explain the mechanism of extreme pressure lubrication.
- e) Describe the nature of oxide film formed in oxidation corrosion.
- f) Explain the tinning process for prevention of corrosion.

3. Solve any four :

- a) Define BOD. How it is determined?
- b) Explain the reverse osmosis process for treatment of hard water.
- c) What is addition reaction ? Explain with reaction.

16

Marks: 56

12

-3-

- d) Numerical Saponification value 10.8 grams of oil after saponification with 50 ml of N/2 alkaline KOH solution and on subsequent titration with N/2 HCI gave a titre value of 14 ml to the phenolphthalein end point. A blank experiment was conducted without taking the oil and on repeating the same procedure gave titre value 50 ml. Calculate the saponification value the oil. (Mol. wt. of KOH = 56).
- e) Selection of lubricants for (i) Cutting tools (ii) I.C. engine.
- f) Explain the weight loss method for measurement of rate of corrosion.

SECTION - II

4. Attempt **any four** :

- a) What is glass ? Explain general properties of glass.
- b) Calculate gross and net calorific value of a coal sample of coal having C = 83%, H = 7%, O = 2%, S = 1.5%, N = 2% and ash = 4.4%. (Take latent heat of steam = 587 cal/g).
- c) Explain refining of crude oil.
- d) Explain properties and applications of PVC and PET.
- e) Explain vulcanization of rubber. What are advantages of vulcanization ?
- f) Explain construction and working of gas liquid chromatography.

5. Attempt **any four** :

- a) Explain composition, properties and applications of steel.
- b) What is biodegradable polymer ? Write examples with applications.
- c) Explain comparison between solid and gaseous fuels.
- d) Explain construction and working of boys calorimeter.
- e) Calculate degree of polymerization of polyethene having molecular weight 18200. (Mol. Wt. of ethane = 28).
- f) What weight of CaCl₂ is required to prepare 0.1 N 500 ml solution and 0.2 M 500 ml solution. (Mol. Wt. of CaCl₂ = 111) ?

16

-4-