SLR-FJ-1

Seat No.	

Set P

F.Y. (B.Tech.) (Semester – I) (New) (CBCS) Examination April/May-2019
ENGINEERING MATHEMATICS – I

Day & Date: Thursday, 02-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory and Q. No. 1 Should be solve in first 30 minutes.
2) Figures to the right indicate fill marks.
3) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative. **14**

1) If $y = \cos^2 x$, then $y_n =$ _____.
   a) $2^n \cos(2x + n\frac{\pi}{2})$ b) $2^{n-1} \cos\left(2x + n\frac{\pi}{2}\right)$
   c) $2^{n-1} \sin\left(2x + n\frac{\pi}{2}\right)$ d) None of these

2) If $y = x^2 e^x$, then $y_n =$ _____.
   a) $e^x(x^2 + 2nx + n^2 - n)$ b) $e^x(x^2 + 2x + 1)$
   c) $e^x(x^2 + 2nx - 1)$ d) $e^x(x^2 + 2nx + n^2)$

3) If $y = \sin^{-1} x$, then $x =$ _____.
   a) $1 + y + \frac{y^2}{2!} + \frac{y^3}{3!} + \cdots$ b) $1 - y + \frac{y^2}{2!} - \frac{y^3}{3!} + \cdots$
   c) $y - \frac{y^3}{3!} + \frac{y^5}{5!} \ldots$ d) $y + \frac{y^3}{3!} + \frac{y^5}{5!} + \cdots$

4) In Taylor's series expansion of $e^x + \sin x$ about the point $x = \pi$, the coefficient of $(x - \pi)^2$ is _____.
   a) e^π b) $e^\pi + 1$
   c) $e^\pi - 1$ d) $\frac{e^\pi}{2}$

5) If the determinant of square matrix A of order m is equal to zero, then the rank of A is _____.
   a) equal to m b) less than m
   c) greater than m d) none of these

6) The system of equations AX = B is inconsistent if _____.
   a) rank of A ≠ rank of (A:B) b) rank of A = rank of (A:B)
   c) rank of A = rank of B d) None of these

7) The eigen values of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 0 & 2 & 4 \\ 0 & 0 & 5 \end{bmatrix}$ are _____.
   a) $0, 2, 5$ b) $1, 2, 5$
   c) $1, -2, -5$ d) $-1, -2, -5$

8) If $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$ then the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$= _____.
   a) $\cos 2u$ b) $\tan 2u$
   c) $2u$ d) $\sin 2u$

9) If $x = e^u \cos v\,, y = e^u \sin v$ then value of $\frac{\partial\,(x,y)}{\partial\,(u,v)}$= _____.

a) e^{-u} b) e^{2u}

c) e^{u} d) e^{-2u}

10) If $\frac{\delta P}{P} = 2\frac{\delta E}{E} - \frac{\delta R}{R}$ and percentage error in E and R are respectively 2% and 1% then percentage error in P is _____.

a) 3% b) 4%

c) 1% d) 5%

11) The function $f(x,y) = 0$ has a saddle point if _____.

a) $rf - s^2 > 0$ b) $rf - s^2 = 0$

c) $rf - s^2 < 0$ d) None of these

12) Which of the following is true?

a) $\text{div (grad } \phi) = \nabla \times \nabla\phi$ b) $\text{div (grad } \phi) = \nabla.\nabla\phi$

c) $\text{curl (grad } \phi) = \nabla^2\phi$ d) $\text{curl (div } \phi) = \nabla^2\phi$

13) If $\bar{r} = ae^{3t} + \text{be}^{2\text{t}}$ then at $t = 0, \frac{d\bar{r}}{dt} =$ _____.

a) a b) b

c) $2b + 3a$ d) $2a + 3b$

14) Curl $(xyi + yzj + zxk)$ at $(1,1,1)$ is _____.

a) $i + j + k$ b) 0

c) $\sqrt{3}$ d) $-(i + j + k)$

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Set P

F.Y. (B.Tech.) (Semester – I) (New) (CBCS) Examination April/May-2019
ENGINEERING MATHEMATICS – I

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Section – I

Q.2 Solve any three of the following **09**

a) Find the n^{th} derivation of $\frac{3x}{2x^2-x-1}$

b) Expand $x^5 - x^4 + x^3 - x^2 + x - 1$ in power's of $(x-1)$.

c) Evaluate $\lim_{x\to 0} \frac{xe^x - \log(1+x)}{x^2}$

d) Find the rank of matrix by reducing to normal form.

$$\begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}$$

e) Verify the Cayley- Hamilton theorem for the matrix A.
Where $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$

Q.3 Solve any three of the following **09**

a) Prove that $sin^{-1}(3x - 4x^3) = 3\left[x + \frac{x^3}{6} + \frac{3}{40}x^5 + \cdots\right]$

b) Find the value of constant a and b such that $\lim_{x\to 0} \frac{a\cosh x - b\cos x}{x^2} = 1$

c) Solve the system of equations $x + 3y + 2z = 0; 2x - y + 3z = 0;$
$3x - 5y + 4z = 0; x + 17y + 4z = 0$

d) Examine whether the following vectors are linearly independent or dependent? If dependent then find the relation between them.
$[2, -1, 3, 2],\quad [1, 3, 4, 2],\quad [3, -5, 2, 2]$

e) Verify the Cauchy's mean value theorem for the functions,
$f(x) = \sqrt{x+9}$ and $g(x) = \sqrt{x}$ in $[0, 16]$

Q.4 Solve any two of the following **10**

a) Find the eigen values and corresponding eigen vector of the matrix A,
where $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

b) If $y = \sin(m\, sin^{-1}x)$, prove that
$(1-x^2)y_{n+2} - (2n+1)xy_{n+1} + (m^2 - n^2)y_n = 0$

c) Expand $e^{x\sin x}$ in ascending power of x upto x^4.

Section – II

Q.5 Solve any three **09**

a) If $u = 9^{xyz}$, prove that $\frac{\partial^3 u}{\partial x\, \partial y\, \partial z} = (1 + 3xyz + x^2\, y^2\, z^2)e^{xyz}$

b) If $z = x^2 + y^2, x = \cos t, y = \sin t$, find $\frac{dz}{dt}$ at $t = \pi$

c) If $x = e^u \cos v, y = e^u \sin v$, prove that $JJ' = 1$

d) A rectangular box with open top has a given volume. Find the dimensions of the box such that the material required is minimum.

e) Find the angle between the tangent planes to the surfaces $x \log z = y^2 - 1$ and $x^2 y = 2 - z$ at $(1, 1, 1)$.

Q.6 Solve any three **09**

a) If $x = u \tan v, y = u \sec v$ prove that $\left(\frac{\partial u}{\partial x}\right)_y . \left(\frac{\partial v}{\partial x}\right)_y = \left(\frac{\partial u}{\partial y}\right)_n . \left(\frac{\partial v}{\partial y}\right)_x$

b) If $z = f(x, y)$ find $x = uv, y = u^2 - v^2$ then prove that

$$2\frac{\partial z}{\partial y} = \frac{1}{u^2 + v^2}\left[u\frac{\partial z}{\partial u} - v\frac{\partial z}{\partial v}\right]$$

c) If $f\ (x, y, z) = x^3 y^2 z^4$ find approximate value of f when $x = 1.99$,

$$y = 3.01, z = 0.99$$

d) Find unit vector normal to the surface $x^2 y + 2xz^2 = 8$ at the point $(1, 0, 2)$

e) Find the tangential and normal component of acceleration of particle morning on the curve $x = t^3 + 1, \quad y = t^2, \ z = t$ at $t = 1$

Q.7 Solve any two **10**

a) State Euler's theorem. If $u = \frac{1}{x^2} + \frac{1}{xy} + \frac{\log x - \log y}{x^2 + y^2}$

prove that

1) $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + 2u = 0$

2) $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy\ \frac{\partial^2 u}{\partial x\ \partial y} + y^2\ \frac{\partial^2 u}{\partial y^2} = 6u$

b) Find the extreme values of $\sin x + \sin y + \sin(x + y)$

c) Show that the vector

$\bar{F} = (6xy + z^3)i + (3x^2 - z)j + (3x\ z^2 - y)k$ is irrotational. Find the function ϕ such that $\bar{F} = -\nabla\phi$

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Seat No.	

Set **Q**

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ENGINEERING MATHEMATICS – I

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e) Find the angle between the tangent planes to the surfaces $x \log z = y^2 - 1$ and $x^2 y = 2 - z$ at $(1, 1, 1)$.

Q.6 Solve any three **09**

a) If $x = u \tan v, y = u \sec v$ prove that $\left(\frac{\partial u}{\partial x}\right)_y . \left(\frac{\partial v}{\partial x}\right)_y = \left(\frac{\partial u}{\partial y}\right)_n . \left(\frac{\partial v}{\partial y}\right)_x$

b) If $z = f(x, y)$ find $x = uv, y = u^2 - v^2$ then prove that

$$2\frac{\partial z}{\partial y} = \frac{1}{u^2 + v^2}\left[u\frac{\partial z}{\partial u} - v\frac{\partial z}{\partial v}\right]$$

c) If $f\ (x, y, z) = x^3 y^2 z^4$ find approximate value of f when $x = 1.99$,

$$y = 3.01, z = 0.99$$

d) Find unit vector normal to the surface $x^2 y + 2xz^2 = 8$ at the point $(1, 0, 2)$

e) Find the tangential and normal component of acceleration of particle morning on the curve $x = t^3 + 1, \quad y = t^2, \ z = t$ at $t = 1$

Q.7 Solve any two **10**

a) State Euler's theorem. If $u = \frac{1}{x^2} + \frac{1}{xy} + \frac{\log x - \log y}{x^2 + y^2}$

prove that

1) $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + 2u = 0$

2) $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy\ \frac{\partial^2 u}{\partial x\ \partial y} + y^2\ \frac{\partial^2 u}{\partial y^2} = 6u$

b) Find the extreme values of $\sin x + \sin y + \sin(x + y)$

c) Show that the vector

$\bar{F} = (6xy + z^3)i + (3x^2 - z)j + (3x\ z^2 - y)k$ is irrotational. Find the function ϕ such that $\bar{F} = -\nabla\phi$

SLR-FJ-1

Seat No.	

Set S

F.Y. (B.Tech.) (Semester – I) (New) (CBCS) Examination April/May-2019
ENGINEERING MATHEMATICS – I

Day & Date: Thursday, 02-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory. And Q. No. 1 Should be solve in first 30 minutes.
2) Figures to the right indicate fill marks.
3) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative. **14**

1) The system of equations AX = B is inconsistent if _____.
   a) rank of A ≠ rank of (A:B) b) rank of A = rank of (A:B)
   c) rank of A = rank of B d) None of these

2) The eigen values of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 0 & 2 & 4 \\ 0 & 0 & 5 \end{bmatrix}$ are _____.
   a) $0, 2, 5$ b) $1, 2, 5$
   c) $1, -2, -5$ d) $-1, -2, -5$

3) If $u = \tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$ then the value of $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$= _____.
   a) $\cos 2u$ b) $\tan 2u$
   c) $2u$ d) $\sin 2u$

4) If $x = e^u \cos v, y = e^u \sin v$ then value of $\frac{\partial (x,y)}{\partial (u,v)}$= _____.
   a) e^{-u} b) e^{2u}
   c) e^u d) e^{-2u}

5) If $\frac{\delta P}{P} = 2\frac{\delta E}{E} - \frac{\delta R}{R}$ and percentage error in E and R are respectively 2% and 1% then percentage error in P is _____.
   a) 3% b) 4%
   c) 1% d) 5%

6) The function $f(x, y) = 0$ has a saddle point if _____.
   a) $rf - s^2 > 0$ b) $rf - s^2 = 0$
   c) $rf - s^2 < 0$ d) None of these

7) Which of the following is true?
   a) $\text{div}\,(\text{grad}\,\phi) = \nabla \times \nabla\phi$ b) $\text{div}\,(\text{grad}\,\phi) = \nabla.\nabla\phi$
   c) $\text{curl}\,(\text{grad}\,\phi) = \nabla^2\phi$ d) $\text{curl}\,(\text{div}\,\phi) = \nabla^2\phi$

8) If $\bar{r} = ae^{3t} + \text{be}^{2t}$ then at $t = 0, \frac{d\bar{r}}{dt} =$ _____.
   a) a b) b
   c) $2b + 3a$ d) $2a + 3b$

9) Curl $(xyi + yzj + zxk)$ at $(1,1,1)$ is _____.

a) $i + j + k$ b) 0

c) $\sqrt{3}$ d) $-(i + j + k)$

10) If $y = \cos^2 x$, then $y_n =$ _____.

a) $2^n \cos(2x + n\frac{\pi}{2})$ b) $2^{n-1} \cos\left(2x + n\frac{\pi}{2}\right)$

c) $2^{n-1} \sin\left(2x + n\frac{\pi}{2}\right)$ d) None of these

11) If $y = x^2 e^x$, then $y_n =$ _____.

a) $e^x(x^2 + 2nx + n^2 - n)$ b) $e^x(x^2 + 2x + 1)$

c) $e^x(x^2 + 2nx - 1)$ d) $e^x(x^2 + 2nx + n^2)$

12) If $y = \sin^{-1} x$, then $x =$ _____.

a) $1 + y + \frac{y^2}{2!} + \frac{y^3}{3!} + \cdots$ b) $1 - y + \frac{y^2}{2!} - \frac{y^3}{3!} + \cdots$

c) $y - \frac{y^3}{3!} + \frac{y^5}{5!} \ldots$ d) $y + \frac{y^3}{3!} + \frac{y^5}{5!} + \cdots$

13) In Taylor's series expansion of $e^x + \sin x$ about the point $x = \pi$, the coefficient of $(x - \pi)^2$ is _____.

a) e^π b) $e^\pi + 1$

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

14) If the determinant of square matrix A of order m is equal to zero, then the rank of A is _____.

a) equal to m b) less than m

c) greater than m d) none of these

SLR-FJ-1

Seat No.	

Set S

F.Y. (B.Tech.) (Semester – I) (New) (CBCS) Examination April/May-2019
ENGINEERING MATHEMATICS – I

Day & Date: Thursday, 02-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate fill marks.
3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any three of the following **09**

a) Find the n^{th} derivation of $\frac{3x}{2x^2-x-1}$

b) Expand $x^5 - x^4 + x^3 - x^2 + x - 1$ in power's of $(x-1)$.

c) Evaluate $\lim_{x\to 0} \frac{xe^x - \log(1+x)}{x^2}$

d) Find the rank of matrix by reducing to normal form.

$$\begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}$$

e) Verify the Cayley- Hamilton theorem for the matrix A.
Where $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{bmatrix}$

Q.3 Solve any three of the following **09**

a) Prove that $sin^{-1}(3x - 4x^3) = 3\left[x + \frac{x^3}{6} + \frac{3}{40}x^5 + \cdots\right]$

b) Find the value of constant a and b such that $\lim_{x\to 0} \frac{a\cosh x - b\cos x}{x^2} = 1$

c) Solve the system of equations $x + 3y + 2z = 0; 2x - y + 3z = 0;$
$3x - 5y + 4z = 0; x + 17y + 4z = 0$

d) Examine whether the following vectors are linearly independent or dependent? If dependent then find the relation between them.
$[2, -1, 3, 2],\quad [1, 3, 4, 2],\quad [3, -5, 2, 2]$

e) Verify the Cauchy's mean value theorem for the functions,
$f(x) = \sqrt{x+9}$ and $g(x) = \sqrt{x}$ in $[0, 16]$

Q.4 Solve any two of the following **10**

a) Find the eigen values and corresponding eigen vector of the matrix A,
where $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

b) If $y = \sin(m\, sin^{-1}x)$, prove that
$(1-x^2)y_{n+2} - (2n+1)xy_{n+1} + (m^2 - n^2)y_n = 0$

c) Expand $e^{x\sin x}$ in ascending power of x upto x^4.

Section – II

Q.5 Solve any three **09**

a) If $u = 9^{xyz}$, prove that $\frac{\partial^3 u}{\partial x\, \partial y\, \partial z} = (1 + 3xyz + x^2\, y^2\, z^2)e^{xyz}$

b) If $z = x^2 + y^2, x = \cos t, y = \sin t$, find $\frac{dz}{dt}$ at $t = \pi$

c) If $x = e^u \cos v, y = e^u \sin v$, prove that $JJ' = 1$

d) A rectangular box with open top has a given volume. Find the dimensions of the box such that the material required is minimum.

e) Find the angle between the tangent planes to the surfaces $x \log z = y^2 - 1$ and $x^2 y = 2 - z$ at $(1, 1, 1)$.

Q.6 Solve any three **09**

a) If $x = u \tan v, y = u \sec v$ prove that $\left(\frac{\partial u}{\partial x}\right)_y . \left(\frac{\partial v}{\partial x}\right)_y = \left(\frac{\partial u}{\partial y}\right)_n . \left(\frac{\partial v}{\partial y}\right)_x$

b) If $z = f(x, y)$ find $x = uv, y = u^2 - v^2$ then prove that

$$2\frac{\partial z}{\partial y} = \frac{1}{u^2 + v^2}\left[u\frac{\partial z}{\partial u} - v\frac{\partial z}{\partial v}\right]$$

c) If $f\ (x, y, z) = x^3 y^2 z^4$ find approximate value of f when $x = 1.99$,

$$y = 3.01, z = 0.99$$

d) Find unit vector normal to the surface $x^2 y + 2xz^2 = 8$ at the point $(1, 0, 2)$

e) Find the tangential and normal component of acceleration of particle morning on the curve $x = t^3 + 1, \quad y = t^2, \ z = t$ at $t = 1$

Q.7 Solve any two **10**

a) State Euler's theorem. If $u = \frac{1}{x^2} + \frac{1}{xy} + \frac{\log x - \log y}{x^2 + y^2}$

prove that

1) $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + 2u = 0$

2) $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy\ \frac{\partial^2 u}{\partial x\ \partial y} + y^2\ \frac{\partial^2 u}{\partial y^2} = 6u$

b) Find the extreme values of $\sin x + \sin y + \sin(x + y)$

c) Show that the vector

$\bar{F} = (6xy + z^3)i + (3x^2 - z)j + (3x\ z^2 - y)k$ is irrotational. Find the function ϕ such that $\bar{F} = -\nabla\phi$

SLR-FJ-2

Seat No.	

Set P

F.Y.B. Tech. (Semester – I) (New) (CBCS) Examination March/April-2019
ENGINEERING MECHANICS

Day & Date: Friday, 03-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Solve Q. 1 in first half an hour.
3) Figures to the right indicate full marks.
4) Assume suitable data if found necessary and mention it clearly.
5) Use of nonprogrammable calculator is allowed.

MCQ / Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative. **14**

1) When several forces of different magnitude and direction act at a point upon a body lying in a plane, they constitute _____.
   a) coplanar force system
   b) coplanar concurrent force system
   c) coplanar non concurrent force system
   d) concurrent force system

2) Varignon's theorem can be applied to determine _____.
   a) Position of resultant
   b) Location of centroid
   c) Magnitude and direction of resultant
   d) None of these

3) A particle acted upon by two forces of equal magnitudes is in equilibrium. The angle between two forces is _____.
   a) zero b) 180°
   c) 90° d) 120°

4) The tangent of the angle of friction is equal to _____
   a) Limiting friction b) Kinetic friction
   c) Coefficient of friction d) Static friction

5) The type of joint that can resist a moment is called as _____.
   a) roller joint b) hinged joint
   c) pin joint d) fixed joint

6) Roof trusses are _____.
   a) simple trusses b) plane trusses
   c) perfect trusses d) all of these

7) The centre of gravity of a lamina will not be at its geometrical centre if it is a _____.
   a) circle b) equilateral triangle
   c) rectangle d) right angled triangle

8) The rate of doing work is known as _____.
   a) Potential energy b) Kinetic energy
   c) Power d) None

9) In order to determine, the effects of force acting on a body we must know _____.
   a) It's magnitude
   b) Direction of the line along which it acts
   c) Point through which it acts on body
   d) All of the above

10) When two ships are moving along inclined directions, then the time when two ships are closest together depends upon _____.
   a) velocity of one of the ships
   b) velocity of both the ships
   c) velocity of both ships and angle between the two directions
   d) none of above

11) A pulley starting from rest is given an angular acceleration of 2 rad/s2. What will be its angular velocity in rpm at the end of 2 minutes.
   a) 4 rpm
   b) 240 rpm
   c) 2292 rpm
   d) 1192 rpm

12) A ball of mass 2kg strikes the floor with a velocity 14 m/s and rebounds back with a velocity of 12 m/s. The impulse in this process is equal to _____.
   a) 0 4NS
   b) 52 NS
   c) 26 NS
   d) 28 NS

13) If the direction of velocities of two colliding bodies is not directed along the line of impact, it is called _____.
   a) Direct impact
   b) Oblique impact
   c) Central impact
   d) Eccentric impact

14) A body is projected vertically upwards with a velocity u from a surface. The velocity with which it strikes the surface back is _____.
   a) u
   b) 2u
   c) u^2/g
   d) u/g

Seat No.	

Set **P**

F.Y.B. Tech. (Semester – I) (New) (CBCS) Examination March/April-2019
ENGINEERING MECHANICS

Day & Date: Friday, 03-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

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.

Section – I

Q.2 Solve any four out of six : **12**

a) State and derive Varignon's theorem of moment.

b) State and explain types of equilibrium.

c) State and derive perpendicular axis theorem.

d) Find the magnitude and direction of resultant for the two forces as shown in Fig. 1

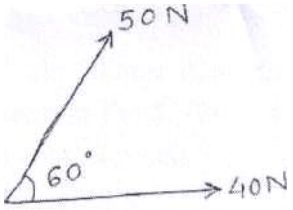

Fig. 1

e) Find support reactions of beam AB shown in Fig. 2

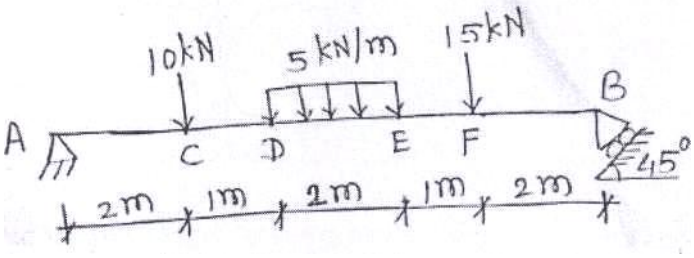

Fig. 2

f) Determine the location of centroid of the lamina shown in Fig. 3

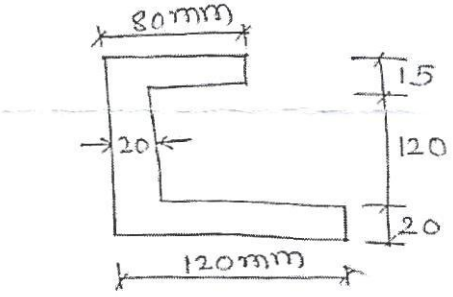

Fig. 3

Q.3 Solve any two questions from the following: **16**

a) A rectangular plate is subjected to the forces as shown in Fig. 4. Find the magnitude, direction and position of the resultant from point B.

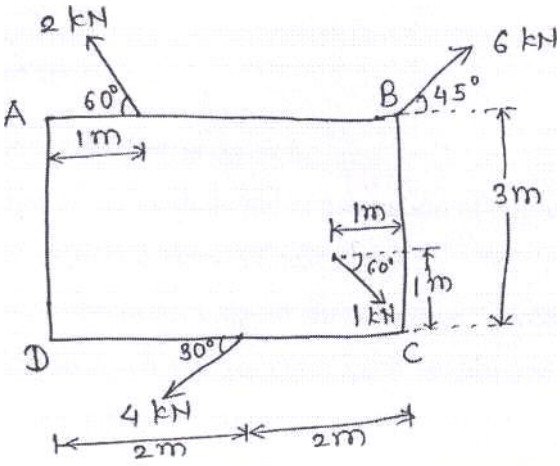

Fig. 4

b) Two cylinders of weight 200N and 300mm diameter each are supported by inclined plane and a vertical wall as shown in Fig.5. Assuming smooth contact surfaces, find the reactions at all supports and contact points

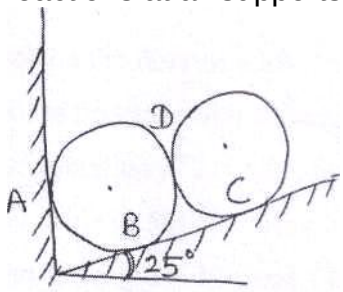

Fig. 5

c) Analyze the given truss in Fig.6 by using method of joints.

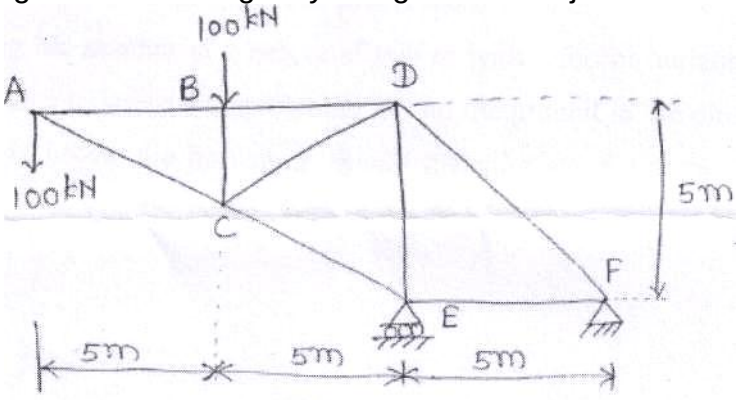

Fig. 6

Q.4 Solve any four out of six : **12**

a) Prove any two equations of rectilinear motion.

b) State law of conservation of momentum and conservation of energy.

c) Explain use of any two motion curves with neat sketches.

d) State types of mechanical vibrations. Explain single degree of freedom.

e) A stone takes 6 seconds to reach the ground after it is dropped from the tower. If the stone is stopped after 2 seconds of its fall and then released again, how much time it will take to reach ground. Take g = 9.81 m/s^2

f) Obtain equation of a trajectory of projectile motion.

Section – II

Q.5 Solve any two. **16**

a) A man weighing 750 N stands on the floor of a lift. Determine the pressure exerted on the floor when
a) the lift moves upwards with an acceleration of 2.5 m/s^2
b) the lift moves downwards with an acceleration of 2.5 m/s^2
Use D'Alembert's principle.

b) A hammer of mass 200 kg is made to fall free from 2 m height on pile of mass 1500 kg. The pile is driven 50 mm into ground in one blow. Determine
a) the common velocity of the pile and hammer after impact,
b) the energy lost in the impact and
c) the average resistance of the ground to penetration.

c) A pilot flying his bomber at a height of 600 m with uniform horizontal velocity of 480 km/hr wants to strike a target which lies on the ground in the direction of flight. At what angle below the horizontal should the pilot see the target at the time of bombing in order to hit the target. Neglect the air resistance.

SLR-FJ-2

Seat No.	

Set Q

F.Y.B. Tech. (Semester – I) (New) (CBCS) Examination March/April-2019
ENGINEERING MECHANICS

Day & Date: Friday, 03-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Solve Q. 1 in first half an hour.
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5) Use of nonprogrammable calculator is allowed.

MCQ / Objective Type Questions

Duration: 30 Minutes Marks: 14

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1) The rate of doing work is known as _____.
   a) Potential energy b) Kinetic energy
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2) In order to determine, the effects of force acting on a body we must know _____.
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3) When two ships are moving along inclined directions, then the time when two ships are closest together depends upon _____.
   a) velocity of one of the ships
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4) A pulley starting from rest is given an angular acceleration of 2 rad/s2. What will be its angular velocity in rpm at the end of 2 minutes.
   a) 4 rpm b) 240 rpm
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5) A ball of mass 2kg strikes the floor with a velocity 14 m/s and rebounds back with a velocity of 12 m/s. The impulse in this process is equal to _____.
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6) If the direction of velocities of two colliding bodies is not directed along the line of impact, it is called _____.
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7) A body is projected vertically upwards with a velocity u from a surface. The velocity with which it strikes the surface back is _____.
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SLR-FJ-2

Seat No.	

Set Q

F.Y.B. Tech. (Semester – I) (New) (CBCS) Examination March/April-2019
ENGINEERING MECHANICS

Day & Date: Friday, 03-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
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Section – I

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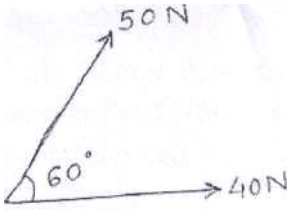

Fig. 1

e) Find support reactions of beam AB shown in Fig. 2

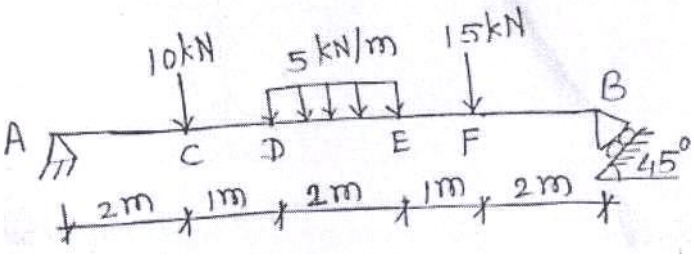

Fig. 2

f) Determine the location of centroid of the lamina shown in Fig. 3

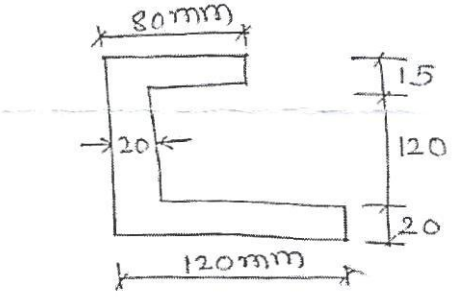

Fig. 3

Q.3 Solve any two questions from the following: **16**

a) A rectangular plate is subjected to the forces as shown in Fig. 4. Find the magnitude, direction and position of the resultant from point B.

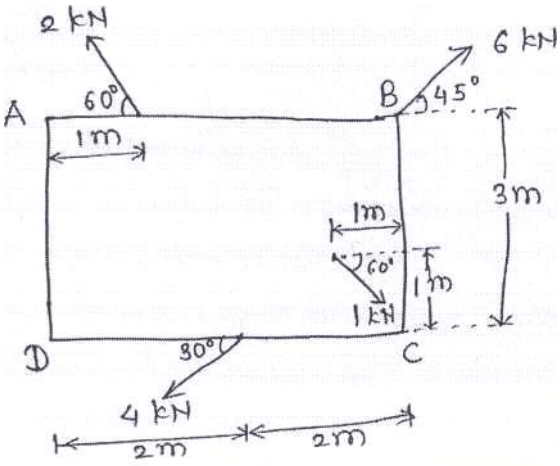

Fig. 4

b) Two cylinders of weight 200N and 300mm diameter each are supported by inclined plane and a vertical wall as shown in Fig.5. Assuming smooth contact surfaces, find the reactions at all supports and contact points

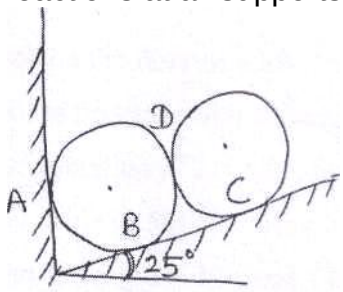

Fig. 5

c) Analyze the given truss in Fig.6 by using method of joints.

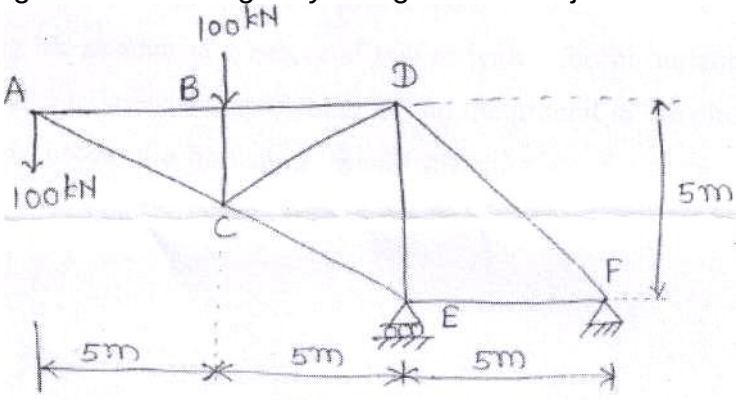

Fig. 6

Q.4 Solve any four out of six : **12**

a) Prove any two equations of rectilinear motion.

b) State law of conservation of momentum and conservation of energy.

c) Explain use of any two motion curves with neat sketches.

d) State types of mechanical vibrations. Explain single degree of freedom.

e) A stone takes 6 seconds to reach the ground after it is dropped from the tower. If the stone is stopped after 2 seconds of its fall and then released again, how much time it will take to reach ground. Take g = 9.81 m/s^2

f) Obtain equation of a trajectory of projectile motion.

Section – II

Q.5 Solve any two. **16**

a) A man weighing 750 N stands on the floor of a lift. Determine the pressure exerted on the floor when
a) the lift moves upwards with an acceleration of 2.5 m/s^2
b) the lift moves downwards with an acceleration of 2.5 m/s^2
Use D'Alembert's principle.

b) A hammer of mass 200 kg is made to fall free from 2 m height on pile of mass 1500 kg. The pile is driven 50 mm into ground in one blow. Determine
a) the common velocity of the pile and hammer after impact,
b) the energy lost in the impact and
c) the average resistance of the ground to penetration.

c) A pilot flying his bomber at a height of 600 m with uniform horizontal velocity of 480 km/hr wants to strike a target which lies on the ground in the direction of flight. At what angle below the horizontal should the pilot see the target at the time of bombing in order to hit the target. Neglect the air resistance.

SLR-FJ-2

Seat No.	

Set R

F.Y.B. Tech. (Semester – I) (New) (CBCS) Examination March/April-2019
ENGINEERING MECHANICS

Day & Date: Friday, 03-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Solve Q. 1 in first half an hour.
3) Figures to the right indicate full marks.
4) Assume suitable data if found necessary and mention it clearly.
5) Use of nonprogrammable calculator is allowed.

MCQ / Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative. **14**

1) A pulley starting from rest is given an angular acceleration of 2 rad/s2. What will be its angular velocity in rpm at the end of 2 minutes.
   a) 4 rpm b) 240 rpm
   c) 2292 rpm d) 1192 rpm

2) A ball of mass 2kg strikes the floor with a velocity 14 m/s and rebounds back with a velocity of 12 m/s. The impulse in this process is equal to _____.
   a) 0 4NS b) 52 NS
   c) 26 NS d) 28 NS

3) If the direction of velocities of two colliding bodies is not directed along the line of impact, it is called _____.
   a) Direct impact b) Oblique impact
   c) Central impact d) Eccentric impact

4) A body is projected vertically upwards with a velocity u from a surface. The velocity with which it strikes the surface back is _____.
   a) u b) 2u
   c) u^2/g d) u/g

5) When several forces of different magnitude and direction act at a point upon a body lying in a plane, they constitute _____.
   a) coplanar force system
   b) coplanar concurrent force system
   c) coplanar non concurrent force system
   d) concurrent force system

6) Varignon's theorem can be applied to determine _____.
   a) Position of resultant
   b) Location of centroid
   c) Magnitude and direction of resultant
   d) None of these

7) A particle acted upon by two forces of equal magnitudes is in equilibrium. The angle between two forces is _____.
   a) zero b) 180°
   c) 90° d) 120°

8) The tangent of the angle of friction is equal to _____
   a) Limiting friction
   b) Kinetic friction
   c) Coefficient of friction
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9) The type of joint that can resist a moment is called as _____.
   a) roller joint
   b) hinged joint
   c) pin joint
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10) Roof trusses are _____.
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11) The centre of gravity of a lamina will not be at its geometrical centre if it is a _____.
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13) In order to determine, the effects of force acting on a body we must know _____.
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14) When two ships are moving along inclined directions, then the time when two ships are closest together depends upon _____.
   a) velocity of one of the ships
   b) velocity of both the ships
   c) velocity of both ships and angle between the two directions
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SLR-FJ-2

Seat No.	

Set R

F.Y.B. Tech. (Semester – I) (New) (CBCS) Examination March/April-2019
ENGINEERING MECHANICS

Day & Date: Friday, 03-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
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Section – I

Q.2 Solve any four out of six : **12**

a) State and derive Varignon's theorem of moment.

b) State and explain types of equilibrium.

c) State and derive perpendicular axis theorem.

d) Find the magnitude and direction of resultant for the two forces as shown in Fig. 1

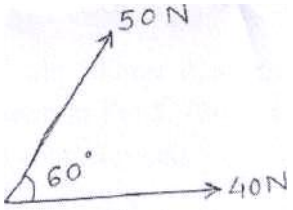


Fig. 1

e) Find support reactions of beam AB shown in Fig. 2

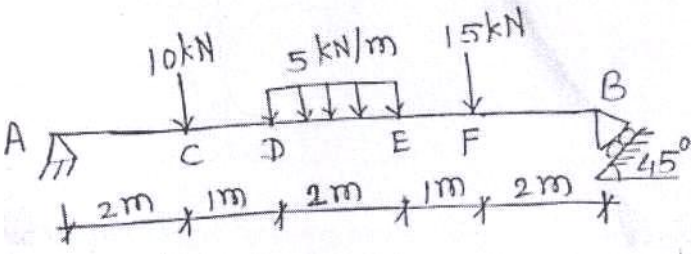


Fig. 2

f) Determine the location of centroid of the lamina shown in Fig. 3

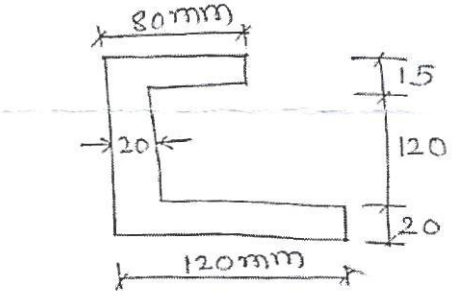


Fig. 3

Q.3 Solve any two questions from the following: **16**

a) A rectangular plate is subjected to the forces as shown in Fig. 4. Find the magnitude, direction and position of the resultant from point B.

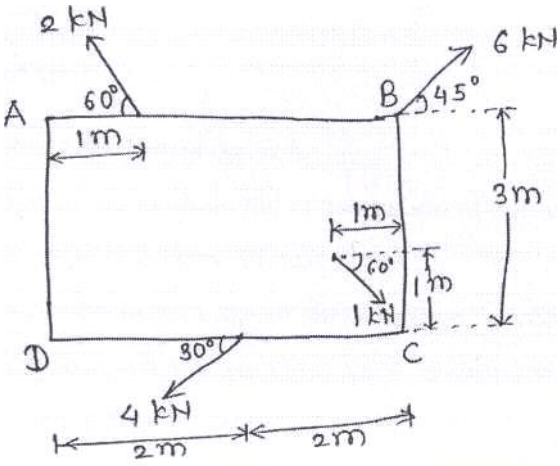
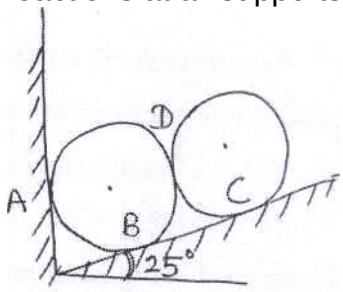


Fig. 4

b) Two cylinders of weight 200N and 300mm diameter each are supported by inclined plane and a vertical wall as shown in Fig.5. Assuming smooth contact surfaces, find the reactions at all supports and contact points



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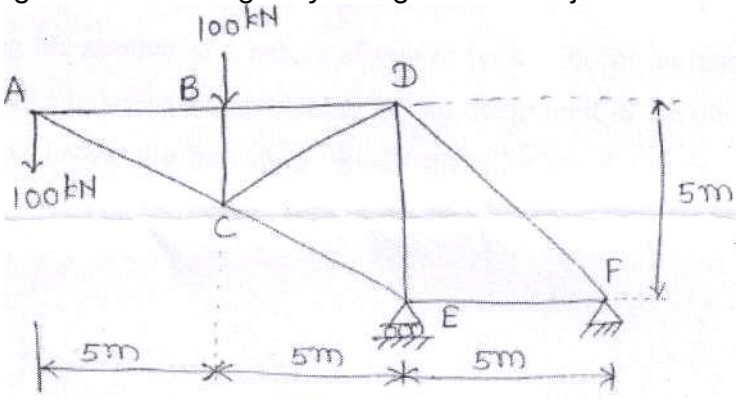

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SLR-FJ-2

Seat No.		Set	S

F.Y.B. Tech. (Semester – I) (New) (CBCS) Examination March/April-2019
ENGINEERING MECHANICS

Day & Date: Friday, 03-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

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Duration: 30 Minutes Marks: 14

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Seat No.	

Set **S**

F.Y.B. Tech. (Semester – I) (New) (CBCS) Examination March/April-2019
ENGINEERING MECHANICS

Day & Date: Friday, 03-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

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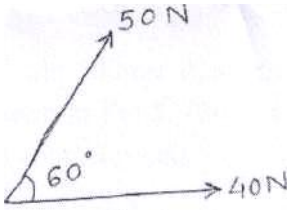

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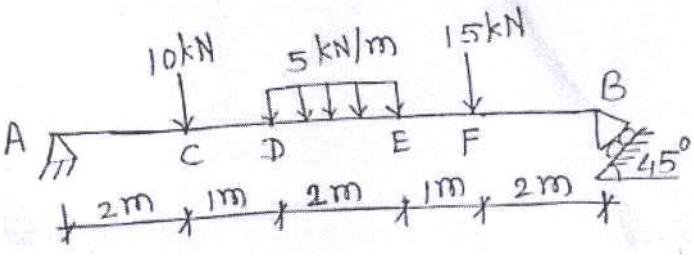

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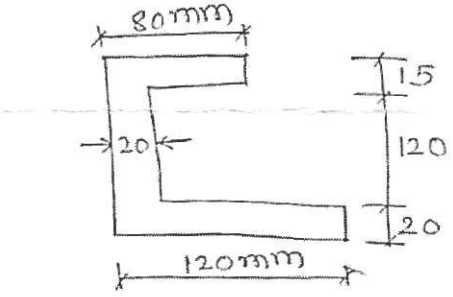

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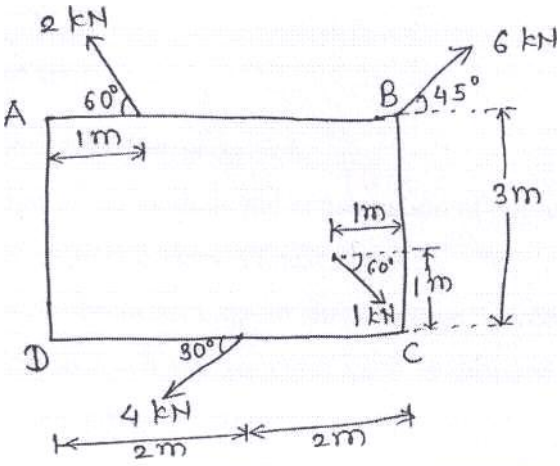

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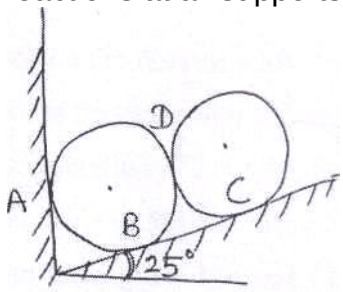

Fig. 5

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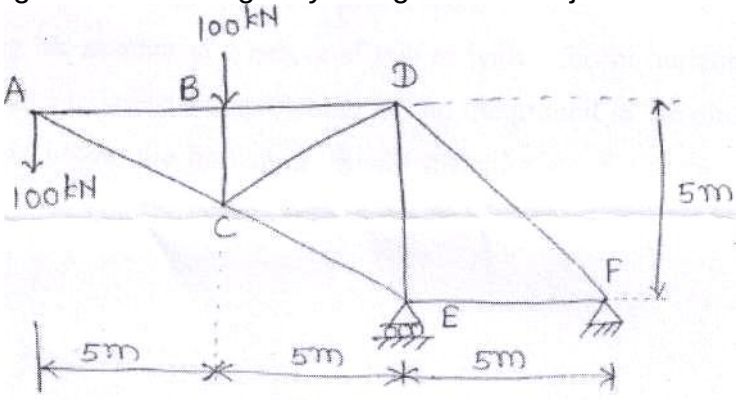

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Section – II

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SLR-FJ-3

Seat No.	

Set P

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Day & Date: Saturday, 04-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Make suitable assumptions, if necessary.
2) Figures to the right indicate fill marks.
3) Q. No. 1 is compulsory; it should be solved in first 30 minutes in answer Book.
4) Answer MCQ/Objective type question on Page No.3 only. Don't forget to mention Q.P. Set (P/Q/R/S) on Top of Page.

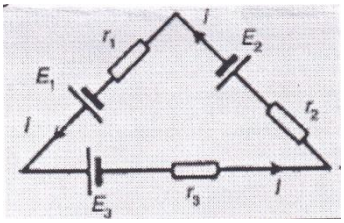
MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 MCQ / Objective Questions **14**

1) Power factor is defined as _____.
   a) Cosine of angle between voltage and current
   b) Ratio of true power to apparent power
   c) Both a and b
   d) R/C

2) Which of the following statements is true? For the circuit shown in Figure



   a) $E1 + E2 + E3 = Ir1 + Ir2 + I3r3$
   b) $E2 + E3 - E1 - I(r1 + r2 + r3) = 0$
   c) $I(r1 + r2 + r3) = E1 - E2 - E3$
   d) $E2 + E3 = E1 = Ir1 + Ir2 + Ir3$

3) The relation between the line and phase voltage of a delta connected circuit is given by _____.
   a) $V_L = V_P$ b) $V_L = \sqrt{3} * V_P$
   c) $V_L = V_P/\sqrt{2}$ d) $V_L = 2V_{p/r}$

4) Four identical resistors are first connected in parallel and then in series. The resultant resistance of the first combination to the second will be _____.
   a) 1/16 times b) 1/4 times
   c) 4 times d) 16 times

5) While comparing magnetic and electrical circuits, the permeance of magnetic circuit is compared with which parameter of electrical circuit?
   a) Resistance b) Conductance
   b) Conductivity d) Resistivity

6) Form factor for sinusoidal alternating current is _____.
   a) $\pi/2\sqrt{2}$ b) 1
   c) 1.11 d) 0.634

7) The peak value of a sinusoidal waveform is equal to _____.
   a) 0.637 $V_{average}$ b) 0.637 V_{rms}
   c) 0.707 V_{rms} d) 1.414 V_{rms}

8) A crystal diode is a _____device.
   a) Non-linear b) Bilateral
   c) Linear d) none of the above

9) LED do not require _____.
   a) Heating b) warm up time
   c) both a and b d) none of the above

10) The element that has biggest size in a transistor is _____.
   a) Collector b) Base
   c) Emitter d) collector-base junction

11) Photovoltaic cell is a_____ transducer.
   a) Active b) Passive
   c) Reactive d) None

12) Which of the following device cannot be used for temperature measurement?
   a) RTD b) Thermocouple
   c) Thermistor d) LVDT

13) In Boolean algebra, the dot sign (.) indicates _____.
   a) OR operation b) AND operation
   c) NOT operation d) none of the above

14) The decimal no. $(25.O2)_{10}$ is equivalent to binary no _____.
   a) $(11000.000001)_2$ b) $(10100.000)_2$
   c) $(11100.000001)_2$ d) $(11001.000001)_2$

Seat No.	

Set **P**

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Day & Date: Saturday, 04-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
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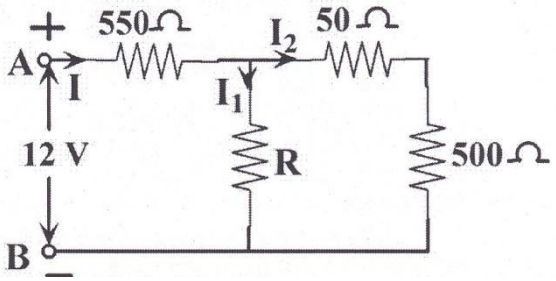
Section I

Q.2 Attempt any FOUR **16**

a) What is the value of unknown resistor R in figure below if the voltage drop across the 500 Ω resistor is 2.5 volts? All resistances are in ohm.



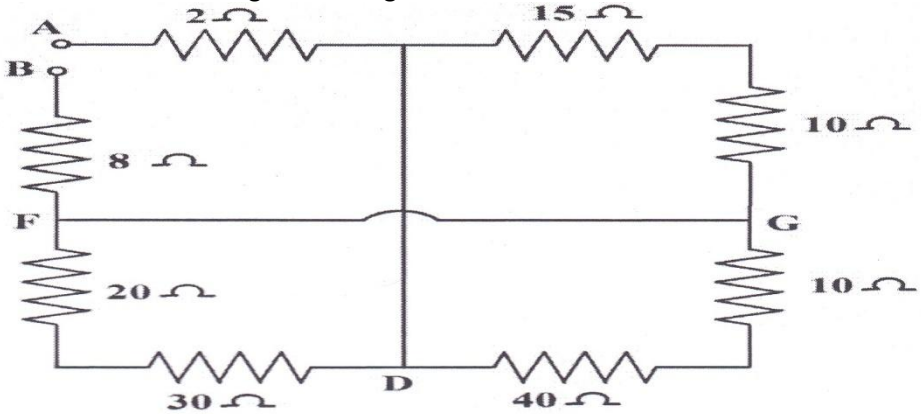
b) The load to a 3 phase supply consists of 3 similar coils connected in star. The line currents are 25A and KVA and KW inputs are 20 and 11 respectively. Find
1) Phase and line voltage
2) KVAR input
3) resistance and reactance of each coil

c) A single phase transformer has 350 primary & 1050 secondary turns. The primary is connected to 400 V, 50 Hz supply. If net cross sectional area of core is 50 cm^2. Find:
1) Maximum Value of Flux density in core
2) Voltage induced in secondary winding

d) Compare electric circuit and magnetic circuit with their similarities and dissimilarities.

e) Derive an expression for average value of an AC quantity.

f) Find R_{AB} in the circuit, given in fig.



Q.3 Solve any two: **12**

a) Derive the equation for converting delta resistances into equivalent star resistances.

b) A coil of 500 turns and resistance of 20 ohms is wound uniformly on an iron ring of mean circumference 50 cm & cross sectional area 4 cm^2. It is connected to 24 V DC supply. Relative permeability of material is 800. Find:

1) MMF
2) Magnetic field strength
3) Total flux
4) Reluctance

c) A coil of resistance of R = 50 Ω and inductance L = 29.8 mH and capacitance of C=3.4μ F are connected in series and supplied by 200 V, 50 Hz supply. Find :

1) The impedance of the circuit
2) Current flowing through the circuit
3) Power consumed in the circuit
4) Power factor of the circuit

Section II

Q.4 Attempt any FOUR **16**

a) State and explain intrinsic and extrinsic semiconductor.

b) Explain Avalanche and Zener breakdown mechanism in reverse biased diode with suitable circuit diagram.

c) Explain working of BJT as a switch.

d) Explain photoelectric pick up with suitable application.

e) Explain wire type strain gauge in details. What is gauge factor?

f) State and prove Demorgan's theorem.

Q.5 Attempt any two: **12**

a) Explain half wave rectifier with necessary diagrams. Derive an expression for:

1) Average value of DC voltage
2) RMS value of DC voltage
3) Rectification efficiency
4) Ripple factor

b) Draw and explain input-output characteristics for CE configuration. Compare different transistor configurations.

c) Explain symbol, equation and truth table for NAND and NOR gate. Derive Basic Gates using NOR gate.

SLR-FJ-3

Seat No.	

Set Q

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   a) Non-linear b) Bilateral
   c) Linear d) none of the above

2) LED do not require _____.
   a) Heating b) warm up time
   c) both a and b d) none of the above

3) The element that has biggest size in a transistor is _____.
   a) Collector b) Base
   c) Emitter d) collector-base junction

4) Photovoltaic cell is a_____ transducer.
   a) Active b) Passive
   c) Reactive d) None

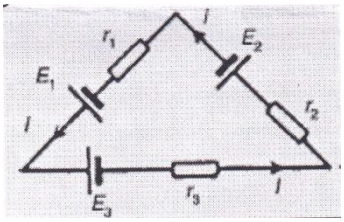
5) Which of the following device cannot be used for temperature measurement?
   a) RTD b) Thermocouple
   c) Thermistor d) LVDT

6) In Boolean algebra, the dot sign (.) indicates _____.
   a) OR operation b) AND operation
   c) NOT operation d) none of the above

7) The decimal no. $(25.O2)_{10}$ is equivalent to binary no _____.
   a) $(11000.000001)_2$ b) $(10100.000)_2$
   c) $(11100.000001)_2$ d) $(11001.000001)_2$

8) Power factor is defined as _____.
   a) Cosine of angle between voltage and current
   b) Ratio of true power to apparent power
   c) Both a and b
   d) R/C

9) Which of the following statements is true? For the circuit shown in Figure



a) $E1 + E2 + E3 = Ir1 + Ir2 + I3r3$
b) $E2 + E3 - E1 - I(r1 + r2 + r3) = 0$
c) $I(r1 + r2 + r3) = E1 - E2 - E3$
d) $E2 + E3 = E1 = Ir1 + Ir2 + Ir3$

10) The relation between the line and phase voltage of a delta connected circuit is given by _____.

a) $\mathrm{V_L} = \mathrm{V_P}$
b) $\mathrm{V_L} = \sqrt{3} * \mathrm{V_P}$
c) $\mathrm{V_L} = \mathrm{V_P}/\sqrt{2}$
d) $\mathrm{V_L} = 2\mathrm{V_{p/r}}$

11) Four identical resistors are first connected in parallel and then in series. The resultant resistance of the first combination to the second will be _____.

a) 1/16 times
b) 1/4 times
c) 4 times
d) 16 times

12) While comparing magnetic and electrical circuits, the permeance of magnetic circuit is compared with which parameter of electrical circuit?

a) Resistance
b) Conductance
b) Conductivity
d) Resistivity

13) Form factor for sinusoidal alternating current is _____.

a) $\pi/2\sqrt{2}$
b) 1
c) 1.11
d) 0.634

14) The peak value of a sinusoidal waveform is equal to _____.

a) 0.637 $V_{average}$
b) 0.637 V_{rms}
c) 0.707 V_{rms}
d) 1.414 V_{rms}

SLR-FJ-3

Seat No.	

Set Q

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC ELECTRICAL & ELECTRONICS ENGINEERING

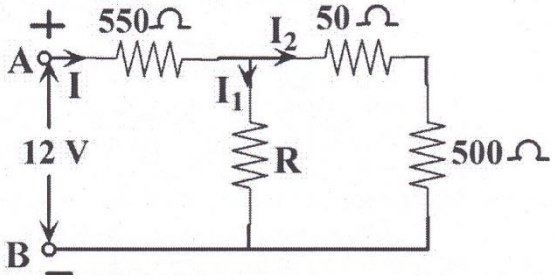
Day & Date: Saturday, 04-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate fill marks.

Section I

Q.2 Attempt any FOUR **16**

a) What is the value of unknown resistor R in figure below if the voltage drop across the 500 Ω resistor is 2.5 volts? All resistances are in ohm.



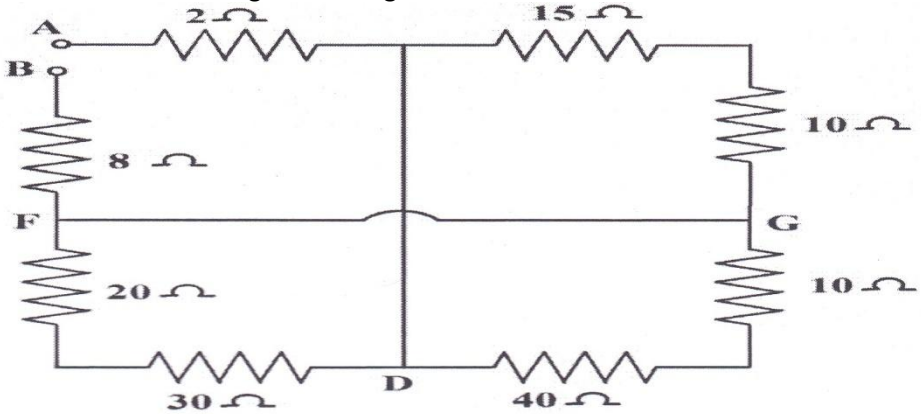
b) The load to a 3 phase supply consists of 3 similar coils connected in star. The line currents are 25A and KVA and KW inputs are 20 and 11 respectively. Find
1) Phase and line voltage
2) KVAR input
3) resistance and reactance of each coil

c) A single phase transformer has 350 primary & 1050 secondary turns. The primary is connected to 400 V, 50 Hz supply. If net cross sectional area of core is 50 cm^2. Find:
1) Maximum Value of Flux density in core
2) Voltage induced in secondary winding

d) Compare electric circuit and magnetic circuit with their similarities and dissimilarities.

e) Derive an expression for average value of an AC quantity.

f) Find R_{AB} in the circuit, given in fig.



Q.3 Solve any two: **12**

a) Derive the equation for converting delta resistances into equivalent star resistances.

b) A coil of 500 turns and resistance of 20 ohms is wound uniformly on an iron ring of mean circumference 50 cm & cross sectional area 4 cm^2. It is connected to 24 V DC supply. Relative permeability of material is 800. Find:

1) MMF
2) Magnetic field strength
3) Total flux
4) Reluctance

c) A coil of resistance of R = 50 Ω and inductance L = 29.8 mH and capacitance of C=3.4μ F are connected in series and supplied by 200 V, 50 Hz supply. Find :

1) The impedance of the circuit
2) Current flowing through the circuit
3) Power consumed in the circuit
4) Power factor of the circuit

Section II

Q.4 Attempt any FOUR **16**

a) State and explain intrinsic and extrinsic semiconductor.

b) Explain Avalanche and Zener breakdown mechanism in reverse biased diode with suitable circuit diagram.

c) Explain working of BJT as a switch.

d) Explain photoelectric pick up with suitable application.

e) Explain wire type strain gauge in details. What is gauge factor?

f) State and prove Demorgan's theorem.

Q.5 Attempt any two: **12**

a) Explain half wave rectifier with necessary diagrams. Derive an expression for:

1) Average value of DC voltage
2) RMS value of DC voltage
3) Rectification efficiency
4) Ripple factor

b) Draw and explain input-output characteristics for CE configuration. Compare different transistor configurations.

c) Explain symbol, equation and truth table for NAND and NOR gate. Derive Basic Gates using NOR gate.

SLR-FJ-3

Seat No.	

Set R

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Day & Date: Saturday, 04-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Make suitable assumptions, if necessary.
2) Figures to the right indicate fill marks.
3) Q. No. 1 is compulsory; it should be solved in first 30 minutes in answer Book.
4) Answer MCQ/Objective type question 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

Q.1 MCQ / Objective Questions **14**

1) Photovoltaic cell is a_____ transducer.
   a) Active b) Passive
   c) Reactive d) None

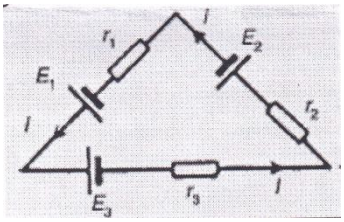
2) Which of the following device cannot be used for temperature measurement?
   a) RTD b) Thermocouple
   c) Thermistor d) LVDT

3) In Boolean algebra, the dot sign (.) indicates _____.
   a) OR operation b) AND operation
   c) NOT operation d) none of the above

4) The decimal no. $(25.O2)_{10}$ is equivalent to binary no _____.
   a) $(11000.000001)_2$ b) $(10100.000)_2$
   c) $(11100.000001)_2$ d) $(11001.000001)_2$

5) Power factor is defined as _____.
   a) Cosine of angle between voltage and current
   b) Ratio of true power to apparent power
   c) Both a and b
   d) R/C

6) Which of the following statements is true? For the circuit shown in Figure



   a) $E1 + E2 + E3 = Ir1 + Ir2 + I3r3$
   b) $E2 + E3 - E1 - I(r1 + r2 + r3) = 0$
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7) The relation between the line and phase voltage of a delta connected circuit is given by _____.
   a) $V_L = V_P$ b) $V_L = \sqrt{3} * V_P$
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8) Four identical resistors are first connected in parallel and then in series. The resultant resistance of the first combination to the second will be _____.

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13) LED do not require _____.

a) Heating
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14) The element that has biggest size in a transistor is _____.

a) Collector
b) Base
c) Emitter
d) collector-base junction

SLR-FJ-3

Seat No.	

Set R

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Day & Date: Saturday, 04-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate fill marks.

Section I

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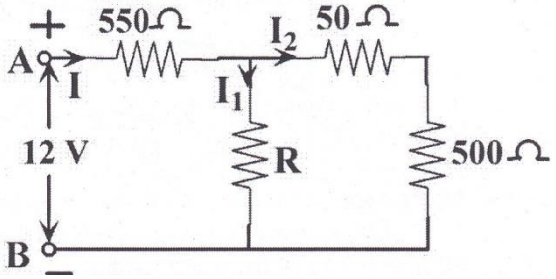
a) What is the value of unknown resistor R in figure below if the voltage drop across the 500 Ω resistor is 2.5 volts? All resistances are in ohm.



b) The load to a 3 phase supply consists of 3 similar coils connected in star. The line currents are 25A and KVA and KW inputs are 20 and 11 respectively. Find
1) Phase and line voltage
2) KVAR input
3) resistance and reactance of each coil

c) A single phase transformer has 350 primary & 1050 secondary turns. The primary is connected to 400 V, 50 Hz supply. If net cross sectional area of core is 50 cm^2. Find:
1) Maximum Value of Flux density in core
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d) Compare electric circuit and magnetic circuit with their similarities and dissimilarities.

e) Derive an expression for average value of an AC quantity.

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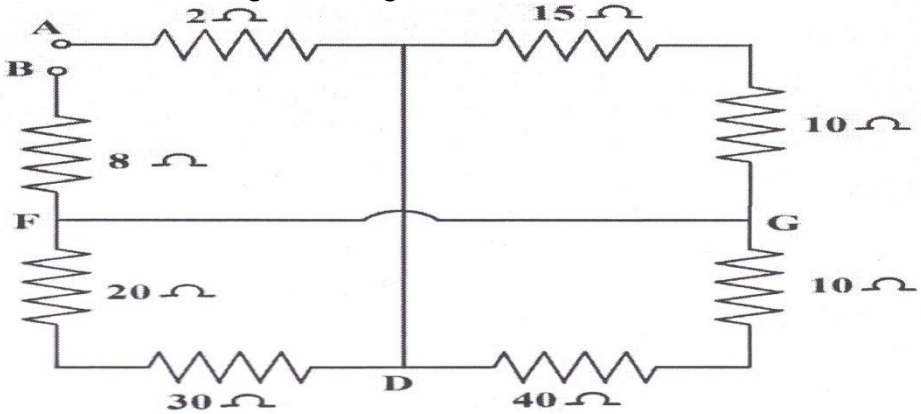

Q.3 Solve any two: **12**

a) Derive the equation for converting delta resistances into equivalent star resistances.

b) A coil of 500 turns and resistance of 20 ohms is wound uniformly on an iron ring of mean circumference 50 cm & cross sectional area 4 cm^2. It is connected to 24 V DC supply. Relative permeability of material is 800. Find:

1) MMF
2) Magnetic field strength
3) Total flux
4) Reluctance

c) A coil of resistance of R = 50 Ω and inductance L = 29.8 mH and capacitance of C=3.4μ F are connected in series and supplied by 200 V, 50 Hz supply. Find :

1) The impedance of the circuit
2) Current flowing through the circuit
3) Power consumed in the circuit
4) Power factor of the circuit

Section II

Q.4 Attempt any FOUR **16**

a) State and explain intrinsic and extrinsic semiconductor.

b) Explain Avalanche and Zener breakdown mechanism in reverse biased diode with suitable circuit diagram.

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c) Explain symbol, equation and truth table for NAND and NOR gate. Derive Basic Gates using NOR gate.

SLR-FJ-3

Seat No.		Set	S

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Day & Date: Saturday, 04-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Make suitable assumptions, if necessary.
2) Figures to the right indicate fill marks.
3) Q. No. 1 is compulsory; it should be solved in first 30 minutes in answer Book.
4) Answer MCQ/Objective type question 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

Q.1 MCQ / Objective Questions **14**

1) Form factor for sinusoidal alternating current is _____.
   a) $\pi/2\sqrt{2}$ b) 1
   c) 1.11 d) 0.634

2) The peak value of a sinusoidal waveform is equal to _____.
   a) 0.637 $V_{average}$ b) 0.637 V_{rms}
   c) 0.707 V_{rms} d) 1.414 V_{rms}

3) A crystal diode is a _____device.
   a) Non-linear b) Bilateral
   c) Linear d) none of the above

4) LED do not require _____.
   a) Heating b) warm up time
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5) The element that has biggest size in a transistor is _____.
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6) Photovoltaic cell is a_____ transducer.
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7) Which of the following device cannot be used for temperature measurement?
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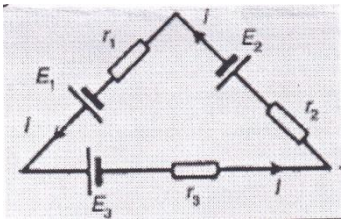

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   c) 4 times
   d) 16 times

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   a) Resistance
   b) Conductance
   b) Conductivity
   d) Resistivity

Seat No.	

Set **S**

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC ELECTRICAL & ELECTRONICS ENGINEERING

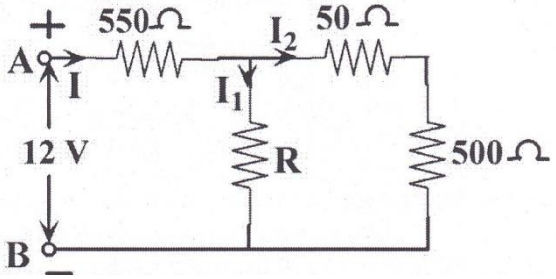
Day & Date: Saturday, 04-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate fill marks.

Section I

Q.2 Attempt any FOUR **16**

a) What is the value of unknown resistor R in figure below if the voltage drop across the 500 Ω resistor is 2.5 volts? All resistances are in ohm.



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c) A single phase transformer has 350 primary & 1050 secondary turns. The primary is connected to 400 V, 50 Hz supply. If net cross sectional area of core is 50 cm^2. Find:
1) Maximum Value of Flux density in core
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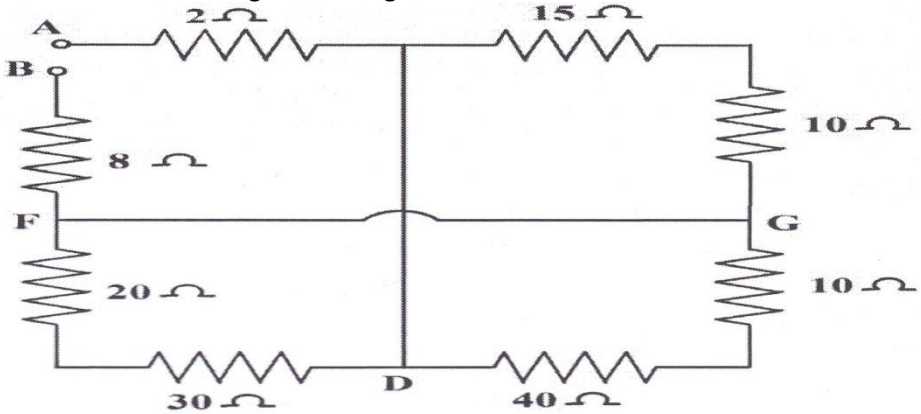
d) Compare electric circuit and magnetic circuit with their similarities and dissimilarities.

e) Derive an expression for average value of an AC quantity.

f) Find R_{AB} in the circuit, given in fig.



Q.3 Solve any two: **12**

a) Derive the equation for converting delta resistances into equivalent star resistances.

b) A coil of 500 turns and resistance of 20 ohms is wound uniformly on an iron ring of mean circumference 50 cm & cross sectional area 4 cm^2. It is connected to 24 V DC supply. Relative permeability of material is 800. Find:

1) MMF
2) Magnetic field strength
3) Total flux
4) Reluctance

c) A coil of resistance of R = 50 Ω and inductance L = 29.8 mH and capacitance of C=3.4μ F are connected in series and supplied by 200 V, 50 Hz supply. Find :

1) The impedance of the circuit
2) Current flowing through the circuit
3) Power consumed in the circuit
4) Power factor of the circuit

Section II

Q.4 Attempt any FOUR **16**

a) State and explain intrinsic and extrinsic semiconductor.

b) Explain Avalanche and Zener breakdown mechanism in reverse biased diode with suitable circuit diagram.

c) Explain working of BJT as a switch.

d) Explain photoelectric pick up with suitable application.

e) Explain wire type strain gauge in details. What is gauge factor?

f) State and prove Demorgan's theorem.

Q.5 Attempt any two: **12**

a) Explain half wave rectifier with necessary diagrams. Derive an expression for:

1) Average value of DC voltage
2) RMS value of DC voltage
3) Rectification efficiency
4) Ripple factor

b) Draw and explain input-output characteristics for CE configuration. Compare different transistor configurations.

c) Explain symbol, equation and truth table for NAND and NOR gate. Derive Basic Gates using NOR gate.

SLR-FJ-4

Seat No.	

Set P

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC MECHANICAL ENGINEERING

Day & Date: Monday, 06-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.1 is compulsory.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Multiple choice questions: **14**

1) In a refrigeration cycle the heat is rejected by refrigerant in _____.
   a) Evaporator b) Condenser
   c) Compressor d) Expansion valve

2) For a closed system, the difference between the heat added to the system and work done by the gas, is equal to the change in _____.
   a) enthalpy b) entropy
   c) internal energy d) temperature

3) Joules experiment gives us which law of thermodynamics _____.
   a) third b) second
   c) first d) zeroth

4) Equal volume of all gases, at the same temperature and pressure, contain equal number of molecules. This is according to _____.
   a) Charle's law b) Avagadro's law
   c) Joule's law d) Gay Lussac law

5) During throttling process _____.
   a) internal energy does not change b) pressure does not change
   c) entropy does not change d) enthalpy does not change

6) A process, in which the working substance neither receives nor gives out heat to its surroundings during its expansion or contraction, is known as
   a) isothermal process b) isentropic process
   c) polytropic process d) adiabatic process

7) For viscous discharge like oil which one pump is used _____.
   a) Reciprocating pumps b) Rotary-(centrifugal) pump
   c) Gear pump d) depend on type of compressor

8) For reaction water turbine which turbine is used _____.
   a) pelton turbine b) Francis turbine
   c) Kaplan turbine d) both b and c

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

10) In a four stroke engine maximum temperature inside the engine cylinder is
   a) beginning of power stroke
   b) end of power stroke
   c) beginning compression stroke
   d) end of exhaust stroke

11) Idler pulley is used for _____.
   a) maintaining belt tension
   b) changing direction of rotation
   c) stopping motion completely
   d) all of the above

12) The gears used to connect two non-parallel and intersecting are known as
   a) spiral gears
   b) bevel gears
   c) spur gears
   d) helical gears

13) The persons height, weight is considered while designing product for persons easy handling with easiness and comfortness in following:
   a) ergonomic consideration
   b) thermodynamics
   c) air condition
   d) aesthetic considerations

14) Which of the following is unitless
   a) Stress
   b) Strain
   c) young's modulus
   d) none of the above

SLR-FJ-4

Seat No.	

Set P

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC MECHANICAL ENGINEERING

Day & Date: Monday, 06-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

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 question.
5) Q. 3 and Q. 5 are long answer type question.
6) Use of log tables and non-programmable single memory calculator is Allowed.

Section I

Q.2 Answer any five of the following: **15**

a) State and explain Kelvin Plank and Clausius statement.
b) Enlist different forms of work. Explain displacement work briefly.
c) Define Thermodynamic system. State the types of system. Explain any one of them with example.
d) For reversible adiabatic process prove that $P V^{\gamma} = C$
e) Compare Impulse and Reaction Turbine.
f) Explain with neat sketch Reciprocating type compressor.
g) Compare between PWR and BWR.

Q.3 Solve any one out of a) and b) and solve any two out of c) to f) **13**

a) In a steady flow machine 420kW of work is done by the machine. The flow rate of fluid is 8 kg/sec. The Specific Volume of the fluid, pressure and velocity at the inlet are 0.35m^3/kg, 8 bar and 28 m/sec. The inlet is 32m above the floor and discharge is at the floor level. The discharge conditions are 0.65 m^3/kg, 2 bar and 280 m/sec respectively. The total heat loss between inlet and discharge is 14 kJ/kg of the fluid. Find the change in Specific internal energy. **05**

b) Explain with neat sketch working of Hydro-Electric Power plant. State its advantage and disadvantages. **05**

c) Volume of 0.2 m^3 of air at pressure of 1.5 bar is expanded isothermally to 0.5 m^3. Calculate final pressure of gas and heat supplied during process. **04**

d) Explain with neat sketch, construction and working of Francis Turbine. **04**

e) Explain function of economizer, super heater and air preheater in a Boiler. **04**

f) During certain reversible process volume changes from 0.5m^3 to 1.5m^3 The law of the process is P= (3/V) + 15, where 'p' is in bar and 'V' is m^3. System rejects 40 KJ heat. Determine work done and change in internal energy. **04**

Section II

Q.4 Solve any five out of seven: **15**

a) Classification of I.C. engine.

b) Diesel engine has compression ratio of 15 and heat addition at constant pressure take place at 6% of stroke. Find the air standard efficiency of the engine. Take γ for air as 1.4

c) Write difference between open belt drive and chain drive.

d) Derive an expression for length of belt for open belt drive.

e) Explain the following terms (any three): i) Tensile stress ii) Compressive stress iii) Shear stress iv) Shear modulus.

f) Write note on selection of material for engineering application.

g) Compare electric resistance and electric arc welding.

Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f): 12

a) In an SI engine working on the ideal Otto cycle, the compression ratio is 5.5. The pressure and temperature at the beginning of compression are 1 bar and 27° C respectively. The maximum pressure in cycle is 30 bar. Determine pressure, temperature at the salient points, the air standard efficiency **05**

b) Explain the construction, working and application of Horizontal Milling machine. **05**

c) An open belt drives whose shafts are separated by a distance of 5 m. The diameter of the large pulley is 1.5 m and that of smaller pulley is 1m. The initial tension in the belt when stationary is 3 kN. The mass of belt is 1.5 kg/m length. The coefficient of friction between belt and pulley is 0.3. Taking centrifugal tension in to account calculate power transmitted when the smaller pulley rotates at 450 rpm **04**

d) Explain ergonomic consideration in design of mechanical component. **04**

e) Explain with neat sketch Pillar type of drilling machine. **04**

f) Explain with neat sketch oxyacetylene gas welding. **04**

SLR-FJ-4

Seat No.	

Set Q

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC MECHANICAL ENGINEERING

Day & Date: Monday, 06-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.1 is compulsory.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Multiple choice questions: **14**

1) For reaction water turbine which turbine is used _____.
   a) pelton turbine b) Francis turbine
   c) Kaplan turbine d) both b and c

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

3) In a four stroke engine maximum temperature inside the engine cylinder is
   a) beginning of power stroke
   b) end of power stroke
   c) beginning compression stroke
   d) end of exhaust stroke

4) Idler pulley is used for _____.
   a) maintaining belt tension b) changing direction of rotation
   c) stopping motion completely d) all of the above

5) The gears used to connect two non-parallel and intersecting are known as
   a) spiral gears b) bevel gears
   c) spur gears d) helical gears

6) The persons height, weight is considered while designing product for persons easy handling with easiness and comfortness in following:
   a) ergonomic consideration b) thermodynamics
   c) air condition d) aesthetic considerations

7) Which of the following is unitless
   a) Stress b) Strain
   c) young's modulus d) none of the above

8) In a refrigeration cycle the heat is rejected by refrigerant in _____.
   a) Evaporator b) Condenser
   c) Compressor d) Expansion valve

9) For a closed system, the difference between the heat added to the system and work done by the gas, is equal to the change in _____.
   a) enthalpy b) entropy
   c) internal energy d) temperature

10) Joules experiment gives us which law of thermodynamics _____.
   a) third b) second
   c) first d) zeroth

11) Equal volume of all gases, at the same temperature and pressure, contain equal number of molecules. This is according to _____.
   a) Charle's law
   b) Avagadro's law
   c) Joule's law
   d) Gay Lussac law

12) During throttling process _____.
   a) internal energy does not change
   b) pressure does not change
   c) entropy does not change
   d) enthalpy does not change

13) A process, in which the working substance neither receives nor gives out heat to its surroundings during its expansion or contraction, is known as
   a) isothermal process
   b) isentropic process
   c) polytropic process
   d) adiabatic process

14) For viscous discharge like oil which one pump is used _____.
   a) Reciprocating pumps
   b) Rotary-(centrifugal) pump
   c) Gear pump
   d) depend on type of compressor

SLR-FJ-4

Seat No.	

Set Q

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC MECHANICAL ENGINEERING

Day & Date: Monday, 06-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

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 question.
5) Q. 3 and Q. 5 are long answer type question.
6) Use of log tables and non-programmable single memory calculator is Allowed.

Section I

Q.2 Answer any five of the following: **15**

a) State and explain Kelvin Plank and Clausius statement.
b) Enlist different forms of work. Explain displacement work briefly.
c) Define Thermodynamic system. State the types of system. Explain any one of them with example.
d) For reversible adiabatic process prove that $P V^{\gamma} = C$
e) Compare Impulse and Reaction Turbine.
f) Explain with neat sketch Reciprocating type compressor.
g) Compare between PWR and BWR.

Q.3 Solve any one out of a) and b) and solve any two out of c) to f) **13**

a) In a steady flow machine 420kW of work is done by the machine. The flow rate of fluid is 8 kg/sec. The Specific Volume of the fluid, pressure and velocity at the inlet are 0.35m^3/kg, 8 bar and 28 m/sec. The inlet is 32m above the floor and discharge is at the floor level. The discharge conditions are 0.65 m^3/kg, 2 bar and 280 m/sec respectively. The total heat loss between inlet and discharge is 14 kJ/kg of the fluid. Find the change in Specific internal energy. **05**

b) Explain with neat sketch working of Hydro-Electric Power plant. State its advantage and disadvantages. **05**

c) Volume of 0.2 m^3 of air at pressure of 1.5 bar is expanded isothermally to 0.5 m^3. Calculate final pressure of gas and heat supplied during process. **04**

d) Explain with neat sketch, construction and working of Francis Turbine. **04**

e) Explain function of economizer, super heater and air preheater in a Boiler. **04**

f) During certain reversible process volume changes from 0.5m^3 to 1.5m^3 The law of the process is P= (3/V) + 15, where 'p' is in bar and 'V' is m^3. System rejects 40 KJ heat. Determine work done and change in internal energy. **04**

Section II

Q.4 Solve any five out of seven: **15**

a) Classification of I.C. engine.

b) Diesel engine has compression ratio of 15 and heat addition at constant pressure take place at 6% of stroke. Find the air standard efficiency of the engine. Take γ for air as 1.4

c) Write difference between open belt drive and chain drive.

d) Derive an expression for length of belt for open belt drive.

e) Explain the following terms (any three): i) Tensile stress ii) Compressive stress iii) Shear stress iv) Shear modulus.

f) Write note on selection of material for engineering application.

g) Compare electric resistance and electric arc welding.

Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f): 12

a) In an SI engine working on the ideal Otto cycle, the compression ratio is 5.5. The pressure and temperature at the beginning of compression are 1 bar and 27° C respectively. The maximum pressure in cycle is 30 bar. Determine pressure, temperature at the salient points, the air standard efficiency **05**

b) Explain the construction, working and application of Horizontal Milling machine. **05**

c) An open belt drives whose shafts are separated by a distance of 5 m. The diameter of the large pulley is 1.5 m and that of smaller pulley is 1m. The initial tension in the belt when stationary is 3 kN. The mass of belt is 1.5 kg/m length. The coefficient of friction between belt and pulley is 0.3. Taking centrifugal tension in to account calculate power transmitted when the smaller pulley rotates at 450 rpm **04**

d) Explain ergonomic consideration in design of mechanical component. **04**

e) Explain with neat sketch Pillar type of drilling machine. **04**

f) Explain with neat sketch oxyacetylene gas welding. **04**

SLR-FJ-4

Seat No.	

Set R

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC MECHANICAL ENGINEERING

Day & Date: Monday, 06-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.1 is compulsory.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Multiple choice questions: **14**

1) Idler pulley is used for _____.
   a) maintaining belt tension b) changing direction of rotation
   c) stopping motion completely d) all of the above

2) The gears used to connect two non-parallel and intersecting are known as
   a) spiral gears b) bevel gears
   c) spur gears d) helical gears

3) The persons height, weight is considered while designing product for persons easy handling with easiness and comfortness in following:
   a) ergonomic consideration b) thermodynamics
   c) air condition d) aesthetic considerations

4) Which of the following is unitless
   a) Stress b) Strain
   c) young's modulus d) none of the above

5) In a refrigeration cycle the heat is rejected by refrigerant in _____.
   a) Evaporator b) Condenser
   c) Compressor d) Expansion valve

6) For a closed system, the difference between the heat added to the system and work done by the gas, is equal to the change in _____.
   a) enthalpy b) entropy
   c) internal energy d) temperature

7) Joules experiment gives us which law of thermodynamics _____.
   a) third b) second
   c) first d) zeroth

8) Equal volume of all gases, at the same temperature and pressure, contain equal number of molecules. This is according to _____.
   a) Charle's law b) Avagadro's law
   c) Joule's law d) Gay Lussac law

9) During throttling process _____.
   a) internal energy does not change b) pressure does not change
   c) entropy does not change d) enthalpy does not change

10) A process, in which the working substance neither receives nor gives out heat to its surroundings during its expansion or contraction, is known as
   a) isothermal process b) isentropic process
   c) polytropic process d) adiabatic process

11) For viscous discharge like oil which one pump is used _____.
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   c) Gear pump
   d) depend on type of compressor

12) For reaction water turbine which turbine is used _____.
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   b) Francis turbine
   c) Kaplan turbine
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13) Draft tube is used for _____.
   a) To increase kinetic energy water striking to turbine
   b) To decrease pressure energy water leaving tailrace
   c) To increase pressure energy water leaving tailrace
   d) None of these

14) In a four stroke engine maximum temperature inside the engine cylinder is
   a) beginning of power stroke
   b) end of power stroke
   c) beginning compression stroke
   d) end of exhaust stroke

SLR-FJ-4

Seat No.	

Set R

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC MECHANICAL ENGINEERING

Day & Date: Monday, 06-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

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 question.
5) Q. 3 and Q. 5 are long answer type question.
6) Use of log tables and non-programmable single memory calculator is Allowed.

Section I

Q.2 Answer any five of the following: **15**

a) State and explain Kelvin Plank and Clausius statement.
b) Enlist different forms of work. Explain displacement work briefly.
c) Define Thermodynamic system. State the types of system. Explain any one of them with example.
d) For reversible adiabatic process prove that $P V^{\gamma} = C$
e) Compare Impulse and Reaction Turbine.
f) Explain with neat sketch Reciprocating type compressor.
g) Compare between PWR and BWR.

Q.3 Solve any one out of a) and b) and solve any two out of c) to f) **13**

a) In a steady flow machine 420kW of work is done by the machine. The flow rate of fluid is 8 kg/sec. The Specific Volume of the fluid, pressure and velocity at the inlet are 0.35m^3/kg, 8 bar and 28 m/sec. The inlet is 32m above the floor and discharge is at the floor level. The discharge conditions are 0.65 m^3/kg, 2 bar and 280 m/sec respectively. The total heat loss between inlet and discharge is 14 kJ/kg of the fluid. Find the change in Specific internal energy. **05**

b) Explain with neat sketch working of Hydro-Electric Power plant. State its advantage and disadvantages. **05**

c) Volume of 0.2 m^3 of air at pressure of 1.5 bar is expanded isothermally to 0.5 m^3. Calculate final pressure of gas and heat supplied during process. **04**

d) Explain with neat sketch, construction and working of Francis Turbine. **04**

e) Explain function of economizer, super heater and air preheater in a Boiler. **04**

f) During certain reversible process volume changes from 0.5m^3 to 1.5m^3 The law of the process is P= (3/V) + 15, where 'p' is in bar and 'V' is m^3. System rejects 40 KJ heat. Determine work done and change in internal energy. **04**

Section II

Q.4 Solve any five out of seven: **15**

a) Classification of I.C. engine.

b) Diesel engine has compression ratio of 15 and heat addition at constant pressure take place at 6% of stroke. Find the air standard efficiency of the engine. Take γ for air as 1.4

c) Write difference between open belt drive and chain drive.

d) Derive an expression for length of belt for open belt drive.

e) Explain the following terms (any three): i) Tensile stress ii) Compressive stress iii) Shear stress iv) Shear modulus.

f) Write note on selection of material for engineering application.

g) Compare electric resistance and electric arc welding.

Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f): 12

a) In an SI engine working on the ideal Otto cycle, the compression ratio is 5.5. The pressure and temperature at the beginning of compression are 1 bar and 27° C respectively. The maximum pressure in cycle is 30 bar. Determine pressure, temperature at the salient points, the air standard efficiency **05**

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c) An open belt drives whose shafts are separated by a distance of 5 m. The diameter of the large pulley is 1.5 m and that of smaller pulley is 1m. The initial tension in the belt when stationary is 3 kN. The mass of belt is 1.5 kg/m length. The coefficient of friction between belt and pulley is 0.3. Taking centrifugal tension in to account calculate power transmitted when the smaller pulley rotates at 450 rpm **04**

d) Explain ergonomic consideration in design of mechanical component. **04**

e) Explain with neat sketch Pillar type of drilling machine. **04**

f) Explain with neat sketch oxyacetylene gas welding. **04**

SLR-FJ-4

Seat No.	

Set S

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC MECHANICAL ENGINEERING

Day & Date: Monday, 06-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q.1 is compulsory.
3) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Multiple choice questions: **14**

1) A process, in which the working substance neither receives nor gives out heat to its surroundings during its expansion or contraction, is known as
   a) isothermal process b) isentropic process
   c) polytropic process d) adiabatic process

2) For viscous discharge like oil which one pump is used _____.
   a) Reciprocating pumps b) Rotary-(centrifugal) pump
   c) Gear pump d) depend on type of compressor

3) For reaction water turbine which turbine is used _____.
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4) Draft tube is used for _____.
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   c) To increase pressure energy water leaving tailrace
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5) In a four stroke engine maximum temperature inside the engine cylinder is
   a) beginning of power stroke
   b) end of power stroke
   c) beginning compression stroke
   d) end of exhaust stroke

6) Idler pulley is used for _____.
   a) maintaining belt tension b) changing direction of rotation
   c) stopping motion completely d) all of the above

7) The gears used to connect two non-parallel and intersecting are known as
   a) spiral gears b) bevel gears
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8) The persons height, weight is considered while designing product for persons easy handling with easiness and comfortness in following:
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   c) internal energy
   d) temperature

12) Joules experiment gives us which law of thermodynamics _____.
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13) Equal volume of all gases, at the same temperature and pressure, contain equal number of molecules. This is according to _____.
   a) Charle's law
   b) Avagadro's law
   c) Joule's law
   d) Gay Lussac law

14) During throttling process _____.
   a) internal energy does not change
   b) pressure does not change
   c) entropy does not change
   d) enthalpy does not change

SLR-FJ-4

Seat No.		Set	S

F.Y. (B. Tech) (Semester - I) (New) (CBCS) Examination March/April-2019
BASIC MECHANICAL ENGINEERING

Day & Date: Monday, 06-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

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 question.
5) Q. 3 and Q. 5 are long answer type question.
6) Use of log tables and non-programmable single memory calculator is Allowed.

Section I

Q.2 Answer any five of the following: **15**

a) State and explain Kelvin Plank and Clausius statement.
b) Enlist different forms of work. Explain displacement work briefly.
c) Define Thermodynamic system. State the types of system. Explain any one of them with example.
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b) Explain with neat sketch working of Hydro-Electric Power plant. State its advantage and disadvantages. **05**

c) Volume of 0.2 m^3 of air at pressure of 1.5 bar is expanded isothermally to 0.5 m^3. Calculate final pressure of gas and heat supplied during process. **04**

d) Explain with neat sketch, construction and working of Francis Turbine. **04**

e) Explain function of economizer, super heater and air preheater in a Boiler. **04**

f) During certain reversible process volume changes from 0.5m^3 to 1.5m^3 The law of the process is P= (3/V) + 15, where 'p' is in bar and 'V' is m^3. System rejects 40 KJ heat. Determine work done and change in internal energy. **04**

Section II

Q.4 Solve any five out of seven: **15**

a) Classification of I.C. engine.

b) Diesel engine has compression ratio of 15 and heat addition at constant pressure take place at 6% of stroke. Find the air standard efficiency of the engine. Take γ for air as 1.4

c) Write difference between open belt drive and chain drive.

d) Derive an expression for length of belt for open belt drive.

e) Explain the following terms (any three): i) Tensile stress ii) Compressive stress iii) Shear stress iv) Shear modulus.

f) Write note on selection of material for engineering application.

g) Compare electric resistance and electric arc welding.

Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f): 12

a) In an SI engine working on the ideal Otto cycle, the compression ratio is 5.5. The pressure and temperature at the beginning of compression are 1 bar and 27° C respectively. The maximum pressure in cycle is 30 bar. Determine pressure, temperature at the salient points, the air standard efficiency **05**

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c) An open belt drives whose shafts are separated by a distance of 5 m. The diameter of the large pulley is 1.5 m and that of smaller pulley is 1m. The initial tension in the belt when stationary is 3 kN. The mass of belt is 1.5 kg/m length. The coefficient of friction between belt and pulley is 0.3. Taking centrifugal tension in to account calculate power transmitted when the smaller pulley rotates at 450 rpm **04**

d) Explain ergonomic consideration in design of mechanical component. **04**

e) Explain with neat sketch Pillar type of drilling machine. **04**

f) Explain with neat sketch oxyacetylene gas welding. **04**

SLR-FJ-5

Seat No.	

Set P

F.Y. (B.Tech.) (Semester - II) (New)(CBCS) Examination March/April-2019
ENGINEERING MATHEMATICS - II

Day & Date: Friday, 10-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of non programmable calculator is allowed.
3) Q. no. 1 is compulsory & it should be solved in first 30 minutes in answer book page no.3. Each question carries one mark.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Multiple choice questions **14**

1) The integrating factor of the differential equation $x\frac{dy}{dx} + (1+x)\,y = e^x$ is
   a) $x \log x$ b) $x + e^x$
   c) xe^{-x} d) xe^x

2) The solution of $\frac{dy}{dx} = -\frac{x^2}{y^2}$ at $x = 1$ and $y = 0$ is
   a) $x^3 + y^3 = 0$ b) $x^3 - y^3 = 1$
   c) $x^3 + y^3 = 3$ d) $x^3 + y^3 = 1$

3) The series $\Sigma\frac{1}{n^p}$, $P > 1$ is
   a) Convergent b) Divergent
   c) Oscillatory d) absolutely convergent

4) In D'Alemberts ratio test if $\lim_{n\to\infty} \frac{u_n}{u_{n+1}} = 1$ then
   a) $\Sigma\, u_n$ converges b) $\Sigma\, u_n$ diverges
   c) the test fail d) $\Sigma\, u_n$ is oscillatory

5) $[\cos\theta - i\sin\theta]^4 =$ _____.
   a) $\sin 4\theta - i\cos 4\theta$ b) $\cos 4\theta + i\sin 4\theta$
   c) $\cos 4\theta - i\sin 4\theta$ d) $\sin 4\theta + i\cos 4\theta$

6) $\sin ix =$ _____.
   a) $\sin hx$ b) $i\sin x$
   c) $-\sin ix$ d) $i\sin hx$

7) Analytic function is also called as _____.
   a) holomorphic b) irregular
   c) harmonic d) Laplace

8) $\frac{B(m+1,n)}{B(m,n)}$ is equal to _____.
   a) $\frac{m}{n}$ b) $\frac{m+1}{n}$
   c) $\frac{m-1}{n}$ d) $\frac{m}{m+n}$

9) The value of $\int_0^\infty \frac{e^{-x}}{x}\,dx$ is _____.
   a) 0 b) ∞
   c) -1 d) 1

10) For the curve $y^2(1+x) = x^2(1-x)$, the origin is a _____.

a) node b) cusp

c) conjugate point d) isolated point

11) The numbers of loops of $r = a\sin 2\theta$ are _____.

a) two b) three

c) four d) eight

12) For $\int_0^\infty \int_x^\infty f(x,y)\, dydx$ by the change of order of integration we get ___.

a) $\int_0^\infty \int_0^x f(x,y)\, dxdy$ b) $\int_x^\infty \int_0^\infty f(x,y)\, dxdy$

c) $\int_0^\infty \int_y^\infty f(x,y)\, dxdy$ d) $\int_0^\infty \int_0^y f(x,y)\, dxdy$

13) The value of $\int_0^{\pi/2} \int_0^{\pi/2} sin\ (x+y)\, dx\, dy$ is _____.

a) 0 b) 2

c) π d) -2

14) The total mass of the lamina $0 \le x \le 1$, $0 \le y \le 1$ with density at any point equal to xy is _____.

a) 4 b) 2

c) $\frac{1}{2}$ d) $\frac{1}{4}$

SLR-FJ-5

Seat No.	

Set P

F.Y. (B.Tech.) (Semester - II) (New)(CBCS) Examination March/April-2019
ENGINEERING MATHEMATICS - II

Day & Date: Friday, 10-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of non programmable calculator is allowed.
3) Figures to the right indicate full marks.

Section - I

Q.2 Attempt any three: **09**

a) Solve: $(x-3y+4)dx=(2x-6y+1)dy$

b) Solve: $\frac{dy}{dx}=\frac{y}{2y\log y+y-x}$

c) Solve: $\frac{dy}{dx}+(2x\,tan^{-1}y-x^3)(1+y^2)=0$

d) Solve: $x^5=1+i$

e) Test the convergence of $\Sigma\frac{3^n}{2^{n+3}}$

Q.3 Attempt any three: **09**

a) Find the orthogonal trajectories of $x^2+y^2+2gx+c=0$, where g is a parameter.

b) Solve : $y\,(x^2y+e^x)dx-e^xdy=0$

c) Examine the convergence of $\Sigma\frac{n!3^n}{(n+1)^n}$

d) Find the analytic function whose imaginary part is $tan^{-1}(y/x)$.

e) Determine whether the function $\sin z$ is analytic; if so find its derivative.

Q.4 Attempt any two: **10**

a) At a room temperature of 25°, the temperature of a body is 75°. After 15 seconds the temperature of the body was found to be 65°. Find its temperature after 90 seconds.

b) Examine for absolute and conditional convergence of

1) $\Sigma\frac{cosn\pi}{n^2+1}$ 2) $\Sigma(-1)^n\frac{2^{3n}}{3^{2n}}$

c) Prove that the function $u=x^3-3xy^2+3x^2-3y^2+1$ satisfies Laplace equation and construct the analytic function $f(z)$

Section – II

Q.5 Attempt any three: **09**

a) Evaluate : $\int_0^1 x^3\left[log\frac{1}{x}\right]^4dx$

b) Evaluate : $\int_0^\infty\frac{e^{-\alpha x}sinx}{x}\,dx$

c) Trace the curve $x=a\,cos^3t,\ y=a\,sin^3t$ with justification.

d) Evaluate : $\int_0^1\int_{y^2}^1\int_0^{1-x}x\,dzdxdy$

e) Evaluate : $\iint e^{3x+4y}dxdy$ over the triangle.
$x=0,\ y=0,\quad x+y=1$

Q.6 Attempt any three: **09**

a) Evaluate : $\int_0^3 \frac{x^{3/2}}{\sqrt{3-x}}\, dx$

b) Evaluate : $\int_0^{a\sqrt{3}} \int_0^{\sqrt{x^2+a^2}} \frac{x\, dydx}{y^2+x^2+a^2}$

c) Trace the curve $r^2 = 4cos2\theta$, with justification.

d) Find the mass of the lamina in the form of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, if density at any point varies as the product of distances from the axes of ellipse.

e) Find the area which is inside the cardiod $r = 2(1 + cos\theta)$ and outside the circle $r = 2$.

Q.7 Attempt any two: **10**

a) Prove that : $\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}\, dx = B\,(m,n)$ and hence evaluate $\int_0^\infty \frac{\sqrt{x}}{(1+x)^2}\, dx$

b) Trace the curve $xy^2 = a(x^2 - a^2)$ with full justification.

c) Change the order of Integration in $\int_0^1 \int_{x^2}^{2-x} xydydx$ and hence evaluate.

SLR-FJ-5

Seat No.	

Set Q

F.Y. (B.Tech.) (Semester - II) (New)(CBCS) Examination March/April-2019
ENGINEERING MATHEMATICS - II

Day & Date: Friday, 10-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of non programmable calculator is allowed.
3) Q. no. 1 is compulsory & it should be solved in first 30 minutes in answer book page no.3. Each question carries one mark.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Multiple choice questions **14**

1) $\frac{B(m+1,n)}{B(m,n)}$ is equal to _____.
   a) $\frac{m}{n}$ b) $\frac{m+1}{n}$
   c) $\frac{m-1}{n}$ d) $\frac{m}{m+n}$

2) The value of $\int_0^\infty \frac{e^{-x}}{x}\,dx$ is _____.
   a) 0 b) ∞
   c) -1 d) 1

3) For the curve $y^2(1+x) = x^2(1-x)$, the origin is a _____.
   a) node b) cusp
   c) conjugate point d) isolated point

4) The numbers of loops of $r = a\sin 2\theta$ are _____.
   a) two b) three
   c) four d) eight

5) For $\int_0^\infty \int_x^\infty f(x,y)\,dydx$ by the change of order of integration we get ___.
   a) $\int_0^\infty \int_0^x f(x,y)\,dxdy$ b) $\int_x^\infty \int_0^\infty f(x,y)\,dxdy$
   c) $\int_0^\infty \int_y^\infty f(x,y)\,dxdy$ d) $\int_0^\infty \int_0^y f(x,y)\,dxdy$

6) The value of $\int_0^{\pi/2} \int_0^{\pi/2} sin\ (x+y)\,dx\,dy$ is _____.
   a) 0 b) 2
   c) π d) -2

7) The total mass of the lamina $0 \le x \le 1$, $0 \le y \le 1$ with density at any point equal to xy is _____.
   a) 4 b) 2
   c) $\frac{1}{2}$ d) $\frac{1}{4}$

8) The integrating factor of the differential equation $x\frac{dy}{dx} + (1+x)\,y = e^x$ is

a) $x \log x$ b) $x + e^x$

c) xe^{-x} d) xe^x

9) The solution of $\frac{dy}{dx} = -\frac{x^2}{y^2}$ at $x = 1$ and $y = 0$ is

a) $x^3 + y^3 = 0$ b) $x^3 - y^3 = 1$

c) $x^3 + y^3 = 3$ d) $x^3 + y^3 = 1$

10) The series $\Sigma\frac{1}{n^p}$, $P > 1$ is

a) Convergent b) Divergent

c) Oscillatory d) absolutely convergent

11) In D'Alemberts ratio test if $\lim_{n\to\infty} \frac{u_n}{u_{n+1}} = 1$ then

a) $\Sigma\, u_n$ converges b) $\Sigma\, u_n$ diverges

c) the test fail d) $\Sigma\, u_n$ is oscillatory

12) $[\cos\theta - i\,\sin\theta]^4 =$ _____.

a) $\sin 4\theta - i\,\cos 4\theta$ b) $\cos 4\theta + i\,\sin 4\theta$

c) $\cos 4\theta - i\,\sin 4\theta$ d) $\sin 4\theta + i\,\cos 4\theta$

13) $\sin ix =$ _____.

a) $\sin hx$ b) $i\,\sin x$

c) $-\sin\ ix$ d) $i\,\sin hx$

14) Analytic function is also called as _____.

a) holomorphic b) irregular

c) harmonic d) Laplace

SLR-FJ-5

Seat No.	

Set Q

F.Y. (B.Tech.) (Semester - II) (New)(CBCS) Examination March/April-2019
ENGINEERING MATHEMATICS - II

Day & Date: Friday, 10-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of non programmable calculator is allowed.
3) Figures to the right indicate full marks.

Section - I

Q.2 Attempt any three:

a) Solve: $(x-3y+4)dx=(2x-6y+1)dy$ **09**

b) Solve: $\frac{dy}{dx}=\frac{y}{2y\log y+y-x}$

c) Solve: $\frac{dy}{dx}+(2x\,tan^{-1}y-x^3)(1+y^2)=0$

d) Solve: $x^5=1+i$

e) Test the convergence of $\Sigma\frac{3^n}{2^{n+3}}$

Q.3 Attempt any three: **09**

a) Find the orthogonal trajectories of $x^2+y^2+2gx+c=0$, where g is a parameter.

b) Solve : $y\,(x^2y+e^x)dx-e^xdy=0$

c) Examine the convergence of $\Sigma\frac{n!3^n}{(n+1)^n}$

d) Find the analytic function whose imaginary part is $tan^{-1}(y/x)$.

e) Determine whether the function $\sin z$ is analytic; if so find its derivative.

Q.4 Attempt any two: **10**

a) At a room temperature of 25°, the temperature of a body is 75°. After 15 seconds the temperature of the body was found to be 65°. Find its temperature after 90 seconds.

b) Examine for absolute and conditional convergence of

1) $\Sigma\frac{cosn\pi}{n^2+1}$ 2) $\Sigma(-1)^n\frac{2^{3n}}{3^{2n}}$

c) Prove that the function $u=x^3-3xy^2+3x^2-3y^2+1$ satisfies Laplace equation and construct the analytic function $f(z)$

Section – II

Q.5 Attempt any three: **09**

a) Evaluate : $\int_0^1 x^3\left[log\frac{1}{x}\right]^4dx$

b) Evaluate : $\int_0^\infty\frac{e^{-\alpha x}sinx}{x}\,dx$

c) Trace the curve $x=a\,cos^3t,\ y=a\,sin^3t$ with justification.

d) Evaluate : $\int_0^1\int_{y^2}^1\int_0^{1-x}x\,dzdxdy$

e) Evaluate : $\iint e^{3x+4y}dxdy$ over the triangle.
$x=0,\ y=0,\quad x+y=1$

Q.6 Attempt any three: **09**

a) Evaluate : $\int_0^3 \frac{x^{3/2}}{\sqrt{3-x}}\, dx$

b) Evaluate : $\int_0^{a\sqrt{3}} \int_0^{\sqrt{x^2+a^2}} \frac{x\, dydx}{y^2+x^2+a^2}$

c) Trace the curve $r^2 = 4cos2\theta$, with justification.

d) Find the mass of the lamina in the form of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, if density at any point varies as the product of distances from the axes of ellipse.

e) Find the area which is inside the cardiod $r = 2(1 + cos\theta)$ and outside the circle $r = 2$.

Q.7 Attempt any two: **10**

a) Prove that : $\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}\, dx = B\,(m,n)$ and hence evaluate $\int_0^\infty \frac{\sqrt{x}}{(1+x)^2}\, dx$

b) Trace the curve $xy^2 = a(x^2 - a^2)$ with full justification.

c) Change the order of Integration in $\int_0^1 \int_{x^2}^{2-x} xydydx$ and hence evaluate.

SLR-FJ-5

Seat No.	

Set R

F.Y. (B.Tech.) (Semester - II) (New)(CBCS) Examination March/April-2019
ENGINEERING MATHEMATICS - II

Day & Date: Friday, 10-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of non programmable calculator is allowed.
3) Q. no. 1 is compulsory & it should be solved in first 30 minutes in answer book page no.3. Each question carries one mark.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Multiple choice questions **14**

1) The numbers of loops of $r = a\sin 2\theta$ are _____.
   a) two b) three
   c) four d) eight

2) For $\int_0^{\infty}\int_x^{\infty} f(x,y)\,dydx$ by the change of order of integration we get ___.
   a) $\int_0^{\infty}\int_0^{x} f(x,y)\,dxdy$ b) $\int_x^{\infty}\int_0^{\infty} f(x,y)\,dxdy$
   c) $\int_0^{\infty}\int_y^{\infty} f(x,y)\,dxdy$ d) $\int_0^{\infty}\int_0^{y} f(x,y)\,dxdy$

3) The value of $\int_0^{\pi/2}\int_0^{\pi/2} sin\ (x+y)\,dx\,dy$ is _____.
   a) 0 b) 2
   c) π d) -2

4) The total mass of the lamina $0 \le x \le 1$, $0 \le y \le 1$ with density at any point equal to xy is _____.
   a) 4 b) 2
   c) $\frac{1}{2}$ d) $\frac{1}{4}$

5) The integrating factor of the differential equation $x\frac{dy}{dx} + (1+x)\,y = e^x$ is
   a) $x\log x$ b) $x + e^x$
   c) xe^{-x} d) xe^x

6) The solution of $\frac{dy}{dx} = -\frac{x^2}{y^2}$ at $x = 1$ and $y = 0$ is
   a) $x^3 + y^3 = 0$ b) $x^3 - y^3 = 1$
   c) $x^3 + y^3 = 3$ d) $x^3 + y^3 = 1$

7) The series $\Sigma\frac{1}{n^p}$, $P > 1$ is
   a) Convergent b) Divergent
   c) Oscillatory d) absolutely convergent

8) In D'Alemberts ratio test if $\lim_{n\to\infty} \frac{u_n}{u_{n+1}} = 1$ then

a) $\Sigma\, u_n$ converges b) $\Sigma\, u_n$ diverges
c) the test fail d) $\Sigma\, u_n$ is oscillatory

9) $[\cos\theta - i\sin\theta]^4 =$ _____.

a) $\sin 4\theta - i\cos 4\theta$ b) $\cos 4\theta + i\sin 4\theta$
c) $\cos 4\theta - i\sin 4\theta$ d) $\sin 4\theta + i\cos 4\theta$

10) $\sin ix =$ _____.

a) $\sin hx$ b) $i\sin x$
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11) Analytic function is also called as _____.

a) holomorphic b) irregular
c) harmonic d) Laplace

12) $\frac{\mathrm{B}(m+1,n)}{\mathrm{B}(m,n)}$ is equal to _____.

a) $\frac{m}{n}$ b) $\frac{m+1}{n}$
c) $\frac{m-1}{n}$ d) $\frac{m}{m+n}$

13) The value of $\int_0^\infty \frac{e^{-x}}{x}\, dx$ is _____.

a) 0 b) ∞
c) -1 d) 1

14) For the curve $y^2(1+x) = x^2(1-x)$, the origin is a _____.

a) node b) cusp
c) conjugate point d) isolated point

SLR-FJ-5

Seat No.	

Set R

F.Y. (B.Tech.) (Semester - II) (New)(CBCS) Examination March/April-2019
ENGINEERING MATHEMATICS - II

Day & Date: Friday, 10-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of non programmable calculator is allowed.
3) Figures to the right indicate full marks.

Section - I

Q.2 Attempt any three:

a) Solve: $(x-3y+4)dx=(2x-6y+1)dy$ **09**

b) Solve: $\frac{dy}{dx}=\frac{y}{2y\log y+y-x}$

c) Solve: $\frac{dy}{dx}+(2x\,tan^{-1}y-x^3)(1+y^2)=0$

d) Solve: $x^5=1+i$

e) Test the convergence of $\Sigma\frac{3^n}{2^{n+3}}$

Q.3 Attempt any three: **09**

a) Find the orthogonal trajectories of $x^2+y^2+2gx+c=0$, where g is a parameter.

b) Solve : $y\,(x^2y+e^x)dx-e^xdy=0$

c) Examine the convergence of $\Sigma\frac{n!3^n}{(n+1)^n}$

d) Find the analytic function whose imaginary part is $tan^{-1}(y/x)$.

e) Determine whether the function $\sin z$ is analytic; if so find its derivative.

Q.4 Attempt any two: **10**

a) At a room temperature of 25°, the temperature of a body is 75°. After 15 seconds the temperature of the body was found to be 65°. Find its temperature after 90 seconds.

b) Examine for absolute and conditional convergence of

1) $\Sigma\frac{cosn\pi}{n^2+1}$ 2) $\Sigma(-1)^n\frac{2^{3n}}{3^{2n}}$

c) Prove that the function $u=x^3-3xy^2+3x^2-3y^2+1$ satisfies Laplace equation and construct the analytic function $f(z)$

Section – II

Q.5 Attempt any three: **09**

a) Evaluate : $\int_0^1 x^3\left[log\frac{1}{x}\right]^4dx$

b) Evaluate : $\int_0^\infty\frac{e^{-\alpha x}sinx}{x}\,dx$

c) Trace the curve $x=a\,cos^3t,\ y=a\,sin^3t$ with justification.

d) Evaluate : $\int_0^1\int_{y^2}^1\int_0^{1-x}x\,dzdxdy$

e) Evaluate : $\iint e^{3x+4y}dxdy$ over the triangle.
$x=0,\ y=0,\quad x+y=1$

Q.6 Attempt any three: **09**

a) Evaluate : $\int_0^3 \frac{x^{3/2}}{\sqrt{3-x}}\, dx$

b) Evaluate : $\int_0^{a\sqrt{3}} \int_0^{\sqrt{x^2+a^2}} \frac{x\, dydx}{y^2+x^2+a^2}$

c) Trace the curve $r^2 = 4cos2\theta$, with justification.

d) Find the mass of the lamina in the form of an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, if density at any point varies as the product of distances from the axes of ellipse.

e) Find the area which is inside the cardiod $r = 2(1 + cos\theta)$ and outside the circle $r = 2$.

Q.7 Attempt any two: **10**

a) Prove that : $\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}\, dx = B\,(m,n)$ and hence evaluate $\int_0^\infty \frac{\sqrt{x}}{(1+x)^2}\, dx$

b) Trace the curve $xy^2 = a(x^2 - a^2)$ with full justification.

c) Change the order of Integration in $\int_0^1 \int_{x^2}^{2-x} xydydx$ and hence evaluate.

SLR-FJ-5

Seat No.	

Set S

F.Y. (B.Tech.) (Semester - II) (New)(CBCS) Examination March/April-2019
ENGINEERING MATHEMATICS - II

Day & Date: Friday, 10-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of non programmable calculator is allowed.
3) Q. no. 1 is compulsory & it should be solved in first 30 minutes in answer book page no.3. Each question carries one mark.
4) Figures to the right indicate full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Multiple choice questions **14**

1) $\sin ix =$ _____.
   a) $\sin hx$ b) $i \sin x$
   c) $-\sin ix$ d) $i \sin hx$

2) Analytic function is also called as _____.
   a) holomorphic b) irregular
   c) harmonic d) Laplace

3) $\frac{B(m+1,n)}{B(m,n)}$ is equal to _____.
   a) $\frac{m}{n}$ b) $\frac{m+1}{n}$
   c) $\frac{m-1}{n}$ d) $\frac{m}{m+n}$

4) The value of $\int_0^\infty \frac{e^{-x}}{x}\, dx$ is _____.
   a) 0 b) ∞
   c) -1 d) 1

5) For the curve $y^2(1+x) = x^2(1-x)$, the origin is a _____.
   a) node b) cusp
   c) conjugate point d) isolated point

6) The numbers of loops of $r = a \sin 2\theta$ are _____.
   a) two b) three
   c) four d) eight

7) For $\int_0^\infty \int_x^\infty f(x,y)\, dydx$ by the change of order of integration we get ___.
   a) $\int_0^\infty \int_0^x f(x,y)\, dxdy$ b) $\int_x^\infty \int_0^\infty f(x,y)\, dxdy$
   c) $\int_0^\infty \int_y^\infty f(x,y)\, dxdy$ d) $\int_0^\infty \int_0^y f(x,y)\, dxdy$

8) The value of $\int_0^{\pi/2} \int_0^{\pi/2} sin\ (x+y)\, dx\, dy$ is _____.
   a) 0 b) 2
   c) π d) -2

9) The total mass of the lamina $0 \leq x \leq 1$, $0 \leq y \leq 1$ with density at any point equal to xy is _____.

a) 4 b) 2

c) $\frac{1}{2}$ d) $\frac{1}{4}$

10) The integrating factor of the differential equation $x\frac{dy}{dx} + (1+x)\,y = e^x$ is

a) $x \log x$ b) $x + e^x$

c) xe^{-x} d) xe^x

11) The solution of $\frac{dy}{dx} = -\frac{x^2}{y^2}$ at $x = 1$ and $y = 0$ is

a) $x^3 + y^3 = 0$ b) $x^3 - y^3 = 1$

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12) The series $\Sigma\frac{1}{n^p}$, $P > 1$ is

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13) In D'Alemberts ratio test if $\lim_{n\to\infty} \frac{u_n}{u_{n+1}} = 1$ then

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c) the test fail d) $\Sigma\, u_n$ is oscillatory

14) $[\cos\theta - i\sin\theta]^4 =$ _____.

a) $\sin 4\theta - i\cos 4\theta$ b) $\cos 4\theta + i\sin 4\theta$

c) $\cos 4\theta - i\sin 4\theta$ d) $\sin 4\theta + i\cos 4\theta$

SLR-FJ-5

Seat No.	

Set S

F.Y. (B.Tech.) (Semester - II) (New)(CBCS) Examination March/April-2019
ENGINEERING MATHEMATICS - II

Day & Date: Friday, 10-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Use of non programmable calculator is allowed.
3) Figures to the right indicate full marks.

Section - I

Q.2 Attempt any three: **09**

a) Solve: $(x-3y+4)dx=(2x-6y+1)dy$

b) Solve: $\frac{dy}{dx}=\frac{y}{2y\log y+y-x}$

c) Solve: $\frac{dy}{dx}+(2x\,tan^{-1}y-x^3)(1+y^2)=0$

d) Solve: $x^5=1+i$

e) Test the convergence of $\Sigma\frac{3^n}{2^{n+3}}$

Q.3 Attempt any three: **09**

a) Find the orthogonal trajectories of $x^2+y^2+2gx+c=0$, where g is a parameter.

b) Solve : $y\,(x^2y+e^x)dx-e^xdy=0$

c) Examine the convergence of $\Sigma\frac{n!3^n}{(n+1)^n}$

d) Find the analytic function whose imaginary part is $tan^{-1}(y/x)$.

e) Determine whether the function $\sin z$ is analytic; if so find its derivative.

Q.4 Attempt any two: **10**

a) At a room temperature of 25°, the temperature of a body is 75°. After 15 seconds the temperature of the body was found to be 65°. Find its temperature after 90 seconds.

b) Examine for absolute and conditional convergence of

1) $\Sigma\frac{cosn\pi}{n^2+1}$ 2) $\Sigma(-1)^n\frac{2^{3n}}{3^{2n}}$

c) Prove that the function $u=x^3-3xy^2+3x^2-3y^2+1$ satisfies Laplace equation and construct the analytic function $f(z)$

Section – II

Q.5 Attempt any three: **09**

a) Evaluate : $\int_0^1 x^3\left[log\frac{1}{x}\right]^4dx$

b) Evaluate : $\int_0^\infty\frac{e^{-\alpha x}sinx}{x}\,dx$

c) Trace the curve $x=a\,cos^3t,\ y=a\,sin^3t$ with justification.

d) Evaluate : $\int_0^1\int_{y^2}^1\int_0^{1-x}x\,dzdxdy$

e) Evaluate : $\iint e^{3x+4y}dxdy$ over the triangle.
$x=0,\ y=0,\quad x+y=1$

Q.6 Attempt any three: **09**

a) Evaluate : $\int_0^3 \frac{x^{3/2}}{\sqrt{3-x}}\, dx$

b) Evaluate : $\int_0^{a\sqrt{3}} \int_0^{\sqrt{x^2+a^2}} \frac{x\, dydx}{y^2+x^2+a^2}$

c) Trace the curve $r^2 = 4cos2\theta$, with justification.

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e) Find the area which is inside the cardiod $r = 2(1 + cos\theta)$ and outside the circle $r = 2$.

Q.7 Attempt any two: **10**

a) Prove that : $\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}\, dx = B\,(m,n)$ and hence evaluate $\int_0^\infty \frac{\sqrt{x}}{(1+x)^2}\, dx$

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c) Change the order of Integration in $\int_0^1 \int_{x^2}^{2-x} xydydx$ and hence evaluate.

SLR-FJ-6

Seat No.	

Set P

F.Y. (B. Tech.) (Semester - II) (New) (CBCS) Examination March/April-2019
ENGINEERING GRAPHICS & DESIGNS

Day & Date: Monday, 13-05-2019 Max. Marks: 70
Time: 10:00 AM To 02:00 PM

Instructions: 1) All questions from each section are compulsory.
2) Figures to the right indicate fill marks.
3) Assume suitable dimensions, wherever required and mention it clearly.
4) Retain all construction lines.
5) All dimensions are in 'mm'.
6) Return all the answer-sheet supplied irrespective of their use.

***Note: Objectives type answer-sheet must be returned after first 40 minutes strictly.**

Section I

Q.1 Solve any FOUR: (Objective Type) **14**

a) Refer Fig.1. Complete the projections of line AB having grade +90% with respect to A and bearing S40^{o}E with respect to A. The true length is 80mm. **03**

b) Refer Fig.2. Complete the projections of line RS which is perpendicular to line PQ at point S. Find true length of line RS. **04**

c) Refer Fig.3. Horizontal line AB intersects frontal line CD. Complete the projections. **03**

d) Refer Fig.4. Complete the projections of horizontal line CD 40mm long; intersecting profile line AB at point D. Line CD makes 45° angle with VP. **03**

e) Refer Fig.5. Find strike and dip of given plane SDK. **04**

f) Refer Fig.6. Complete the projections of plane CDE if it strikes S45^{0}W and dips 45° North Westerly. **03**

SLR-FJ-6

Seat No.	

Set P

F.Y. (B. Tech.) (Semester - II) (New) (CBCS) Examination March/April-2019
ENGINEERING GRAPHICS & DESIGNS

Day & Date: Monday, 13-05-2019 Max. Marks: 56
Time: 10:00 AM To 02:00 PM

Instructions: 1) All questions from each section are compulsory.
2) Figures to the right indicate fill marks.
3) Assume suitable dimensions, wherever required and mention it clearly.
4) Retain all construction lines.
5) All dimensions are in 'mm'.
6) Return all the answer-sheet supplied irrespective of their use.

Section I

Q.2 Solve the following:

a) Complete the projections of line AB if point A is 10mm above HP and 17mm in front of VP. **04**
1) Its bearing is S 40° E w.r.t. A
2) Its gradient is + 75% w.r.t. A
3) Its front view length is 60 mm

b) A line AB, 80 mm long is inclined at 40° to FRP and its front view makes an angle of 60° to HRP. The end A is in FRP and 14 mm above HRP. Complete the projections. **03**

c) An isosceles triangle of base side 40 mm and height 70 mm rests on its base side in V.P in such a way that its front view looks like as an equilateral triangle. Complete the projections and find the angle made by plane with V.P. **04**

Q.3 A hexagonal plane ABCDEF of 40mm side has its side AB in HRP and the side opposite to resting side is 30mm above the HRP. Complete the projections if resting side makes 40° with FRP. **07**

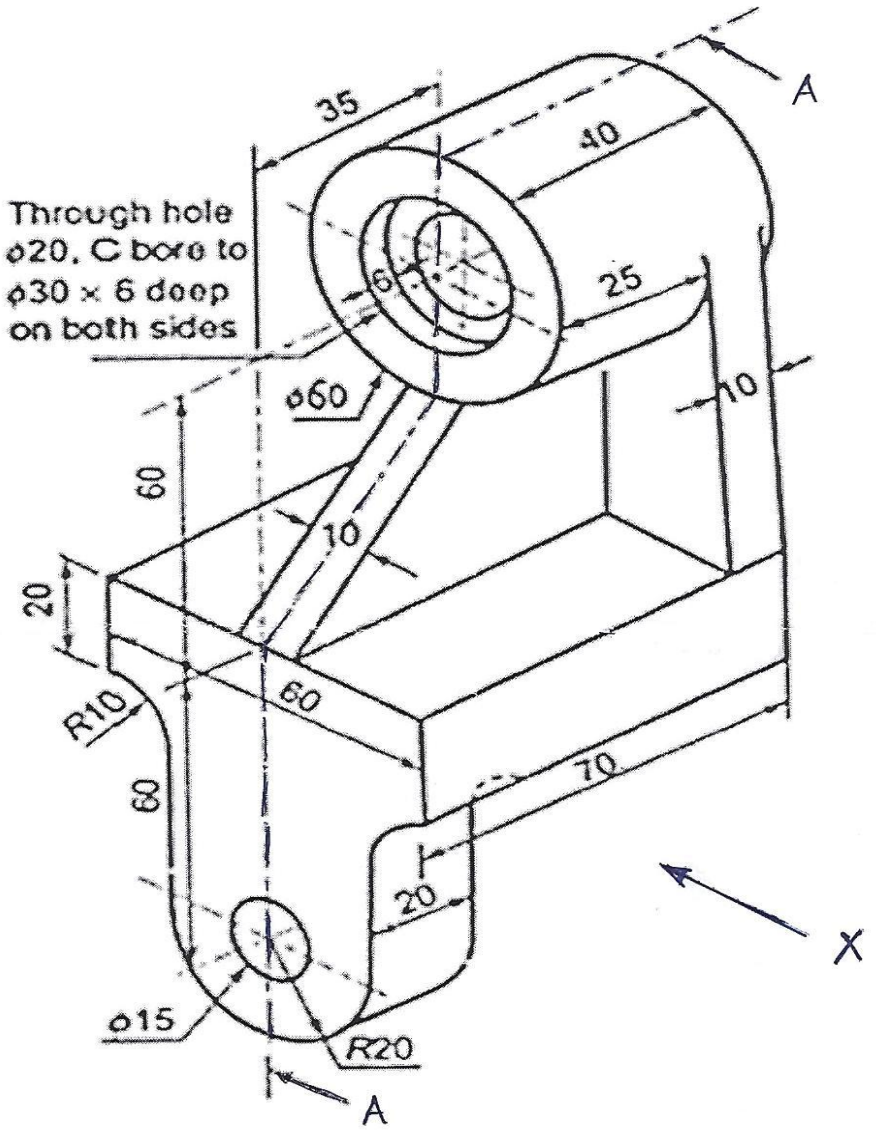
Q.4 An equilateral triangular prism of 40mm side of base and 70mm height of axis is kept on its HP on one of its base side. It is tilted in such a way that the lateral surface containing resting side makes 40° with HP. Complete the projections if resting side makes 50° with VP. **10**

OR

A pentagonal pyramid of base side 40 mm and axis 70 mm long is resting on one of its corner in HP, in such a way that the slant edge containing that corner is vertical, and plane containing axis and slant edge is perpendicular to VP. Draw the projection of pyramid.

Section II

Q.5 Figure shows a pictorial view of an object. Draw the following views, by using first angle method of projection. **14**
a) Sectional Elevation in X direction along A-A;
b) Plan; and c) left hand side view



Q.6 A square pyramid with side of base 45 mm and axis of 70 mm is kept in HRP on its base such that all sides of base are equally inclined to FRP. It is to be cut by an auxiliary inclined plane in such a way that true shape of section is an equilateral triangle with base 40 mm. Find inclination of cutting plane with HRP. **07**

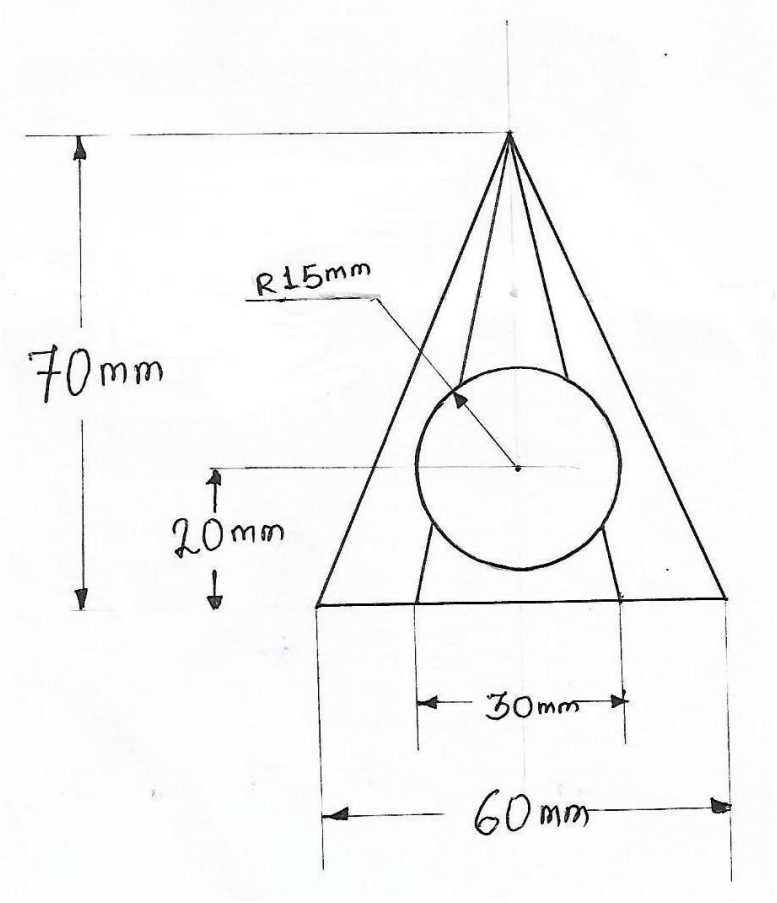
OR

A hexagonal pyramid having 35mm and 70mm long axis is lying on ground on one of triangular faces with its axis parallel to VP. A vertical section plane, which makes 30° to VP, cuts the solid and pass through center of base. Draw sectional front view and true shape of section.

Q.7 A pentagonal prism of base 40 mm and axis 70 mm is kept on it base in HRP such that one its base edge is perpendicular to VP. It is cut by section plane making an angle of 45° and passing through midpoint of axis of prism. Draw development of lateral surface of cut pentagonal prism. **07**

OR

Draw the development of lateral surfaces of cut Hexagonal Pyramid.



SLR-FJ-7

Seat No.	

Set P

F.Y. (B. Tech) (Semester - II) (New) (CBCS) Examination March/April-2019
BASIC CIVIL ENGINEERING

Day & Date: Wednesday, 15-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

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

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 MCQ / Objective type question paper **14**

1) Soil and its behaviour under the application of load is studied under the following sub branch of civil engineering _____.
   a) Geotechnical Engineering b) Environmental Engineering
   c) Surveying d) Town planning

2) Zero reading of the graduated arc of prismatic compass is marked near.
   a) North end b) South end
   c) East end d) West end

3) Contour Map consisting of no. of closed loops around each other with reduced level increasing inwards indicates _____.
   a) Hill b) Valley
   c) Ridge d) Pond

4) Total number of links in Günter's chain are _____
   a) 150 b) 66
   c) 16 d) 100

5) The most efficient method of irrigation is _____.
   a) Furrow b) Border strip
   c) Check bund d) Drip

6) The water stored in between full reservoir level and high flood level is called as _____.
   a) Dead storage b) Useful storage
   c) Surcharge storage d) None of these

7) Generally the dry dock is used _____.
   a) For loading and unloading
   b) As Road stead
   c) For repair and maintenance of ships
   d) All of these

8) In a mortar, the binding material is _____.
   a) Cement b) Sand
   c) Surkhi d) Cinder

9) Line up to which the plinth of a building adjoining a street may be law-fully extended is called?
   a) Building line b) Building boundary
   c) Building extend d) Building plan

10) For a good building stone how much is the required crushing strength?
   a) Less than 50 N/mm^2 b) Greater than 100 N/mm^2
   c) 155 N/mm^2 d) 10 N/mm^2

11) Final setting Time of Ordinary Portland Cement (OPC) is _____.
   a) 20 Min b) 400 Min
   c) 30 Min d) 600 Min

12) GPS stands for _____.
   a) Government Public System
   b) Global Positioning System
   c) Global Police System
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13) The study of something without making actual contact with the object of study is _____.
   a) Remote sensing b) Contouring
   c) Triangulation d) GPS

14) Building bye-laws are laid _____.
   a) To prevent haphazard growth of city
   b) To avoid air and noise pollution
   c) To ensure proper light of ventilation, parking etc
   d) All of above

SLR-FJ-7

Seat No.	

Set P

F.Y. (B. Tech) (Semester - II) (New) (CBCS) Examination March/April-2019
BASIC CIVIL ENGINEERING

Day & Date: Wednesday, 15-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate fill marks.

Section I

Q.2 Attempt any four of the following **12**

a) With neat sketch of road in embankment explain its various components.

b) Define contour and draw contour for Saddle and valley.

c) What are the different roles those civil engineer plays during construction activity. Explain briefly.

d) Write a short note on solid waste management? Why it is essential.

e) With neat sketch explain rooftop water harvesting method. What are its merits and demerits?

f) Differentiate between Collimation plane method and Rise fall method.

g) Explain how the knowledge of civil engineering is important to other branches of engineering.

Q.3 Attempt any two of the following **16**

a) 1) Explain different types of irrigation canals stating their carrying capacity.
2) With the neat sketch explain various components of railway.

b) The following bearings were taken with a prismatic compass for a closed traverse. Draw rough Traverse, Calculate the induced angles, check for the local attraction and angular error. Calculate the corrected bearings. Give the sample calculations.

Stations	A	B	C	D	E
F.B	293°30’	25°	90°	140°30’	206°
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c) A level field book was found to be tampered. Some of the readings could not be read reliably. Fill in the missing readings and calculate R.L. of all stations on this page. Support your calculation by suitable checks.

Stn	BS	IS	FS	Rise	Fall	R.L	Remarks
A	3.250						BM
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C		2.250					
D	---		1.920				CP-I
E		2.540			0.015		
F		---		1.000			
G	1.175		2.115			225.305	CP-II
H		1.625					
I	---		1.895				CP-III
J			1.255		0.750		Last station

Section II

Q.4 Solve any Four **16**

a) Write various Grades of concrete and their uses.

b) Note on Requirements of earthquake resistant buildings.

c) Write Ideal Engineering Properties and uses of following building materials.

1) Steel
2) Brick

d) Write note on Green Building.

e) Write Applications of Remote Sensing in various fields.

f) Explain principle of load transfer mechanism in framed structure.

Q.5 Solve any Two **12**

a) Draw the cross section of building showing various elements of building. Explain any four in brief.

b) Write note on:

1) Global Positioning System
2) Geographic Information System

c) What is the building bye law? Explain Building line, open space requirement, Carpet area, Built-up area.

SLR-FJ-7

Seat No.	

Set Q

F.Y. (B. Tech) (Semester - II) (New) (CBCS) Examination March/April-2019
BASIC CIVIL ENGINEERING

Day & Date: Wednesday, 15-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

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

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 MCQ / Objective type question paper **14**

1) In a mortar, the binding material is _____.
   a) Cement b) Sand
   c) Surkhi d) Cinder

2) Line up to which the plinth of a building adjoining a street may be law-fully extended is called?
   a) Building line b) Building boundary
   c) Building extend d) Building plan

3) For a good building stone how much is the required crushing strength?
   a) Less than 50 N/mm^2 b) Greater than 100 N/mm^2
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11) Total number of links in Günter's chain are _____
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   c) 16
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12) The most efficient method of irrigation is _____.
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13) The water stored in between full reservoir level and high flood level is called as _____.
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   d) All of these

SLR-FJ-7

Seat No.	

Set Q

F.Y. (B. Tech) (Semester - II) (New) (CBCS) Examination March/April-2019
BASIC CIVIL ENGINEERING

Day & Date: Wednesday, 15-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate fill marks.

Section I

Q.2 Attempt any four of the following **12**

a) With neat sketch of road in embankment explain its various components.

b) Define contour and draw contour for Saddle and valley.

c) What are the different roles those civil engineer plays during construction activity. Explain briefly.

d) Write a short note on solid waste management? Why it is essential.

e) With neat sketch explain rooftop water harvesting method. What are its merits and demerits?

f) Differentiate between Collimation plane method and Rise fall method.

g) Explain how the knowledge of civil engineering is important to other branches of engineering.

Q.3 Attempt any two of the following **16**

a) 1) Explain different types of irrigation canals stating their carrying capacity.
2) With the neat sketch explain various components of railway.

b) The following bearings were taken with a prismatic compass for a closed traverse. Draw rough Traverse, Calculate the induced angles, check for the local attraction and angular error. Calculate the corrected bearings. Give the sample calculations.

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E		2.540			0.015		
F		---		1.000			
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H		1.625					
I	---		1.895				CP-III
J			1.255		0.750		Last station

Section II

Q.4 Solve any Four **16**

a) Write various Grades of concrete and their uses.

b) Note on Requirements of earthquake resistant buildings.

c) Write Ideal Engineering Properties and uses of following building materials.

1) Steel
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e) Write Applications of Remote Sensing in various fields.

f) Explain principle of load transfer mechanism in framed structure.

Q.5 Solve any Two **12**

a) Draw the cross section of building showing various elements of building. Explain any four in brief.

b) Write note on:

1) Global Positioning System
2) Geographic Information System

c) What is the building bye law? Explain Building line, open space requirement, Carpet area, Built-up area.

SLR-FJ-7

Seat No.	

Set R

F.Y. (B. Tech) (Semester - II) (New) (CBCS) Examination March/April-2019
BASIC CIVIL ENGINEERING

Day & Date: Wednesday, 15-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

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

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 MCQ/Objective type question paper **14**

1) Final setting Time of Ordinary Portland Cement (OPC) is _____.
   a) 20 Min b) 400 Min
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3) The study of something without making actual contact with the object of study is _____.
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4) Building bye-laws are laid _____.
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5) Soil and its behaviour under the application of load is studied under the following sub branch of civil engineering _____.
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7) Contour Map consisting of no. of closed loops around each other with reduced level increasing inwards indicates _____.
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SLR-FJ-7

Seat No.	

Set R

F.Y. (B. Tech) (Semester - II) (New) (CBCS) Examination March/April-2019
BASIC CIVIL ENGINEERING

Day & Date: Wednesday, 15-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate fill marks.

Section I

Q.2 Attempt any four of the following **12**

a) With neat sketch of road in embankment explain its various components.

b) Define contour and draw contour for Saddle and valley.

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SLR-FJ-7

Seat No.		Set	S

F.Y. (B. Tech) (Semester - II) (New) (CBCS) Examination March/April-2019
BASIC CIVIL ENGINEERING

Day & Date: Wednesday, 15-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 MCQ / Objective type question paper **14**

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SLR-FJ-7

Seat No.	

Set S

F.Y. (B. Tech) (Semester - II) (New) (CBCS) Examination March/April-2019
BASIC CIVIL ENGINEERING

Day & Date: Wednesday, 15-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate fill marks.

Section I

Q.2 Attempt any four of the following **12**

a) With neat sketch of road in embankment explain its various components.

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c) What is the building bye law? Explain Building line, open space requirement, Carpet area, Built-up area.

SLR-FJ-8

Seat No.	

Set P

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING PHYSICS I / ENGINEERING PHYSICS II

Day & Date: Friday, 17-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory. And Q. No. 1 Should be solve in first 30 minutes.
2) Figures to the right indicate full marks.
3) Make suitable assumptions, if necessary.
4) Answer MCQ/Objective type question 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 x 10^{26}/k.mol.
2) Velocity of light, c = 3 x 10^{8} m/sec.
3) Charge of electron, e = 1.6 x 10^{-19} C.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative. **14**

1) Acceptor type semiconductor is formed by adding impurity of valency ___.
   a) 3 b) 4
   c) 5 d) 2

2) The number of died axes symmetry elements that are present in a cubic crystal are -_____.
   a) 4 b) 6
   c) 8 d) 10

3) The Miller indices of the plane parallel to y & z axes are _____.
   a) (0 0 1) b) (0 1 0)
   c) (1 0 0) d) (1 1 1)

4) The audible range of frequency is _____.
   a) 20 KHz to 20 MHz b) 200 KHz to 200 MHz
   c) 200 Hz to 200 MHz d) 20 Hz to 20 KHz

5) Reverberation time is _____ to/of volume of the hall.
   a) directly proportional b) inversely proportional
   c) Independent d) None of these

6) The inertial frame of reference is _____ frame of reference.
   a) An accelerated b) Non-accelerated
   c) A rotating d) None of these

7) The Lorentz transformation equation for x' co-ordinate from s to s' _____.
   a) $x' = (x+vt) / \sqrt{1-v^2/c^2}$ b) $x' = (x-ct) / 1-v^2/c^2$
   c) $x' = (x-vt) / \sqrt{1-v^2/c^2}$ d) $x' = x-vt (\sqrt{1-v^2/c^2})$

8) The resolving power of a grating having N slits in n^{th} order will be _____.
   a) (n+N) b) (n-N)
   c) n/N d) n.N

9) The substances that rotate the plane of polarization are said to be _____.
   a) opaque
   b) optically inactive
   c) optically active
   d) polaroid

10) Stimulated absorption process is represented by equation _____.
   a) $A^* + h\gamma \rightarrow A + 2h\gamma$
   b) $A + h\gamma \rightarrow A^*$
   c) $A^* \rightarrow A + h\gamma$
   d) $A^* + h\gamma \rightarrow A + h\gamma$

11) The hologram records _____ of the object.
   a) Both intensity variation & phase distribution
   b) Only phase distribution
   c) Only intensity variation
   d) None of these

12) In total internal reflection phenomenon the light ray incident from _____.
   a) Rarer to denser
   b) Rarer to rarer
   c) Denser to denser
   d) Denser to rarer

13) The numerical aperture is given by the equation _____.
   a) NA = $\sqrt{(n_1^2 + n_2^2)}$
   b) NA = $(n_1^2 - n_2^2)$
   c) NA = $\sqrt{(n_1^2 - n_2^2)}$
   d) NA = $\sqrt{(n_2^2 - n_1^2)}$

14) The chirality of zigzag CNT is _____.
   a) (a, b)
   b) (a, 0)
   c) (a, a)
   d) (0, b)

SLR-FJ-8

Seat No.		Set	P

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING PHYSICS I / ENGINEERING PHYSICS II

Day & Date: Friday, 17-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsor
2) Figures to the right indicate fill marks.
3) Make suitable assumptions, if necessary.

Constants: 1) Avogadro's no., N= 6.02 x 10^{26}/k.mol.
2) Velocity of light, c = 3 x 10^{8} m/sec.
3) Charge of electron, e = 1.6 x 10^{-19} C.

Section – I

Q.2 Attempt any SIX of the following : **18**

a) Show that Fermi level in an intrinsic semiconductor lies half way between a valence band & conduction band.
b) Explain in detail Bragg's law.
c) What are the acoustic requirements of a good auditorium?
d) What is piezo-electric effect & magneto-striction effect?
e) Derive the expression of length contraction.
f) Derive Einstein's expression for mass-energy equivalence.
g) A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with B=1.5 wb/m^2. If a current of 200 A is set up in the strip, calculate hall voltage that appears across the strip. Assume R_H = 6 x 10^{-7} m^3/C.
h) Molybdenum has a BCC structure. Its density is 10.2 x 10^3 kg/m^3 and its atomic weight is 95.94. determine the lattice constant of Molybdenum atom.

Q.3 Attempt any TWO of the following : **10**

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 & interplaner spacing for cubic crystal.
c) For an empty assembly hall of size 20x15x10 m^3 the reverberation time is 3.5s. calculate the average absorption coefficient of the hall. What are of the wall should be covered by the curtain so as to reduce the reverberation time to 2.5 s. Given the absorption coefficient of curtain cloth is 0.5.
d) Derive the expression for Lorentz transformation equations & its inverse.

Section – II

Q.4 Attempt any SIX of the following : **18**

a) Explain Rayleigh's criterion of resolution.
b) Define:
1) Spontaneous emission
2) Stimulated emission
3) Stimulated absorption
c) Explain construction and reconstruction of hologram with neat diagram.
d) Write a note on: Classification of optical fibers.
e) State properties of matter waves.
f) Write applications of nanotechnology.

g) A plane diffraction grating has the value of grating constant equal to $15x10^{-4}$ cm. calculate the position of the third order maximum for $\lambda = 2.4x10^{-4}$ cm.

h) What is the numerical aperture and fractional refractive index change of an optical fiber cable with cladding index of 1.378 and a core index of 1.546.

Q.5 Attempt any TWO of the following : **10**

a) With neat diagram explain construction and working of Laurent's half shade polarimeter.

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) Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.30 nm. Given $h=6.634x10^{-34}$ J.s and $m=1.67x10^{-27}$ kg.

SLR-FJ-8

Seat No.	

Set Q

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING PHYSICS I / ENGINEERING PHYSICS II

Day & Date: Friday, 17-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory. And Q. No. 1 Should be solve in first 30 minutes.
2) Figures to the right indicate full marks.
3) Make suitable assumptions, if necessary.
4) Answer MCQ/Objective type question 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 x 10^{26}/k.mol.
2) Velocity of light, c = 3 x 10^{8} m/sec.
3) Charge of electron, e = 1.6 x 10^{-19} C.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative. **14**

1) The resolving power of a grating having N slits in n^{th} order will be _____.
   a) (n+N) b) (n-N)
   c) n/N d) n.N

2) The substances that rotate the plane of polarization are said to be _____.
   a) opaque b) optically inactive
   c) optically active d) polaroid

3) Stimulated absorption process is represented by equation _____.
   a) $A^* + h\gamma \rightarrow A + 2h\gamma$ b) $A + h\gamma \rightarrow A^*$
   c) $A^* \rightarrow A + h\gamma$ d) $A^* + h\gamma \rightarrow A + h\gamma$

4) The hologram records _____ of the object.
   a) Both intensity variation & phase distribution
   b) Only phase distribution
   c) Only intensity variation
   d) None of these

5) In total internal reflection phenomenon the light ray incident from _____.
   a) Rarer to denser b) Rarer to rarer
   c) Denser to denser d) Denser to rarer

6) The numerical aperture is given by the equation _____.
   a) NA = $\sqrt{(n_1^2 + n_2^2)}$ b) NA = $(n_1^2 - n_2^2)$
   c) NA = $\sqrt{(n_1^2 - n_2^2)}$ d) NA = $\sqrt{(n_2^2 - n_1^2)}$

7) The chirality of zigzag CNT is _____.
   a) (a, b) b) (a, 0)
   c) (a, a) d) (0, b)

8) Acceptor type semiconductor is formed by adding impurity of valency ___.
   a) 3 b) 4
   c) 5 d) 2

9) The number of died axes symmetry elements that are present in a cubic crystal are -_____.
   a) 4 b) 6
   c) 8 d) 10

10) The Miller indices of the plane parallel to y & z axes are _____.
   a) (0 0 1) b) (0 1 0)
   c) (1 0 0) d) (1 1 1)

11) The audible range of frequency is _____.
   a) 20 KHz to 20 MHz b) 200 KHz to 200 MHz
   c) 200 Hz to 200 MHz d) 20 Hz to 20 KHz

12) Reverberation time is _____ to/of volume of the hall.
   a) directly proportional b) inversely proportional
   c) Independent d) None of these

13) The inertial frame of reference is _____ frame of reference.
   a) An accelerated b) Non-accelerated
   c) A rotating d) None of these

14) The Lorentz transformation equation for x' co-ordinate from s to s' _____.
   a) $x' = (x+vt) / \sqrt{1-v^2/c^2}$ b) $x' = (x-ct) / 1-v^2/c^2$
   c) $x' = (x-vt) / \sqrt{1-v^2/c^2}$ d) $x' = x-vt (\sqrt{1-v^2/c^2})$

SLR-FJ-8

Seat No.	

Set Q

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING PHYSICS I / ENGINEERING PHYSICS II

Day & Date: Friday, 17-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsor
2) Figures to the right indicate fill marks.
3) Make suitable assumptions, if necessary.

Constants: 1) Avogadro's no., N= 6.02 x 10^{26}/k.mol.
2) Velocity of light, c = 3 x 10^{8} m/sec.
3) Charge of electron, e = 1.6 x 10^{-19} C.

Section – I

Q.2 Attempt any SIX of the following : **18**

a) Show that Fermi level in an intrinsic semiconductor lies half way between a valence band & conduction band.
b) Explain in detail Bragg's law.
c) What are the acoustic requirements of a good auditorium?
d) What is piezo-electric effect & magneto-striction effect?
e) Derive the expression of length contraction.
f) Derive Einstein's expression for mass-energy equivalence.
g) A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with B=1.5 wb/m^2. If a current of 200 A is set up in the strip, calculate hall voltage that appears across the strip. Assume R_H = 6 x 10^{-7} m^3/C.
h) Molybdenum has a BCC structure. Its density is 10.2 x 10^3 kg/m^3 and its atomic weight is 95.94. determine the lattice constant of Molybdenum atom.

Q.3 Attempt any TWO of the following : **10**

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 & interplaner spacing for cubic crystal.
c) For an empty assembly hall of size 20x15x10 m^3 the reverberation time is 3.5s. calculate the average absorption coefficient of the hall. What are of the wall should be covered by the curtain so as to reduce the reverberation time to 2.5 s. Given the absorption coefficient of curtain cloth is 0.5.
d) Derive the expression for Lorentz transformation equations & its inverse.

Section – II

Q.4 Attempt any SIX of the following : **18**

a) Explain Rayleigh's criterion of resolution.
b) Define:
1) Spontaneous emission
2) Stimulated emission
3) Stimulated absorption
c) Explain construction and reconstruction of hologram with neat diagram.
d) Write a note on: Classification of optical fibers.
e) State properties of matter waves.
f) Write applications of nanotechnology.

g) A plane diffraction grating has the value of grating constant equal to $15x10^{-4}$ cm. calculate the position of the third order maximum for $\lambda = 2.4x10^{-4}$ cm.

h) What is the numerical aperture and fractional refractive index change of an optical fiber cable with cladding index of 1.378 and a core index of 1.546.

Q.5 Attempt any TWO of the following : **10**

a) With neat diagram explain construction and working of Laurent's half shade polarimeter.

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) Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.30 nm. Given $h=6.634x10^{-34}$ J.s and $m=1.67x10^{-27}$ kg.

SLR-FJ-8

Seat No.	

Set R

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING PHYSICS I / ENGINEERING PHYSICS II

Day & Date: Friday, 17-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory. And Q. No. 1 Should be solve in first 30 minutes.
2) Figures to the right indicate full marks.
3) Make suitable assumptions, if necessary.
4) Answer MCQ/Objective type question 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 x 10^{26}/k.mol.
2) Velocity of light, c = 3 x 10^{8} m/sec.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative. **14**

1) The hologram records _____ of the object.
   a) Both intensity variation & phase distribution
   b) Only phase distribution
   c) Only intensity variation
   d) None of these

2) In total internal reflection phenomenon the light ray incident from _____.
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3) The numerical aperture is given by the equation _____.
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4) The chirality of zigzag CNT is _____.
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5) Acceptor type semiconductor is formed by adding impurity of valency ___.
   a) 3 b) 4
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6) The number of died axes symmetry elements that are present in a cubic crystal are -_____.
   a) 4 b) 6
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7) The Miller indices of the plane parallel to y & z axes are _____.
   a) (0 0 1) b) (0 1 0)
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8) The audible range of frequency is _____.
   a) 20 KHz to 20 MHz b) 200 KHz to 200 MHz
   c) 200 Hz to 200 MHz d) 20 Hz to 20 KHz

9) Reverberation time is _____ to/of volume of the hall.
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11) The Lorentz transformation equation for x' co-ordinate from s to s' _____.
   a) $x' = (x+vt) / \sqrt{1-v^2/c^2}$ b) $x' = (x-ct) / 1-v^2/c^2$
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SLR-FJ-8

Seat No.	

Set R

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING PHYSICS I / ENGINEERING PHYSICS II

Day & Date: Friday, 17-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsor
2) Figures to the right indicate fill marks.
3) Make suitable assumptions, if necessary.

Constants: 1) Avogadro's no., N= 6.02 x 10^{26}/k.mol.
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Section – I

Q.2 Attempt any SIX of the following : **18**

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g) A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with B=1.5 wb/m^2. If a current of 200 A is set up in the strip, calculate hall voltage that appears across the strip. Assume R_H = 6 x 10^{-7} m^3/C.
h) Molybdenum has a BCC structure. Its density is 10.2 x 10^3 kg/m^3 and its atomic weight is 95.94. determine the lattice constant of Molybdenum atom.

Q.3 Attempt any TWO of the following : **10**

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b) Explain the term Miller indices. Derive the relation between lattice constant & interplaner spacing for cubic crystal.
c) For an empty assembly hall of size 20x15x10 m^3 the reverberation time is 3.5s. calculate the average absorption coefficient of the hall. What are of the wall should be covered by the curtain so as to reduce the reverberation time to 2.5 s. Given the absorption coefficient of curtain cloth is 0.5.
d) Derive the expression for Lorentz transformation equations & its inverse.

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2) Stimulated emission
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SLR-FJ-8

Seat No.	

Set S

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING PHYSICS I / ENGINEERING PHYSICS II

Day & Date: Friday, 17-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory. And Q. No. 1 Should be solve in first 30 minutes.
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MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

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1) The inertial frame of reference is _____ frame of reference.
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2) The Lorentz transformation equation for x' co-ordinate from s to s' _____.
   a) x'= (x+vt) / $\sqrt{1-v^2/c^2}$ b) x'= (x-ct) /$1-v^2/c^2$
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   a) 20 KHz to 20 MHz b) 200 KHz to 200 MHz
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14) Reverberation time is _____ to/of volume of the hall.
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   c) Independent d) None of these

SLR-FJ-8

Seat No.	

Set S

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING PHYSICS I / ENGINEERING PHYSICS II

Day & Date: Friday, 17-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsor
2) Figures to the right indicate fill marks.
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Section – I

Q.2 Attempt any SIX of the following : **18**

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c) For an empty assembly hall of size 20x15x10 m^3 the reverberation time is 3.5s. calculate the average absorption coefficient of the hall. What are of the wall should be covered by the curtain so as to reduce the reverberation time to 2.5 s. Given the absorption coefficient of curtain cloth is 0.5.
d) Derive the expression for Lorentz transformation equations & its inverse.

Section – II

Q.4 Attempt any SIX of the following : **18**

a) Explain Rayleigh's criterion of resolution.
b) Define:
1) Spontaneous emission
2) Stimulated emission
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c) Explain construction and reconstruction of hologram with neat diagram.
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c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.

d) Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.30 nm. Given $h=6.634x10^{-34}$ J.s and $m=1.67x10^{-27}$ kg.

SLR-FJ-9

Seat No.	

Set P

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING CHEMISTRY I / ENGINEERING CHEMISTRY II

Day & Date: Monday, 20-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve the MCQs in first 30 min.
2) Figures to the right indicate full marks.
3) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative. **14**

1) Tinning is the process of coating iron with _____.
   a) Zn b) Sn
   c) Cu d) Nil

2) Containers for the food should not be _____.
   a) galvanized b) tinned
   c) electroplated d) all of those

3) When graphite is dispersed in oil, it is called _____.
   a) grease b) aquadag
   c) oildag d) blended oil

4) Capacity of an oil to stick onto the surfaces of machine parts under conditions of heavy lead, is Called _____.
   a) Volatility b) Oiliness
   c) Acid value d) flash point

5) Osmosis is a processes in which _____.
   a) Solvent molecules move from a solution of higher concentration to lower concentration through a semi permeable membrane
   b) Solute molecules move from a solution of higher concentration to lower one through a semi permeable membrane
   c) Solvent molecules move from a solution of lower concentration to higher one through a semi permeable membrane
   d) Solute molecules move from a solution of lower concentration to higher one through a semi permeable membrane

6) Chlorine is used in purification of drinking water for _____.
   a) disinfection b) coagulation
   c) desalination d) none of these

7) A reaction in which an attacking species (nucleophile, electrophile or free radical) replace another atom or group in the substrate is called _____.
   a) addition reaction b) substitution reaction
   c) elimination reaction d) rearrangement reaction

8) Purest form of iron is: _____.
   a) steel b) wrought iron
   c) pig iron d) cast iron

9) The main constituent of safety glass is _____.
   a) $CaCO_3$ b) PbO
   c) vinyl plastic d) boron

10) A fuel having high ignition temperature is _____.
   a) Petrol b) Wood
   c) Kerosene d) LPG

11) An example of primary fuel is _____.
   a) natural gas b) petrol
   c) wood charcoal d) coke

12) Natural rubber is basically a polymer of _____.
   a) isoprene b) propylene
   c) ethylene d) propane

13) Which of the following is an addition polymer?
   a) Bakelite b) Nylon
   c) Terylene d) Polyethylene

14) Which of the following can be used for purification of substances?
   a) IR spectroscopy b) UV spectroscopy
   c) Gas chromatography d) Calorimetry

Seat No.	

Set **P**

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING CHEMISTRY I / ENGINEERING CHEMISTRY II

Day & Date: Monday, 20-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
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3) Draw neat and labeled diagram wherever necessary.

Section – I

Q.2 Solve any four **16**

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.
$Ca(HCO_3)_2$	95	162
$Mg(HCO_3)_2$	65	146
$MgSO_4$	33	120
$CaCl_2$	25	111

b) Explain Scale and Sludge formation in water.

c) Explain with examples the elimination and rearrangement type of reactions.

d) Define Lubricant. Explain the semisolid lubricant.

e) Describe the Hydrogen evolution and oxygen absorption mechanism of wet corrosion.

f) Explain the Galvanization process for prevention of corrosion.

Q.3 Solve any four **12**

a) Define:-
1) Acidity
2) BOD
3) COD

b) Describe the sedimentation with coagulation process for treatment of the water.

c) How will you synthesis the Aspirin?

d) Numerical Acid Value In an Acid value determination experiment 13.6 gm of oil sample required 7.7 ml of N/10 KOH solution for neutralization to phenolphthalein end point. Calculate the acid value of oil sample. (Mol. wt. of KOH =56)

e) Define:-
1) Cloud point & Pour point
2) Aniline point
3) Saponification value

f) Describe the electrical resistance method for measurement of rate of corrosion.

Section – II

Q.4 Attempt any four **16**

a) Explain general method of manufacturing of glass.

b) During the determination of calorific value of a gaseous fuel by Boy's calorimeter, the following results were obtained:
Volume of the gaseous fuel burnt at STP = 0.13 m^3
Weight of water used for cooling = 35.6 Kg
Weight of steam condensed = 0.045 Kg
Temperature of Inlet water = 24.1^0C
Temperature of Outlet water = 38.4^0C
Determine the gross and net calorific values of gaseous fuel.
(Take latent heat of condensation of steam = 587 kcal/kg)

c) Explain construction and working of bomb calorimeter.

d) Define plastics. Explain thermosoftening and thermosetting plastics.

e) Explain properties and applications of Buna-S and Thiokol rubbers.

f) Define TGA. Explain instrumentation of TGA.

Q.5 Attempt any Four **12**

a) Explain composition properties and applications of cast iron and wrought iron.

b) Explain any three types of glass.

c) Explain characteristics of good fuels.

d) Explain preparation, advantages and disadvantages of biodiesel.

e) A polymer has following population
15 molecules have molecular weight each 8000
20 molecules have molecular weight each 10000
25 molecules have molecular weight each 12000
40 molecules have molecular weight each 18000
Calculate its number average molecular weight.

f) What weight of $MgSO_4$ is required to prepare 0.2 N 300 ml solution and 0.1 M 500 ml solution?
(Mol. Wt. of $MgSO_4$ = 120)

SLR-FJ-9

Seat No.	

Set Q

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING CHEMISTRY I / ENGINEERING CHEMISTRY II

Day & Date: Monday, 20-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve the MCQs in first 30 min.
2) Figures to the right indicate full marks.
3) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative. **14**

1) Purest form of iron is: _____.
   a) steel b) wrought iron
   c) pig iron d) cast iron

2) The main constituent of safety glass is _____.
   a) $CaCO_3$ b) PbO
   c) vinyl plastic d) boron

3) A fuel having high ignition temperature is _____.
   a) Petrol b) Wood
   c) Kerosene d) LPG

4) An example of primary fuel is _____.
   a) natural gas b) petrol
   c) wood charcoal d) coke

5) Natural rubber is basically a polymer of _____.
   a) isoprene b) propylene
   c) ethylene d) propane

6) Which of the following is an addition polymer?
   a) Bakelite b) Nylon
   c) Terylene d) Polyethylene

7) Which of the following can be used for purification of substances?
   a) IR spectroscopy b) UV spectroscopy
   c) Gas chromatography d) Calorimetry

8) Tinning is the process of coating iron with _____.
   a) Zn b) Sn
   c) Cu d) Nil

9) Containers for the food should not be _____.
   a) galvanized b) tinned
   c) electroplated d) all of those

10) When graphite is dispersed in oil, it is called _____.
   a) grease b) aquadag
   c) oildag d) blended oil

11) Capacity of an oil to stick onto the surfaces of machine parts under conditions of heavy lead, is Called _____.
   a) Volatility
   b) Oiliness
   c) Acid value
   d) flash point

12) Osmosis is a processes in which _____.
   a) Solvent molecules move from a solution of higher concentration to lower concentration through a semi permeable membrane
   b) Solute molecules move from a solution of higher concentration to lower one through a semi permeable membrane
   c) Solvent molecules move from a solution of lower concentration to higher one through a semi permeable membrane
   d) Solute molecules move from a solution of lower concentration to higher one through a semi permeable membrane

13) Chlorine is used in purification of drinking water for _____.
   a) disinfection
   b) coagulation
   c) desalination
   d) none of these

14) A reaction in which an attacking species (nucleophile, electrophile or free radical) replace another atom or group in the substrate is called _____.
   a) addition reaction
   b) substitution reaction
   c) elimination reaction
   d) rearrangement reaction

SLR-FJ-9

Seat No.	

Set Q

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING CHEMISTRY I / ENGINEERING CHEMISTRY II

Day & Date: Monday, 20-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat and labeled diagram wherever necessary.

Section – I

Q.2 Solve any four **16**

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.
$Ca(HCO_3)_2$	95	162
$Mg(HCO_3)_2$	65	146
$MgSO_4$	33	120
$CaCl_2$	25	111

b) Explain Scale and Sludge formation in water.

c) Explain with examples the elimination and rearrangement type of reactions.

d) Define Lubricant. Explain the semisolid lubricant.

e) Describe the Hydrogen evolution and oxygen absorption mechanism of wet corrosion.

f) Explain the Galvanization process for prevention of corrosion.

Q.3 Solve any four **12**

a) Define:-
1) Acidity
2) BOD
3) COD

b) Describe the sedimentation with coagulation process for treatment of the water.

c) How will you synthesis the Aspirin?

d) Numerical Acid Value In an Acid value determination experiment 13.6 gm of oil sample required 7.7 ml of N/10 KOH solution for neutralization to phenolphthalein end point. Calculate the acid value of oil sample. (Mol. wt. of KOH =56)

e) Define:-
1) Cloud point & Pour point
2) Aniline point
3) Saponification value

f) Describe the electrical resistance method for measurement of rate of corrosion.

Section – II

Q.4 Attempt any four **16**

a) Explain general method of manufacturing of glass.

b) During the determination of calorific value of a gaseous fuel by Boy's calorimeter, the following results were obtained:

Volume of the gaseous fuel burnt at STP = 0.13 m^3
Weight of water used for cooling = 35.6 Kg
Weight of steam condensed = 0.045 Kg
Temperature of Inlet water = 24.1^0C
Temperature of Outlet water = 38.4^0C

Determine the gross and net calorific values of gaseous fuel.
(Take latent heat of condensation of steam = 587 kcal/kg)

c) Explain construction and working of bomb calorimeter.

d) Define plastics. Explain thermosoftening and thermosetting plastics.

e) Explain properties and applications of Buna-S and Thiokol rubbers.

f) Define TGA. Explain instrumentation of TGA.

Q.5 Attempt any Four **12**

a) Explain composition properties and applications of cast iron and wrought iron.

b) Explain any three types of glass.

c) Explain characteristics of good fuels.

d) Explain preparation, advantages and disadvantages of biodiesel.

e) A polymer has following population
15 molecules have molecular weight each 8000
20 molecules have molecular weight each 10000
25 molecules have molecular weight each 12000
40 molecules have molecular weight each 18000
Calculate its number average molecular weight.

f) What weight of $MgSO_4$ is required to prepare 0.2 N 300 ml solution and 0.1 M 500 ml solution?
(Mol. Wt. of $MgSO_4$ = 120)

SLR-FJ-9

Seat No.	

Set R

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING CHEMISTRY I / ENGINEERING CHEMISTRY II

Day & Date: Monday, 20-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve the MCQs in first 30 min.
2) Figures to the right indicate full marks.
3) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative. **14**

1) An example of primary fuel is _____.
   a) natural gas b) petrol
   c) wood charcoal d) coke

2) Natural rubber is basically a polymer of _____.
   a) isoprene b) propylene
   c) ethylene d) propane

3) Which of the following is an addition polymer?
   a) Bakelite b) Nylon
   c) Terylene d) Polyethylene

4) Which of the following can be used for purification of substances?
   a) IR spectroscopy b) UV spectroscopy
   c) Gas chromatography d) Calorimetry

5) Tinning is the process of coating iron with _____.
   a) Zn b) Sn
   c) Cu d) Nil

6) Containers for the food should not be _____.
   a) galvanized b) tinned
   c) electroplated d) all of those

7) When graphite is dispersed in oil, it is called _____.
   a) grease b) aquadag
   c) oildag d) blended oil

8) Capacity of an oil to stick onto the surfaces of machine parts under conditions of heavy lead, is Called _____.
   a) Volatility b) Oiliness
   c) Acid value d) flash point

9) Osmosis is a processes in which _____.
   a) Solvent molecules move from a solution of higher concentration to lower concentration through a semi permeable membrane
   b) Solute molecules move from a solution of higher concentration to lower one through a semi permeable membrane
   c) Solvent molecules move from a solution of lower concentration to higher one through a semi permeable membrane
   d) Solute molecules move from a solution of lower concentration to higher one through a semi permeable membrane

10) Chlorine is used in purification of drinking water for _____.
   a) disinfection b) coagulation
   c) desalination d) none of these

11) A reaction in which an attacking species (nucleophile, electrophile or free radical) replace another atom or group in the substrate is called _____.
   a) addition reaction b) substitution reaction
   c) elimination reaction d) rearrangement reaction

12) Purest form of iron is: _____.
   a) steel b) wrought iron
   c) pig iron d) cast iron

13) The main constituent of safety glass is _____.
   a) $CaCO_3$ b) PbO
   c) vinyl plastic d) boron

14) A fuel having high ignition temperature is _____.
   a) Petrol b) Wood
   c) Kerosene d) LPG

Seat No.	

Set **R**

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING CHEMISTRY I / ENGINEERING CHEMISTRY II

Day & Date: Monday, 20-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat and labeled diagram wherever necessary.

Section – I

Q.2 Solve any four **16**

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.
$Ca(HCO_3)_2$	95	162
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$MgSO_4$	33	120
$CaCl_2$	25	111

b) Explain Scale and Sludge formation in water.

c) Explain with examples the elimination and rearrangement type of reactions.

d) Define Lubricant. Explain the semisolid lubricant.

e) Describe the Hydrogen evolution and oxygen absorption mechanism of wet corrosion.

f) Explain the Galvanization process for prevention of corrosion.

Q.3 Solve any four **12**

a) Define:-
1) Acidity
2) BOD
3) COD

b) Describe the sedimentation with coagulation process for treatment of the water.

c) How will you synthesis the Aspirin?

d) Numerical Acid Value In an Acid value determination experiment 13.6 gm of oil sample required 7.7 ml of N/10 KOH solution for neutralization to phenolphthalein end point. Calculate the acid value of oil sample. (Mol. wt. of KOH =56)

e) Define:-
1) Cloud point & Pour point
2) Aniline point
3) Saponification value

f) Describe the electrical resistance method for measurement of rate of corrosion.

Section – II

Q.4 Attempt any four **16**

a) Explain general method of manufacturing of glass.

b) During the determination of calorific value of a gaseous fuel by Boy's calorimeter, the following results were obtained:

Volume of the gaseous fuel burnt at STP = 0.13 m^3
Weight of water used for cooling = 35.6 Kg
Weight of steam condensed = 0.045 Kg
Temperature of Inlet water = 24.1^0C
Temperature of Outlet water = 38.4^0C

Determine the gross and net calorific values of gaseous fuel.
(Take latent heat of condensation of steam = 587 kcal/kg)

c) Explain construction and working of bomb calorimeter.

d) Define plastics. Explain thermosoftening and thermosetting plastics.

e) Explain properties and applications of Buna-S and Thiokol rubbers.

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a) Explain composition properties and applications of cast iron and wrought iron.

b) Explain any three types of glass.

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Calculate its number average molecular weight.

f) What weight of $MgSO_4$ is required to prepare 0.2 N 300 ml solution and 0.1 M 500 ml solution?
(Mol. Wt. of $MgSO_4$ = 120)

SLR-FJ-9

Seat No.	

Set S

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING CHEMISTRY I / ENGINEERING CHEMISTRY II

Day & Date: Monday, 20-05-2019 Max. Marks: 70
Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve the MCQs in first 30 min.
2) Figures to the right indicate full marks.
3) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Q.1 Choose the correct alternative. **14**

1) Chlorine is used in purification of drinking water for _____.
   a) disinfection b) coagulation
   c) desalination d) none of these

2) A reaction in which an attacking species (nucleophile, electrophile or free radical) replace another atom or group in the substrate is called _____.
   a) addition reaction b) substitution reaction
   c) elimination reaction d) rearrangement reaction

3) Purest form of iron is: _____.
   a) steel b) wrought iron
   c) pig iron d) cast iron

4) The main constituent of safety glass is _____.
   a) $CaCO_3$ b) PbO
   c) vinyl plastic d) boron

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   b) Solute molecules move from a solution of higher concentration to lower one through a semi permeable membrane
   c) Solvent molecules move from a solution of lower concentration to higher one through a semi permeable membrane
   d) Solute molecules move from a solution of lower concentration to higher one through a semi permeable membrane

Seat No.	

Set **S**

F.Y. (B.Tech.) (Semester – II) (New) (CBCS) Examination
March/April-2019
ENGINEERING CHEMISTRY I / ENGINEERING CHEMISTRY II

Day & Date: Monday, 20-05-2019 Max. Marks: 56
Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat and labeled diagram wherever necessary.

Section – I

Q.2 Solve any four **16**

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.
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c) Explain with examples the elimination and rearrangement type of reactions.

d) Define Lubricant. Explain the semisolid lubricant.

e) Describe the Hydrogen evolution and oxygen absorption mechanism of wet corrosion.

f) Explain the Galvanization process for prevention of corrosion.

Q.3 Solve any four **12**

a) Define:-
1) Acidity
2) BOD
3) COD

b) Describe the sedimentation with coagulation process for treatment of the water.

c) How will you synthesis the Aspirin?

d) Numerical Acid Value In an Acid value determination experiment 13.6 gm of oil sample required 7.7 ml of N/10 KOH solution for neutralization to phenolphthalein end point. Calculate the acid value of oil sample. (Mol. wt. of KOH =56)

e) Define:-
1) Cloud point & Pour point
2) Aniline point
3) Saponification value

f) Describe the electrical resistance method for measurement of rate of corrosion.

Section – II

Q.4 Attempt any four **16**

a) Explain general method of manufacturing of glass.

b) During the determination of calorific value of a gaseous fuel by Boy's calorimeter, the following results were obtained:
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b) Explain any three types of glass.

c) Explain characteristics of good fuels.

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(Mol. Wt. of $MgSO_4$ = 120)