SLR-TJ – 1

Seat No.	

Set **P**

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – I

Day and Date : Monday, 11-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) The n^{th} derivative of $\frac{1}{x}$ is

a) $\frac{(-1)^n n!}{x^{n+1}}$ b) $\frac{(-1)^n n!}{x^n}$ c) $\frac{(-1)^n (n-1)!}{x^n}$ d) $\frac{(-1)^n (n-1)!}{x^{n+1}}$

2) The n^{th} term in the Taylor's series is

a) $\frac{f^n(h)}{n!}$ b) $\frac{x^n}{n!}$ c) $\frac{x^n}{n!} f^n(h)$ d) $x^n f^{(n)}(h)$

3) Which of the following is not true ?

a) sinix = isinhx b) cosix = coshx c) tanix = itanhx d) cotix = icothx

4) The modulus and the amplitude of $2 + 2\sqrt{3}\,i$ are

a) $4\sqrt{3}, \frac{\pi}{3}$ b) $4, \frac{\pi}{3}$ c) $4, \frac{\pi}{6}$ d) $4, \frac{2\pi}{3}$

5) If $y = xe^{2x}$ then y_n =

a) $2n!\, xe^{2x}$ b) $2^n xe^{2x}$

c) $2^n e^{2x} x + n2^{n-1} e^{2x}$ d) $2^n e^{2x} x^2 + n2^{n-2} e^x$

6) Cosh(x + iy) =

a) coshxcosy + isinhxsiny b) coshxcosy – isinhxsiny

c) coshxcoshy + isinhxsinhy d) sinhxsiny + icoshxcosy

P.T.O.

7) The expansion of $\tan^{-1}x$ in powers of x is

a) $1-\frac{x^3}{3}+\frac{x^5}{5}-\frac{x^7}{7}+\ldots$ b) $x+\frac{x^3}{3}+\frac{x^5}{5}+\frac{x^7}{7}+\ldots$

c) $x-\frac{x^3}{3}+\frac{x^5}{5}-\frac{x^7}{7}+\ldots$ d) $x-\frac{x^3}{3!}+\frac{x^5}{5!}-\frac{x^7}{7!}+\ldots$

8) If A is a matrix of order 4×3 then the rank of the matrix A is

a) less than 3 or equal to 3 b) greater than 3

c) greater than 4 d) none of these

9) The system of equations AX = B is inconsistent if

a) rank of A $\neq$ rank of (A : B) b) rank of A = rank of (A : B)

c) rank of A = rank of B d) none of these

10) If X_1, X_2, X_3 are linearly dependent vectors then

a) $X_1 = X_2 = X_3$ b) $X_1 = K_1X_2 + K_2X_3$

c) $X_1 = 0, X_2 = 0, X_3 = 0$ d) None of these

11) If $u = x^2y\phi\left(y/x\right)$ then $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=$

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

12) If δx is an error in x, then $100\times\frac{\partial x}{x}$ is called

a) absolute error in x b) relative error in x

c) percentage error in x d) none of these

13) If $x = uv,\ y=\frac{u}{v}$, then $\frac{\partial(x, y)}{\partial(u, v)}=$

a) $\frac{-u}{v}$ b) $-2\frac{u}{v}$ c) $\frac{-u}{2v}$ d) $\frac{u}{v}$

14) If $z = \sin^{-1}\left(\frac{x}{y}\right)$, then $\frac{\partial z}{\partial x}=$

a) $\frac{1}{\sqrt{y^2-x^2}}$ b) $\frac{x}{\sqrt{y^2-x^2}}$ c) $\frac{y}{\sqrt{y^2-x^2}}$ d) $\frac{1}{\sqrt{x^2-y^2}}$

SLR-TJ – 1

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – I

Day and Date : Monday, 11-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

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

SECTION – I

2. Solve **any three** of the following : **9**

a) Find n^{th} derivative of $\frac{1}{6x^2 - 5x + 1}$.

b) Evaluate $\left(\frac{1 + \sin\alpha + i\cos\alpha}{1 + \sin\alpha - i\cos\alpha}\right)^n$.

c) By using Maclaurin series expand $\log(1 + e^x)$.

d) Expand $x^3 - 3x^2 + 4x + 3$ in powers of $(x - 2)$.

e) Prove that $\left(1 + i\sqrt{3}\right)^8 + \left(1 - i\sqrt{3}\right)^8 = -2^8$.

3. Solve **any three** of the following : **9**

a) Find n^{th} derivative of $e^{2x} \cdot \sin\left(\frac{x}{2}\right) \cdot \cos\left(\frac{x}{2}\right)$.

b) If $\lim_{x \to 0} \frac{x(1 + a\cos x) - b\sin x}{x^3} = 1$, find a and b.

c) Evaluate $\lim_{x \to \frac{\pi}{2}} (\sec x)^{\cot x}$.

d) Prove that $\tanh^{-1}(\cos\theta) = \cosh^{-1}(\operatorname{cosec}\theta)$.

e) If $\sin(\theta + i\phi) = \cos\alpha + i\sin\alpha$, then show that $\cos^2\theta = \pm\sin\alpha$.

Set P

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

a) If $i^{\alpha+i\beta} = \alpha + i\beta$, prove that $\alpha^2 + \beta^2 = e^{-(4n+1)\pi\beta}$ where n is positive integer.

b) If $y = \sin[m\sin^{-1}x]$, prove that $(1 - x^2)y_{n+2} - (2n + 1)\, xy_{n+1} + (m^2 - n^2)\, y_n = 0$. Hence deduce that $y_n(0) = 0$ if n is even

$y_n(0) = \left[(n-2)^2 - m^2\right]\ldots\left(3^2 - m^2\right)\left(1^2 - m^2\right)\cdot m$ if n is odd.

c) Prove that $e^{x\sin x} = 1 + x^2 + \frac{1}{3}x^4 + \frac{1}{120}x^6 + \ldots$ (use standard expansions).

SECTION – II

5. Solve **any three** of the following : **9**

a) Reduce the following matrix to normal form and hence find it's rank

$$\begin{bmatrix} 3 & 2 & 1 & 4 \\ 1 & 4 & 3 & 2 \\ 4 & 6 & 4 & 6 \\ 7 & 8 & 5 & 10 \end{bmatrix}$$

b) Find the value of λ and μ for which $2x + 3y + 5z = 9$; $7x + 3y - 2z = 8$; $2x + 3y + \lambda z = \mu$ has a i) Unique solution ii) Many solution iii) No solution.

c) If $z = f(u, v)$ and $u = x^2 - y^2$, $v = 2xy$, show that $x\frac{\partial z}{\partial x} - y\frac{\partial z}{\partial y} = 2\left(x^2 + y^2\right)\frac{\partial z}{\partial u}$.

d) If $z = x^3 - 3xy^2 + x + e^x\cos y + 1$, find the value of $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y}$.

e) Find the minimum value of $x^2 + y^2 + z^2$ subject to the condition $ax + by + cz = P$.

6. Solve **any three** of the following : **9**

a) Find the eigen values and eigen vector corresponding to least eigen value of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

b) Find the eigen values of the matrix A and also find eigen values of A^{-1}, if

$$A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}.$$

c) If $z = f(x, y)$ and $x = e^u \cos v$, $y = e^u \sin v$, prove that

$$\left(\frac{\partial z}{\partial u}\right)^2 + \left(\frac{\partial z}{\partial v}\right)^2 = e^{2u}\left[\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2\right].$$

d) If $u = x(1 - y)$ and $v = xy$, find the Jacobians $J = \frac{\partial(u, v)}{\partial(x, y)}$ and $J' = \frac{\partial(x, y)}{\partial(u, v)}$. Verify that $JJ' = 1$.

e) If the Kinetic energy $T = \frac{1}{2}mv^2$, find approximately the change in T as the mass m changes from 49 to 49.5 and the velocity v changes from 1600 to 1590.

7. Solve **any two** of the following : **(2×5=10)**

a) Verify the Cayley – Hamilton theorem for the matrix

$$A = \begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}$$ and also find A^{-1}.

b) If $u = \operatorname{cosec}\left[\frac{x^{1/2} + y^{1/2}}{x^{1/3} + y^{1/3}}\right]$, find the value of

i) $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$

ii) $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x \partial y} + y^2\frac{\partial^2 u}{\partial y^2}$.

c) Find the maximum and minimum values of the function $x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$.

———————

Set P

SLR-TJ – 1

Seat No.	

Set **Q**

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – I

Day and Date : Monday, 11-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) If A is a matrix of order 4×3 then the rank of the matrix A is
   a) less than 3 or equal to 3 b) greater than 3
   c) greater than 4 d) none of these

2) The system of equations AX = B is inconsistent if
   a) rank of A $\neq$ rank of (A : B) b) rank of A = rank of (A : B)
   c) rank of A = rank of B d) none of these

3) If X_1, X_2, X_3 are linearly dependent vectors then
   a) $X_1 = X_2 = X_3$ b) $X_1 = K_1X_2 + K_2X_3$
   c) $X_1 = 0, X_2 = 0, X_3 = 0$ d) None of these

4) If $u = x^2y\phi\left(\frac{y}{x}\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} =$
   a) 0 b) u c) 2u d) 3u

5) If δx is an error in x, then $100 \times \frac{\partial x}{x}$ is called
   a) absolute error in x b) relative error in x
   c) percentage error in x d) none of these

P.T.O.

6) If $x = uv,\ y = \frac{u}{v}$, then $\frac{\partial(x, y)}{\partial(u, v)} =$

a) $\frac{-u}{v}$ b) $-2\frac{u}{v}$ c) $\frac{-u}{2v}$ d) $\frac{u}{v}$

7) If $z = \sin^{-1}\left(\frac{x}{y}\right)$, then $\frac{\partial z}{\partial x} =$

a) $\frac{1}{\sqrt{y^2 - x^2}}$ b) $\frac{x}{\sqrt{y^2 - x^2}}$ c) $\frac{y}{\sqrt{y^2 - x^2}}$ d) $\frac{1}{\sqrt{x^2 - y^2}}$

8) The n^{th} derivative of $\frac{1}{x}$ is

a) $\frac{(-1)^n n!}{x^{n+1}}$ b) $\frac{(-1)^n n!}{x^n}$ c) $\frac{(-1)^n (n-1)!}{x^n}$ d) $\frac{(-1)^n (n-1)!}{x^{n+1}}$

9) The n^{th} term in the Taylor's series is

a) $\frac{f^n(h)}{n!}$ b) $\frac{x^n}{n!}$ c) $\frac{x^n}{n!} f^n(h)$ d) $x^n f^{(n)}(h)$

10) Which of the following is not true ?

a) sinix = isinhx b) cosix = coshx c) tanix = itanhx d) cotix = icothx

11) The modulus and the amplitude of $2 + 2\sqrt{3}\,i$ are

a) $4\sqrt{3}, \frac{\pi}{3}$ b) $4, \frac{\pi}{3}$ c) $4, \frac{\pi}{6}$ d) $4, \frac{2\pi}{3}$

12) If $y = xe^{2x}$ then $y_n =$

a) $2n!\ xe^{2x}$ b) $2^n xe^{2x}$

c) $2^n e^{2x} x + n2^{n-1} e^{2x}$ d) $2^n e^{2x} x^2 + n2^{n-2} e^x$

13) Cosh(x + iy) =

a) coshxcosy + isinhxsiny b) coshxcosy – isinhxsiny

c) coshxcoshy + isinhxsinhy d) sinhxsiny + icoshxcosy

14) The expansion of $\tan^{-1}x$ in powers of x is

a) $1 - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \ldots$ b) $x + \frac{x^3}{3} + \frac{x^5}{5} + \frac{x^7}{7} + \ldots$

c) $x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \ldots$ d) $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots$

SLR-TJ – 1

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – I

Day and Date : Monday, 11-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

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

SECTION – I

2. Solve **any three** of the following : **9**

a) Find n^{th} derivative of $\frac{1}{6x^2 - 5x + 1}$.

b) Evaluate $\left(\frac{1+\sin\alpha+i\cos\alpha}{1+\sin\alpha-i\cos\alpha}\right)^n$.

c) By using Maclaurin series expand $\log(1 + e^x)$.

d) Expand $x^3 - 3x^2 + 4x + 3$ in powers of $(x - 2)$.

e) Prove that $\left(1+i\sqrt{3}\right)^8 + \left(1-i\sqrt{3}\right)^8 = -2^8$.

3. Solve **any three** of the following : **9**

a) Find n^{th} derivative of $e^{2x} \cdot \sin\left(\frac{x}{2}\right) \cdot \cos\left(\frac{x}{2}\right)$.

b) If $\lim_{x\to 0} \frac{x(1+a\cos x) - b\sin x}{x^3} = 1$, find a and b.

c) Evaluate $\lim_{x\to\frac{\pi}{2}} (\sec x)^{\cot x}$.

d) Prove that $\tanh^{-1}(\cos\theta) = \cosh^{-1}(\operatorname{cosec}\theta)$.

e) If $\sin(\theta + i\phi) = \cos\alpha + i\sin\alpha$, then show that $\cos^2\theta = \pm\sin\alpha$.

Set Q

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

a) If $i^{\alpha+i\beta} = \alpha + i\beta$, prove that $\alpha^2 + \beta^2 = e^{-(4n+1)\pi\beta}$ where n is positive integer.

b) If $y = \sin[m\sin^{-1}x]$, prove that $(1 - x^2)y_{n+2} - (2n + 1)\, xy_{n+1} + (m^2 - n^2)\, y_n = 0$. Hence deduce that $y_n(0) = 0$ if n is even

$y_n(0) = \left[(n-2)^2 - m^2\right]\ldots\left(3^2 - m^2\right)\left(1^2 - m^2\right)\cdot m$ if n is odd.

c) Prove that $e^{x\sin x} = 1 + x^2 + \frac{1}{3}x^4 + \frac{1}{120}x^6 + \ldots$ (use standard expansions).

SECTION – II

5. Solve **any three** of the following : **9**

a) Reduce the following matrix to normal form and hence find it's rank

$$\begin{bmatrix} 3 & 2 & 1 & 4 \\ 1 & 4 & 3 & 2 \\ 4 & 6 & 4 & 6 \\ 7 & 8 & 5 & 10 \end{bmatrix}$$

b) Find the value of λ and μ for which $2x + 3y + 5z = 9$; $7x + 3y - 2z = 8$; $2x + 3y + \lambda z = \mu$ has a i) Unique solution ii) Many solution iii) No solution.

c) If $z = f(u, v)$ and $u = x^2 - y^2$, $v = 2xy$, show that $x\frac{\partial z}{\partial x} - y\frac{\partial z}{\partial y} = 2\left(x^2 + y^2\right)\frac{\partial z}{\partial u}$.

d) If $z = x^3 - 3xy^2 + x + e^x\cos y + 1$, find the value of $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y}$.

e) Find the minimum value of $x^2 + y^2 + z^2$ subject to the condition $ax + by + cz = P$.

6. Solve **any three** of the following : **9**

a) Find the eigen values and eigen vector corresponding to least eigen value of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

b) Find the eigen values of the matrix A and also find eigen values of A^{-1}, if

$$A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}.$$

c) If $z = f(x, y)$ and $x = e^u \cos v$, $y = e^u \sin v$, prove that

$$\left(\frac{\partial z}{\partial u}\right)^2 + \left(\frac{\partial z}{\partial v}\right)^2 = e^{2u}\left[\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2\right].$$

d) If $u = x(1 - y)$ and $v = xy$, find the Jacobians $J = \frac{\partial(u, v)}{\partial(x, y)}$ and $J' = \frac{\partial(x, y)}{\partial(u, v)}$. Verify that $JJ' = 1$.

e) If the Kinetic energy $T = \frac{1}{2}mv^2$, find approximately the change in T as the mass m changes from 49 to 49.5 and the velocity v changes from 1600 to 1590.

7. Solve **any two** of the following : **(2×5=10)**

a) Verify the Cayley – Hamilton theorem for the matrix

$$A = \begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}$$ and also find A^{-1}.

b) If $u = \operatorname{cosec}\left[\frac{x^{1/2} + y^{1/2}}{x^{1/3} + y^{1/3}}\right]$, find the value of

i) $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$

ii) $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x \partial y} + y^2\frac{\partial^2 u}{\partial y^2}$.

c) Find the maximum and minimum values of the function $x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$.

———————

Set Q

SLR-TJ – 1

Seat No.	

Set R

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – I

Day and Date : Monday, 11-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) If $y = xe^{2x}$ then y_n =
   a) $2n!\ xe^{2x}$ b) $2^n xe^{2x}$
   c) $2^n e^{2x} x + n2^{n-1} e^{2x}$ d) $2^n e^{2x} x^2 + n2^{n-2} e^x$

2) Cosh(x + iy) =
   a) coshxcosy + isinhxsiny b) coshxcosy – isinhxsiny
   c) coshxcoshy + isinhxsinhy d) sinhxsiny + icoshxcosy

3) The expansion of $\tan^{-1}x$ in powers of x is
   a) $1-\frac{x^3}{3}+\frac{x^5}{5}-\frac{x^7}{7}+\ldots$ b) $x+\frac{x^3}{3}+\frac{x^5}{5}+\frac{x^7}{7}+\ldots$
   c) $x-\frac{x^3}{3}+\frac{x^5}{5}-\frac{x^7}{7}+\ldots$ d) $x-\frac{x^3}{3!}+\frac{x^5}{5!}-\frac{x^7}{7!}+\ldots$

4) If A is a matrix of order 4 × 3 then the rank of the matrix A is
   a) less than 3 or equal to 3 b) greater than 3
   c) greater than 4 d) none of these

5) 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

P.T.O.

6) If X_1, X_2, X_3 are linearly dependent vectors then

a) $X_1 = X_2 = X_3$ b) $X_1 = K_1X_2 + K_2X_3$
c) $X_1 = 0, X_2 = 0, X_3 = 0$ d) None of these

7) If $u = x^2 y\phi\left(y/x\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} =$

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

8) If δx is an error in x, then $100 \times \frac{\partial x}{x}$ is called

a) absolute error in x b) relative error in x
c) percentage error in x d) none of these

9) If $x = uv,\ y = \frac{u}{v}$, then $\frac{\partial(x, y)}{\partial(u, v)} =$

a) $\frac{-u}{v}$ b) $-2\frac{u}{v}$ c) $\frac{-u}{2v}$ d) $\frac{u}{v}$

10) If $z = \sin^{-1}\left(\frac{x}{y}\right)$, then $\frac{\partial z}{\partial x} =$

a) $\frac{1}{\sqrt{y^2 - x^2}}$ b) $\frac{x}{\sqrt{y^2 - x^2}}$ c) $\frac{y}{\sqrt{y^2 - x^2}}$ d) $\frac{1}{\sqrt{x^2 - y^2}}$

11) The n^{th} derivative of $\frac{1}{x}$ is

a) $\frac{(-1)^n n!}{x^{n+1}}$ b) $\frac{(-1)^n n!}{x^n}$ c) $\frac{(-1)^n (n-1)!}{x^n}$ d) $\frac{(-1)^n (n-1)!}{x^{n+1}}$

12) The n^{th} term in the Taylor's series is

a) $\frac{f^n(h)}{n!}$ b) $\frac{x^n}{n!}$ c) $\frac{x^n}{n!} f^n(h)$ d) $x^n f^{(n)}(h)$

13) Which of the following is not true ?

a) sinix = isinhx b) cosix = coshx c) tanix = itanhx d) cotix = icothx

14) The modulus and the amplitude of $2 + 2\sqrt{3}\,i$ are

a) $4\sqrt{3}, \frac{\pi}{3}$ b) $4, \frac{\pi}{3}$ c) $4, \frac{\pi}{6}$ d) $4, \frac{2\pi}{3}$

———————

SLR-TJ – 1

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – I

Day and Date : Monday, 11-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

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

SECTION – I

2. Solve **any three** of the following : **9**

a) Find n^{th} derivative of $\frac{1}{6x^2 - 5x + 1}$.

b) Evaluate $\left(\frac{1 + \sin\alpha + i\cos\alpha}{1 + \sin\alpha - i\cos\alpha}\right)^n$.

c) By using Maclaurin series expand $\log(1 + e^x)$.

d) Expand $x^3 - 3x^2 + 4x + 3$ in powers of $(x - 2)$.

e) Prove that $\left(1 + i\sqrt{3}\right)^8 + \left(1 - i\sqrt{3}\right)^8 = -2^8$.

3. Solve **any three** of the following : **9**

a) Find n^{th} derivative of $e^{2x} \cdot \sin\left(\frac{x}{2}\right) \cdot \cos\left(\frac{x}{2}\right)$.

b) If $\lim_{x \to 0} \frac{x(1 + a\cos x) - b\sin x}{x^3} = 1$, find a and b.

c) Evaluate $\lim_{x \to \frac{\pi}{2}} (\sec x)^{\cot x}$.

d) Prove that $\tanh^{-1}(\cos\theta) = \cosh^{-1}(\operatorname{cosec}\theta)$.

e) If $\sin(\theta + i\phi) = \cos\alpha + i\sin\alpha$, then show that $\cos^2\theta = \pm\sin\alpha$.

Set R

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

a) If $i^{\alpha+i\beta} = \alpha + i\beta$, prove that $\alpha^2 + \beta^2 = e^{-(4n+1)\pi\beta}$ where n is positive integer.

b) If $y = \sin[m\sin^{-1}x]$, prove that $(1 - x^2)y_{n+2} - (2n + 1)\, xy_{n+1} + (m^2 - n^2)\, y_n = 0$. Hence deduce that $y_n(0) = 0$ if n is even

$y_n(0) = \left[(n-2)^2 - m^2\right]\ldots\left(3^2 - m^2\right)\left(1^2 - m^2\right)\cdot m$ if n is odd.

c) Prove that $e^{x\sin x} = 1 + x^2 + \frac{1}{3}x^4 + \frac{1}{120}x^6 + \ldots$ (use standard expansions).

SECTION – II

5. Solve **any three** of the following : **9**

a) Reduce the following matrix to normal form and hence find it's rank

$$\begin{bmatrix} 3 & 2 & 1 & 4 \\ 1 & 4 & 3 & 2 \\ 4 & 6 & 4 & 6 \\ 7 & 8 & 5 & 10 \end{bmatrix}$$

b) Find the value of λ and μ for which $2x + 3y + 5z = 9$; $7x + 3y - 2z = 8$; $2x + 3y + \lambda z = \mu$ has a i) Unique solution ii) Many solution iii) No solution.

c) If $z = f(u, v)$ and $u = x^2 - y^2$, $v = 2xy$, show that $x\frac{\partial z}{\partial x} - y\frac{\partial z}{\partial y} = 2\left(x^2 + y^2\right)\frac{\partial z}{\partial u}$.

d) If $z = x^3 - 3xy^2 + x + e^x\cos y + 1$, find the value of $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y}$.

e) Find the minimum value of $x^2 + y^2 + z^2$ subject to the condition $ax + by + cz = P$.

6. Solve **any three** of the following : **9**

a) Find the eigen values and eigen vector corresponding to least eigen value of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

b) Find the eigen values of the matrix A and also find eigen values of A^{-1}, if

$$A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}.$$

c) If $z = f(x, y)$ and $x = e^u \cos v$, $y = e^u \sin v$, prove that

$$\left(\frac{\partial z}{\partial u}\right)^2 + \left(\frac{\partial z}{\partial v}\right)^2 = e^{2u}\left[\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2\right].$$

d) If $u = x(1 - y)$ and $v = xy$, find the Jacobians $J = \frac{\partial(u, v)}{\partial(x, y)}$ and $J' = \frac{\partial(x, y)}{\partial(u, v)}$. Verify that $JJ' = 1$.

e) If the Kinetic energy $T = \frac{1}{2}mv^2$, find approximately the change in T as the mass m changes from 49 to 49.5 and the velocity v changes from 1600 to 1590.

7. Solve **any two** of the following : **(2×5=10)**

a) Verify the Cayley – Hamilton theorem for the matrix

$$A = \begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}$$ and also find A^{-1}.

b) If $u = \operatorname{cosec}\left[\frac{x^{1/2} + y^{1/2}}{x^{1/3} + y^{1/3}}\right]$, find the value of

i) $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$

ii) $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x \partial y} + y^2\frac{\partial^2 u}{\partial y^2}$.

c) Find the maximum and minimum values of the function $x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$.

———————

Set R

SLR-TJ – 1

Seat No.	

Set S

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – I

Day and Date : Monday, 11-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) If X_1, X_2, X_3 are linearly dependent vectors then

a) $X_1 = X_2 = X_3$ b) $X_1 = K_1X_2 + K_2X_3$

c) $X_1 = 0, X_2 = 0, X_3 = 0$ d) None of these

2) If $u = x^2y\phi\left(\frac{y}{x}\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} =$

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

3) If δx is an error in x, then $100 \times \frac{\partial x}{x}$ is called

a) absolute error in x b) relative error in x

c) percentage error in x d) none of these

4) If $x = uv,\ y = \frac{u}{v}$, then $\frac{\partial(x, y)}{\partial(u, v)} =$

a) $\frac{-u}{v}$ b) $-2\frac{u}{v}$ c) $\frac{-u}{2v}$ d) $\frac{u}{v}$

P.T.O.

5) If $z = \sin^{-1}\left(\frac{x}{y}\right)$, then $\frac{\partial z}{\partial x} =$

a) $\frac{1}{\sqrt{y^2 - x^2}}$ b) $\frac{x}{\sqrt{y^2 - x^2}}$ c) $\frac{y}{\sqrt{y^2 - x^2}}$ d) $\frac{1}{\sqrt{x^2 - y^2}}$

6) The n^{th} derivative of $\frac{1}{x}$ is

a) $\frac{(-1)^n n!}{x^{n+1}}$ b) $\frac{(-1)^n n!}{x^n}$ c) $\frac{(-1)^n (n-1)!}{x^n}$ d) $\frac{(-1)^n (n-1)!}{x^{n+1}}$

7) The n^{th} term in the Taylor's series is

a) $\frac{f^n(h)}{n!}$ b) $\frac{x^n}{n!}$ c) $\frac{x^n}{n!} f^n(h)$ d) $x^n f^{(n)}(h)$

8) Which of the following is not true ?

a) sinix = isinhx b) cosix = coshx c) tanix = itanhx d) cotix = icothx

9) The modulus and the amplitude of $2 + 2\sqrt{3}\,i$ are

a) $4\sqrt{3}, \frac{\pi}{3}$ b) $4, \frac{\pi}{3}$ c) $4, \frac{\pi}{6}$ d) $4, \frac{2\pi}{3}$

10) If $y = xe^{2x}$ then $y_n =$

a) $2n!\, xe^{2x}$ b) $2^n xe^{2x}$

c) $2^n e^{2x} x + n2^{n-1} e^{2x}$ d) $2^n e^{2x} x^2 + n2^{n-2} e^x$

11) Cosh(x + iy) =

a) coshxcosy + isinhxsiny b) coshxcosy – isinhxsiny

c) coshxcoshy + isinhxsinhy d) sinhxsiny + icoshxcosy

12) The expansion of $\tan^{-1}x$ in powers of x is

a) $1 - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \ldots$ b) $x + \frac{x^3}{3} + \frac{x^5}{5} + \frac{x^7}{7} + \ldots$

c) $x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + \ldots$ d) $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots$

13) If A is a matrix of order 4×3 then the rank of the matrix A is

a) less than 3 or equal to 3 b) greater than 3

c) greater than 4 d) none of these

14) The system of equations AX = B is inconsistent if

a) rank of A $\neq$ rank of (A : B) b) rank of A = rank of (A : B)

c) rank of A = rank of B d) none of these

SLR-TJ – 1

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – I

Day and Date : Monday, 11-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

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

SECTION – I

2. Solve **any three** of the following : **9**

a) Find n^{th} derivative of $\frac{1}{6x^2 - 5x + 1}$.

b) Evaluate $\left(\frac{1+\sin\alpha+i\cos\alpha}{1+\sin\alpha-i\cos\alpha}\right)^n$.

c) By using Maclaurin series expand $\log(1 + e^x)$.

d) Expand $x^3 - 3x^2 + 4x + 3$ in powers of $(x - 2)$.

e) Prove that $\left(1+i\sqrt{3}\right)^8 + \left(1-i\sqrt{3}\right)^8 = -2^8$.

3. Solve **any three** of the following : **9**

a) Find n^{th} derivative of $e^{2x} \cdot \sin\left(\frac{x}{2}\right) \cdot \cos\left(\frac{x}{2}\right)$.

b) If $\lim_{x\to 0} \frac{x(1+a\cos x) - b\sin x}{x^3} = 1$, find a and b.

c) Evaluate $\lim_{x\to\frac{\pi}{2}} (\sec x)^{\cot x}$.

d) Prove that $\tanh^{-1}(\cos\theta) = \cosh^{-1}(\operatorname{cosec}\theta)$.

e) If $\sin(\theta + i\phi) = \cos\alpha + i\sin\alpha$, then show that $\cos^2\theta = \pm\sin\alpha$.

Set S

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

a) If $i^{\alpha+i\beta} = \alpha + i\beta$, prove that $\alpha^2 + \beta^2 = e^{-(4n+1)\pi\beta}$ where n is positive integer.

b) If $y = \sin[m\sin^{-1}x]$, prove that $(1 - x^2)y_{n+2} - (2n + 1)\, xy_{n+1} + (m^2 - n^2)\, y_n = 0$. Hence deduce that $y_n(0) = 0$ if n is even

$y_n(0) = \left[(n-2)^2 - m^2\right]\ldots\left(3^2 - m^2\right)\left(1^2 - m^2\right)\cdot m$ if n is odd.

c) Prove that $e^{x\sin x} = 1 + x^2 + \frac{1}{3}x^4 + \frac{1}{120}x^6 + \ldots$ (use standard expansions).

SECTION – II

5. Solve **any three** of the following : **9**

a) Reduce the following matrix to normal form and hence find it's rank

$$\begin{bmatrix} 3 & 2 & 1 & 4 \\ 1 & 4 & 3 & 2 \\ 4 & 6 & 4 & 6 \\ 7 & 8 & 5 & 10 \end{bmatrix}$$

b) Find the value of λ and μ for which $2x + 3y + 5z = 9$; $7x + 3y - 2z = 8$; $2x + 3y + \lambda z = \mu$ has a i) Unique solution ii) Many solution iii) No solution.

c) If $z = f(u, v)$ and $u = x^2 - y^2$, $v = 2xy$, show that $x\frac{\partial z}{\partial x} - y\frac{\partial z}{\partial y} = 2\left(x^2 + y^2\right)\frac{\partial z}{\partial u}$.

d) If $z = x^3 - 3xy^2 + x + e^x\cos y + 1$, find the value of $\frac{\partial^2 z}{\partial x^2} + \frac{\partial^2 z}{\partial y}$.

e) Find the minimum value of $x^2 + y^2 + z^2$ subject to the condition $ax + by + cz = P$.

6. Solve **any three** of the following : **9**

a) Find the eigen values and eigen vector corresponding to least eigen value of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

b) Find the eigen values of the matrix A and also find eigen values of A^{-1}, if

$$A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}.$$

c) If z = f(x, y) and $x = e^u \cos v$, $y = e^u \sin v$, prove that

$$\left(\frac{\partial z}{\partial u}\right)^2 + \left(\frac{\partial z}{\partial v}\right)^2 = e^{2u}\left[\left(\frac{\partial z}{\partial x}\right)^2 + \left(\frac{\partial z}{\partial y}\right)^2\right].$$

d) If u = x (1 – y) and v = xy, find the Jacobians $J = \frac{\partial(u, v)}{\partial(x, y)}$ and $J' = \frac{\partial(x, y)}{\partial(u, v)}$. Verify that $JJ' = 1$.

e) If the Kinetic energy $T = \frac{1}{2}mv^2$, find approximately the change in T as the mass m changes from 49 to 49.5 and the velocity v changes from 1600 to 1590.

7. Solve **any two** of the following : **(2×5=10)**

a) Verify the Cayley – Hamilton theorem for the matrix

$$A = \begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & -1 \end{bmatrix}$$ and also find A^{-1}.

b) If $u = \operatorname{cosec}\left[\frac{x^{1/2} + y^{1/2}}{x^{1/3} + y^{1/3}}\right]$, find the value of

i) $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$

ii) $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x \partial y} + y^2\frac{\partial^2 u}{\partial y^2}$.

c) Find the maximum and minimum values of the function $x^3 + 3xy^2 – 15x^2 – 15y^2 + 72x$.

———————

Set S

SLR-TJ – 2

Seat No.	

Set **P**

F.E. (Part – I) (CBCS) Examination, 2017
APPLIED MECHANICS

Day and Date : Wednesday, 13-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) A 10 N force is acting in horizontal direction towards right. Then the resolved components are
   a) H = 10 N V = 0 b) H = 10 N V = 10
   c) H = 0 N V = 10 d) H = 0 N V = 0

2) Two forces F1 and F2 are parallel to each other and acting towards down, these are known as
   a) Coplanar concurrent forces b) Non coplanar concurrent forces
   c) Like parallel forces d) Unlike parallel forces

3) The angle of inclination of the plane at which the body starts to move down the plane is called
   a) Angle of friction b) Angle of repose
   c) Angle of projection d) None of these

4) The redundant frame is also called as _____ frame.
   a) Perfect b) Imperfect c) Deficient d) None of these

5) The moment of inertia of a triangular section of base b and height h about an axis through its base is given by
   a) $bh^3/36$ b) $bh^3/16$ c) $bh^3/26$ d) $bh^3/12$

6) The horizontal range of a projectile is maximum when the angle of projection with horizontal is
   a) 50° b) 45° c) 60° d) None of these

P.T.O.

7) Unit of impulse of force is
   a) N b) Nm c) N/m d) Ns

8) Product of mass and velocity is
   a) Moment b) Momentum c) Movement d) Power

9) Angle made by moving particle at the center of the circle in case of angular motion is
   a) Angular velocity b) Angular displacement
   c) Angular speed d) Angular acceleration

10) The motion of a wheel of a car is
   a) Purely translation
   b) Purely rotational
   c) Combined translation and rotational
   d) None of these

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

12) 1 kg force is equal to
   a) 7.8 N b) 8.91 N c) 9.81 N d) 9.18 N

13) Which of the following is a vector quantity ?
   a) Area b) Length c) Distance d) Displacement

14) Slope of velocity time curve gives
   a) Displacement b) Velocity c) Acceleration d) Jerk

———————

SLR-TJ – 2

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
APPLIED MECHANICS

Day and Date : Wednesday, 13-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***all*** *questions.*
2) Assume suitable data if ***necessary****, but mention it* ***clearly****.*

SECTION – I

2. Solve **any four** : **(4×3=12)**

a) State and prove Varignon's theorem.

b) Discuss the concept of free body diagram with neat example.

c) State assumptions in analysis of perfect frame.

d) Two forces acting at and away from the point having magnitude of 10 kN and 20 kN respectively, having an angle 60° as shown in Fig. 1. Find the resultant.

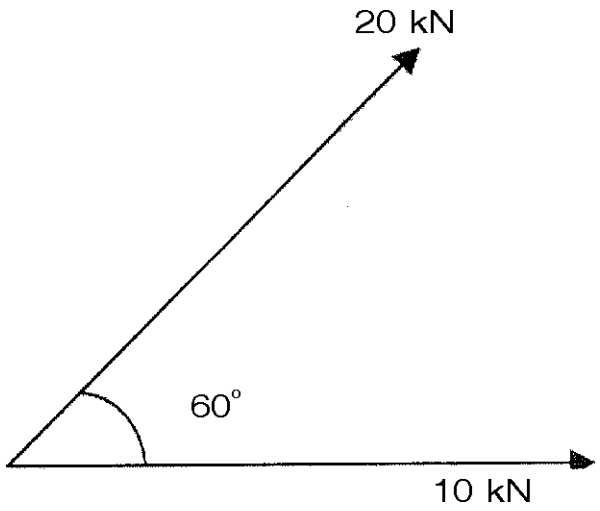


Fig. 1

e) Find the value of the forces P and Q if the system is in equilibrium as shown in Fig. 2.

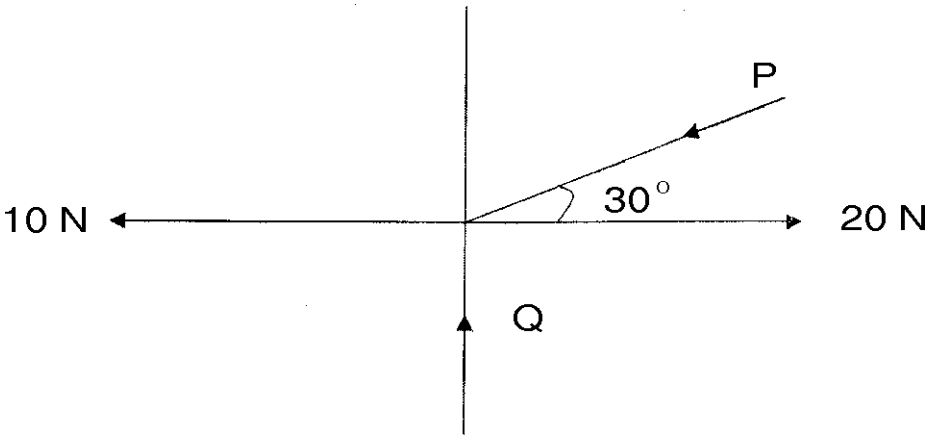


Fig. 2

f) A simply supported beam 3 m span is loaded with uniformly distributed load of 2 kN/m and a point load of 6 kN at 1 m from left hand support. Determine reactions at supports. (Ref. Fig. (A))

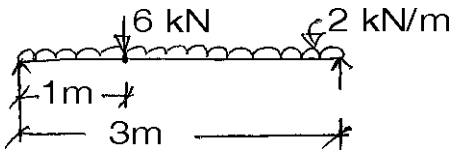


Fig. (A)

3. Solve **any two** : **(8×2=16)**

a) A beam AB 20 m long supported on two intermediate supports 12 m apart, carries a UDL of 6 kN/m and two concentrated load of 30 kN at left end A and 50 kN at the right end B as shown in Fig. 3. How far away should the first support 'C' be located from the end A so the reactions at both the supports are equal ?

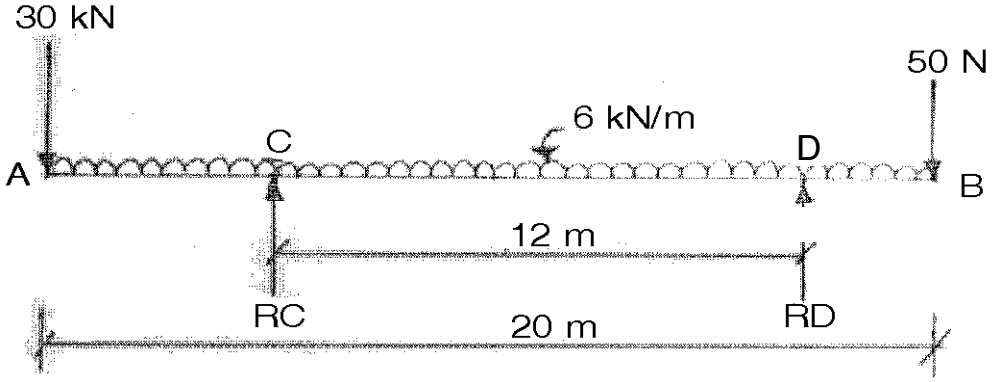


Fig. 3

b) Determine the forces in all members of a truss shown in Fig. 4.

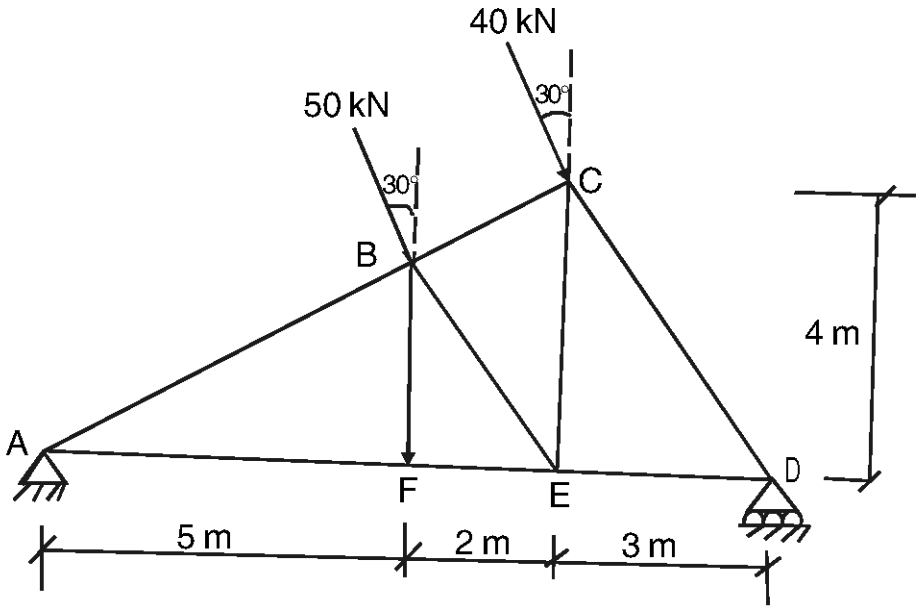


Fig. 4

c) Calculate the moment of inertia of the section shown in Fig. 5 about the centroidal axis parallel to and perpendicular to top edge.

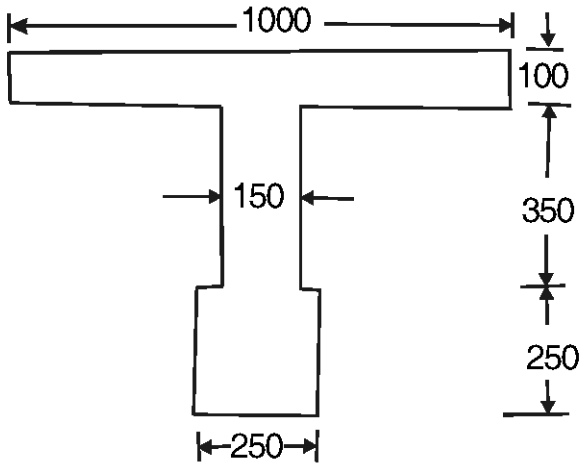


Fig. 5

SECTION – II

4. Solve **any four** : **(4×3=12)**
   a) Derive three equations of motion of a body moving with uniform acceleration.
   b) What is banking of roads ? Why it is required ?
   c) Define
      i) Trajectory ii) Range iii) Projectile
   d) A particle starting from rest moves in a straight line whose equation of motion is given by $s = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle at $t = 5$ sec.
   e) A horse pulling a cart exerts a steady horizontal pull of 300 N and walks at a rate of 4.5 kmph. How much work is done by the horse in 5 min. ?
   f) A car is moving at 72 kmph. If the wheels are of 75 cm diameter, find the angular velocity of the wheel about its axis.

5. Solve **any two** : **(8×2=16)**
   a) Two stations P and Q are 5.2 km apart. An automobile starts from rest from the station P and accelerates uniformly to attain a speed of 48 kmph in 30 seconds. This speed is maintained until the brakes are applied. The automobile comes to rest at the station Q with a uniform retardation of 1 m/s^2. Determine total time required to cover the distance between these two stations.
   b) Determine the tension in the string and acceleration of block A and B weighing 750 N and 250 N connected by an inextensible string as shown in Fig. 6. Assume pulleys as functionless and weight less.

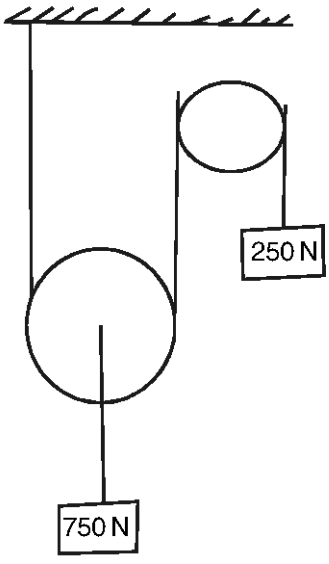


Fig. 6

c) A body weighing 300 N is pushed up a 30° plane by a 400 N force acting parallel to the plane as shown in Fig. 7. If the initial velocity of the body is 1.5 m/sec. and coefficient of kinetic friction is $\mu = 0.2$, what velocity will the body have after moving 6 m ?

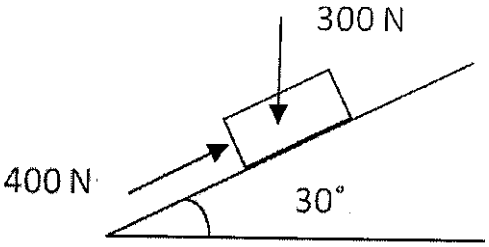


Fig. 7

Set P

SLR-TJ – 2

Seat No.	

Set **Q**

F.E. (Part – I) (CBCS) Examination, 2017
APPLIED MECHANICS

Day and Date : Wednesday, 13-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Product of mass and velocity is
a) Moment b) Momentum c) Movement d) Power

2) Angle made by moving particle at the center of the circle in case of angular motion is
a) Angular velocity b) Angular displacement
c) Angular speed d) Angular acceleration

3) The motion of a wheel of a car is
a) Purely translation
b) Purely rotational
c) Combined translation and rotational
d) None of these

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

5) 1 kg force is equal to
a) 7.8 N b) 8.91 N c) 9.81 N d) 9.18 N

6) Which of the following is a vector quantity ?
a) Area b) Length c) Distance d) Displacement

7) Slope of velocity time curve gives
a) Displacement b) Velocity c) Acceleration d) Jerk

8) A 10 N force is acting in horizontal direction towards right. Then the resolved components are
   a) H = 10 N V = 0 b) H = 10 N V = 10
   c) H = 0 N V = 10 d) H = 0 N V = 0

9) Two forces F1 and F2 are parallel to each other and acting towards down, these are known as
   a) Coplanar concurrent forces b) Non coplanar concurrent forces
   c) Like parallel forces d) Unlike parallel forces

10) The angle of inclination of the plane at which the body starts to move down the plane is called
   a) Angle of friction b) Angle of repose
   c) Angle of projection d) None of these

11) The redundant frame is also called as _____ frame.
   a) Perfect b) Imperfect c) Deficient d) None of these

12) The moment of inertia of a triangular section of base b and height h about an axis through its base is given by
   a) $bh^3/36$ b) $bh^3/16$ c) $bh^3/26$ d) $bh^3/12$

13) The horizontal range of a projectile is maximum when the angle of projection with horizontal is
   a) 50° b) 45° c) 60° d) None of these

14) Unit of impulse of force is
   a) N b) Nm c) N/m d) Ns

_____

SLR-TJ – 2

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
APPLIED MECHANICS

Day and Date : Wednesday, 13-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***all*** *questions.*
2) Assume suitable data if ***necessary****, but mention it* ***clearly****.*

SECTION – I

2. Solve **any four** : **(4×3=12)**

a) State and prove Varignon's theorem.

b) Discuss the concept of free body diagram with neat example.

c) State assumptions in analysis of perfect frame.

d) Two forces acting at and away from the point having magnitude of 10 kN and 20 kN respectively, having an angle 60° as shown in Fig. 1. Find the resultant.

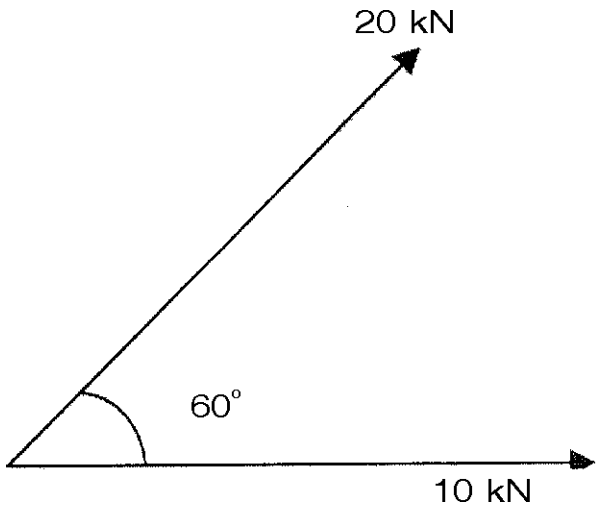


Fig. 1

e) Find the value of the forces P and Q if the system is in equilibrium as shown in Fig. 2.

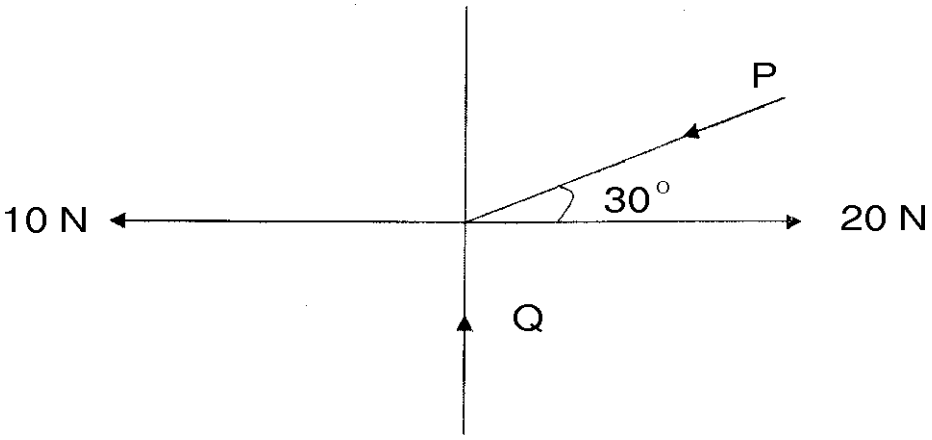


Fig. 2

f) A simply supported beam 3 m span is loaded with uniformly distributed load of 2 kN/m and a point load of 6 kN at 1 m from left hand support. Determine reactions at supports. (Ref. Fig. (A))

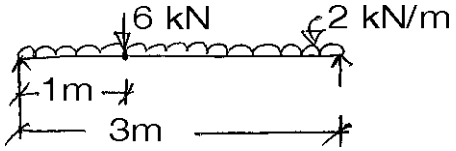


Fig. (A)

3. Solve **any two** : **(8×2=16)**

a) A beam AB 20 m long supported on two intermediate supports 12 m apart, carries a UDL of 6 kN/m and two concentrated load of 30 kN at left end A and 50 kN at the right end B as shown in Fig. 3. How far away should the first support 'C' be located from the end A so the reactions at both the supports are equal ?

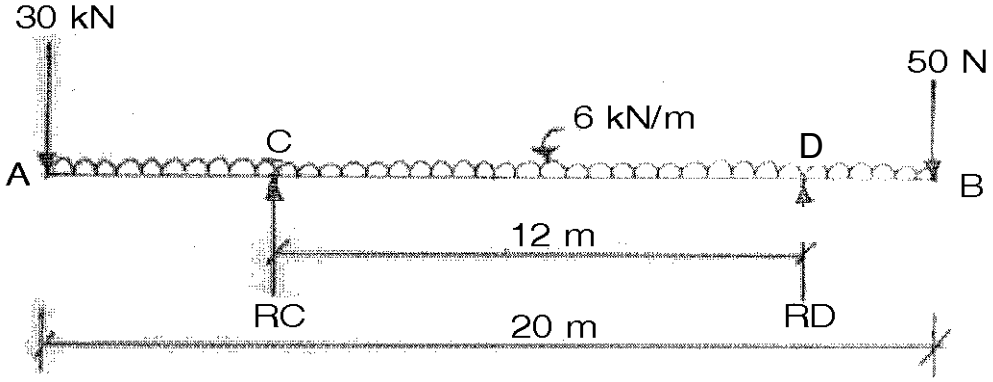


Fig. 3

Set Q

b) Determine the forces in all members of a truss shown in Fig. 4.

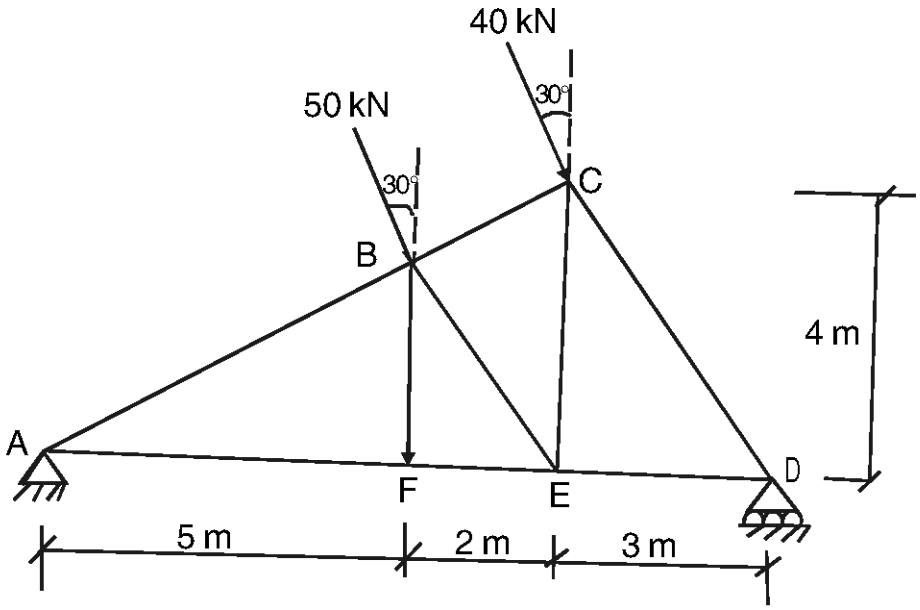


Fig. 4

c) Calculate the moment of inertia of the section shown in Fig. 5 about the centroidal axis parallel to and perpendicular to top edge.

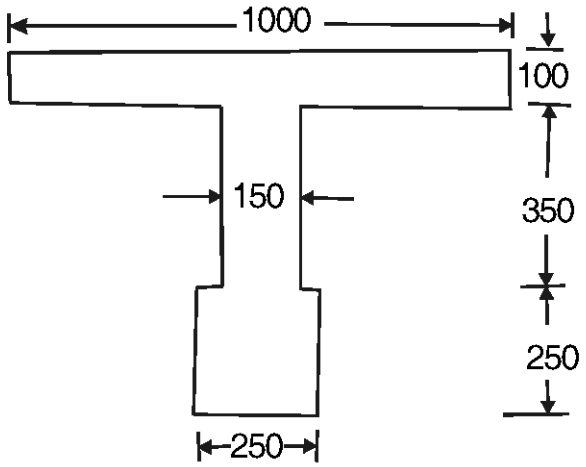


Fig. 5

SECTION – II

4. Solve **any four** : **(4×3=12)**
   a) Derive three equations of motion of a body moving with uniform acceleration.
   b) What is banking of roads ? Why it is required ?
   c) Define
      i) Trajectory ii) Range iii) Projectile
   d) A particle starting from rest moves in a straight line whose equation of motion is given by $s = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle at $t = 5$ sec.
   e) A horse pulling a cart exerts a steady horizontal pull of 300 N and walks at a rate of 4.5 kmph. How much work is done by the horse in 5 min. ?
   f) A car is moving at 72 kmph. If the wheels are of 75 cm diameter, find the angular velocity of the wheel about its axis.

5. Solve **any two** : **(8×2=16)**
   a) Two stations P and Q are 5.2 km apart. An automobile starts from rest from the station P and accelerates uniformly to attain a speed of 48 kmph in 30 seconds. This speed is maintained until the brakes are applied. The automobile comes to rest at the station Q with a uniform retardation of 1 m/s^2. Determine total time required to cover the distance between these two stations.
   b) Determine the tension in the string and acceleration of block A and B weighing 750 N and 250 N connected by an inextensible string as shown in Fig. 6. Assume pulleys as functionless and weight less.

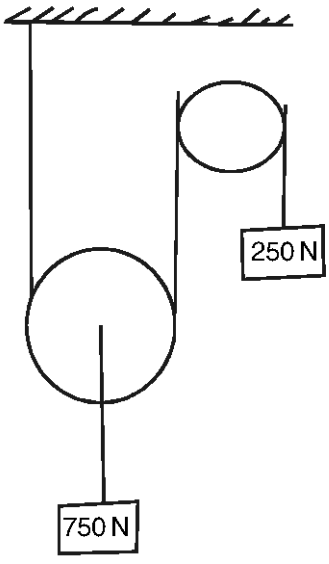


Fig. 6

c) A body weighing 300 N is pushed up a 30° plane by a 400 N force acting parallel to the plane as shown in Fig. 7. If the initial velocity of the body is 1.5 m/sec. and coefficient of kinetic friction is $\mu = 0.2$, what velocity will the body have after moving 6 m ?

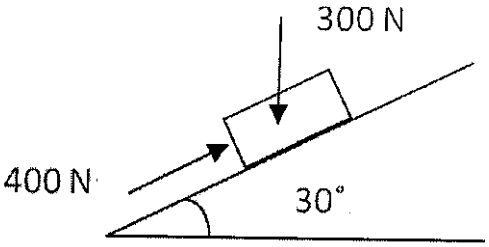


Fig. 7

Set Q

SLR-TJ – 2

Seat No.	

Set **R**

F.E. (Part – I) (CBCS) Examination, 2017
APPLIED MECHANICS

Day and Date : Wednesday, 13-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) The moment of inertia of a triangular section of base b and height h about an axis through its base is given by
a) $bh^3/36$ b) $bh^3/16$ c) $bh^3/26$ d) $bh^3/12$

2) The horizontal range of a projectile is maximum when the angle of projection with horizontal is
a) 50° b) 45° c) 60° d) None of these

3) Unit of impulse of force is
a) N b) Nm c) N/m d) Ns

4) Product of mass and velocity is
a) Moment b) Momentum c) Movement d) Power

5) Angle made by moving particle at the center of the circle in case of angular motion is
a) Angular velocity b) Angular displacement
c) Angular speed d) Angular acceleration

6) The motion of a wheel of a car is
a) Purely translation
b) Purely rotational
c) Combined translation and rotational
d) None of these

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

8) 1 kg force is equal to
   a) 7.8 N b) 8.91 N c) 9.81 N d) 9.18 N

9) Which of the following is a vector quantity ?
   a) Area b) Length c) Distance d) Displacement

10) Slope of velocity time curve gives
   a) Displacement b) Velocity c) Acceleration d) Jerk

11) A 10 N force is acting in horizontal direction towards right. Then the resolved components are
   a) H = 10 N V = 0 b) H = 10 N V = 10
   c) H = 0 N V = 10 d) H = 0 N V = 0

12) Two forces F1 and F2 are parallel to each other and acting towards down, these are known as
   a) Coplanar concurrent forces b) Non coplanar concurrent forces
   c) Like parallel forces d) Unlike parallel forces

13) The angle of inclination of the plane at which the body starts to move down the plane is called
   a) Angle of friction b) Angle of repose
   c) Angle of projection d) None of these

14) The redundant frame is also called as _____ frame.
   a) Perfect b) Imperfect c) Deficient d) None of these

_____

SLR-TJ – 2

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
APPLIED MECHANICS

Day and Date : Wednesday, 13-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***all*** *questions.*
2) Assume suitable data if ***necessary****, but mention it* ***clearly****.*

SECTION – I

2. Solve **any four** : **(4×3=12)**

a) State and prove Varignon's theorem.

b) Discuss the concept of free body diagram with neat example.

c) State assumptions in analysis of perfect frame.

d) Two forces acting at and away from the point having magnitude of 10 kN and 20 kN respectively, having an angle 60° as shown in Fig. 1. Find the resultant.

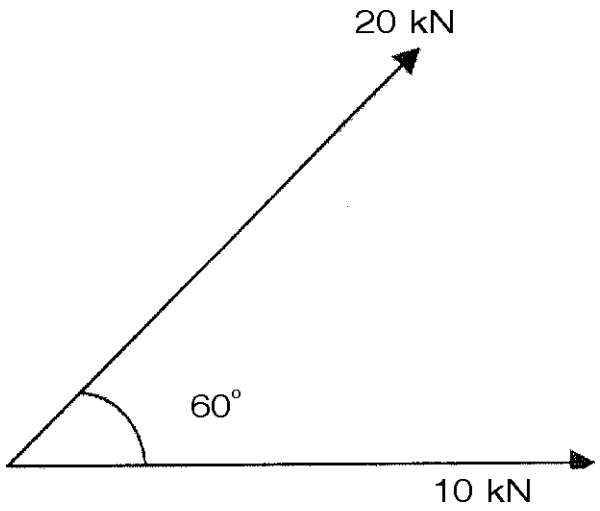


Fig. 1

e) Find the value of the forces P and Q if the system is in equilibrium as shown in Fig. 2.

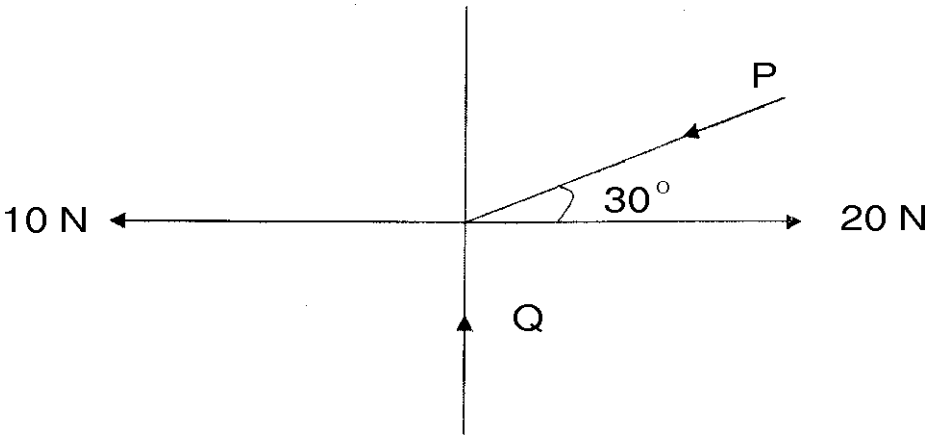


Fig. 2

f) A simply supported beam 3 m span is loaded with uniformly distributed load of 2 kN/m and a point load of 6 kN at 1 m from left hand support. Determine reactions at supports. (Ref. Fig. (A))

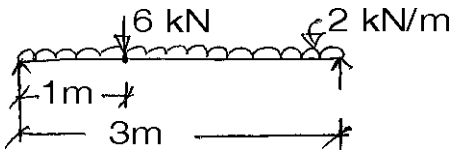


Fig. (A)

3. Solve **any two** : **(8×2=16)**

a) A beam AB 20 m long supported on two intermediate supports 12 m apart, carries a UDL of 6 kN/m and two concentrated load of 30 kN at left end A and 50 kN at the right end B as shown in Fig. 3. How far away should the first support 'C' be located from the end A so the reactions at both the supports are equal ?

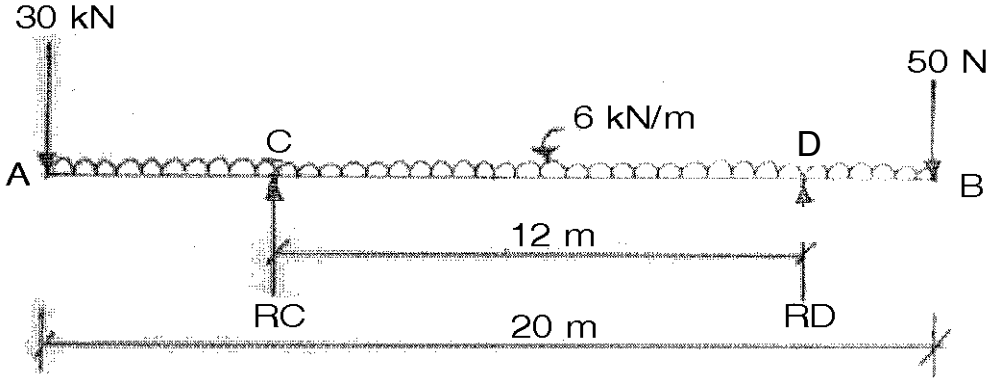


Fig. 3

b) Determine the forces in all members of a truss shown in Fig. 4.

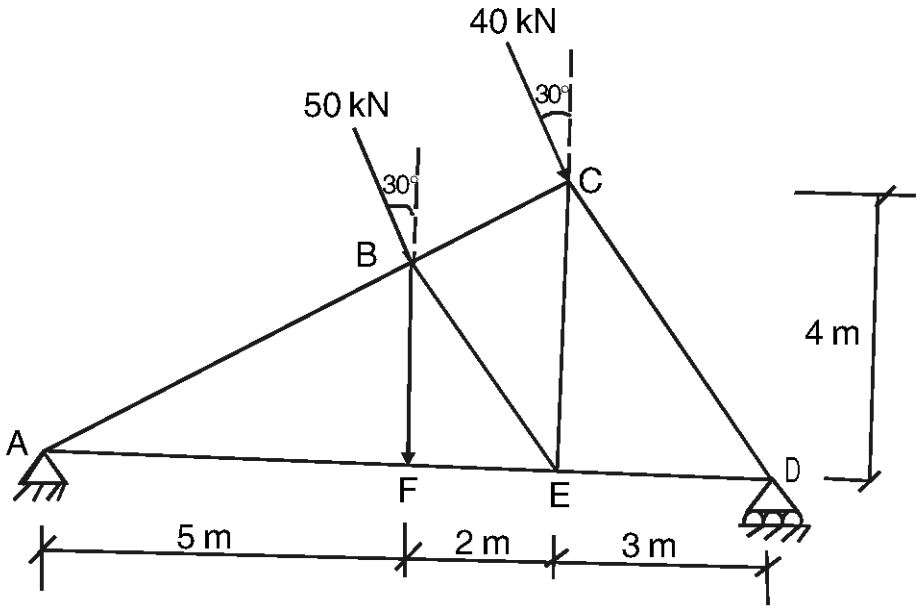


Fig. 4

c) Calculate the moment of inertia of the section shown in Fig. 5 about the centroidal axis parallel to and perpendicular to top edge.

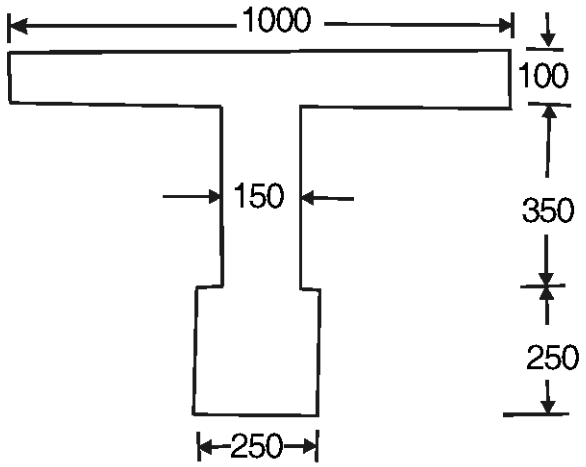


Fig. 5

SECTION – II

4. Solve **any four** : **(4×3=12)**
   a) Derive three equations of motion of a body moving with uniform acceleration.
   b) What is banking of roads ? Why it is required ?
   c) Define
      i) Trajectory ii) Range iii) Projectile
   d) A particle starting from rest moves in a straight line whose equation of motion is given by $s = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle at $t = 5$ sec.
   e) A horse pulling a cart exerts a steady horizontal pull of 300 N and walks at a rate of 4.5 kmph. How much work is done by the horse in 5 min. ?
   f) A car is moving at 72 kmph. If the wheels are of 75 cm diameter, find the angular velocity of the wheel about its axis.

5. Solve **any two** : **(8×2=16)**
   a) Two stations P and Q are 5.2 km apart. An automobile starts from rest from the station P and accelerates uniformly to attain a speed of 48 kmph in 30 seconds. This speed is maintained until the brakes are applied. The automobile comes to rest at the station Q with a uniform retardation of 1 m/s^2. Determine total time required to cover the distance between these two stations.
   b) Determine the tension in the string and acceleration of block A and B weighing 750 N and 250 N connected by an inextensible string as shown in Fig. 6. Assume pulleys as functionless and weight less.

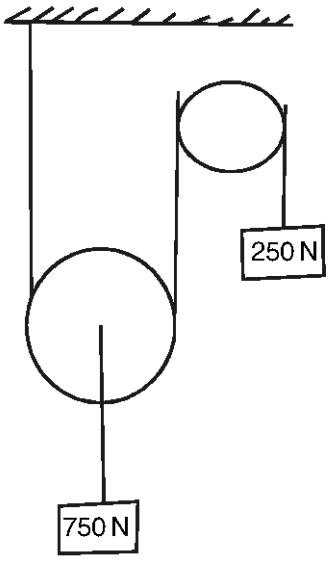


Fig. 6

c) A body weighing 300 N is pushed up a 30° plane by a 400 N force acting parallel to the plane as shown in Fig. 7. If the initial velocity of the body is 1.5 m/sec. and coefficient of kinetic friction is $\mu = 0.2$, what velocity will the body have after moving 6 m ?

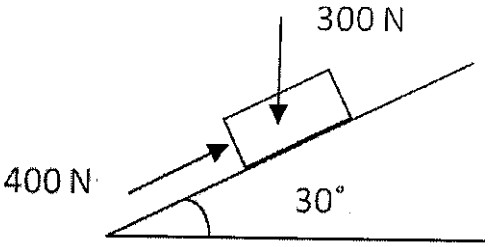


Fig. 7

Set R

SLR-TJ – 2

Seat No.	

Set **S**

F.E. (Part – I) (CBCS) Examination, 2017
APPLIED MECHANICS

Day and Date : Wednesday, 13-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) The motion of a wheel of a car is
   a) Purely translation
   b) Purely rotational
   c) Combined translation and rotational
   d) None of these

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

3) 1 kg force is equal to
   a) 7.8 N b) 8.91 N c) 9.81 N d) 9.18 N

4) Which of the following is a vector quantity ?
   a) Area b) Length c) Distance d) Displacement

5) Slope of velocity time curve gives
   a) Displacement b) Velocity c) Acceleration d) Jerk

6) A 10 N force is acting in horizontal direction towards right. Then the resolved components are
   a) H = 10 N V = 0 b) H = 10 N V = 10
   c) H = 0 N V = 10 d) H = 0 N V = 0

7) Two forces F1 and F2 are parallel to each other and acting towards down, these are known as
   a) Coplanar concurrent forces
   b) Non coplanar concurrent forces
   c) Like parallel forces
   d) Unlike parallel forces

8) The angle of inclination of the plane at which the body starts to move down the plane is called
   a) Angle of friction
   b) Angle of repose
   c) Angle of projection
   d) None of these

9) The redundant frame is also called as _____ frame.
   a) Perfect b) Imperfect c) Deficient d) None of these

10) The moment of inertia of a triangular section of base b and height h about an axis through its base is given by
   a) $bh^3/36$ b) $bh^3/16$ c) $bh^3/26$ d) $bh^3/12$

11) The horizontal range of a projectile is maximum when the angle of projection with horizontal is
   a) 50° b) 45° c) 60° d) None of these

12) Unit of impulse of force is
   a) N b) Nm c) N/m d) Ns

13) Product of mass and velocity is
   a) Moment b) Momentum c) Movement d) Power

14) Angle made by moving particle at the center of the circle in case of angular motion is
   a) Angular velocity
   b) Angular displacement
   c) Angular speed
   d) Angular acceleration

_____

SLR-TJ – 2

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
APPLIED MECHANICS

Day and Date : Wednesday, 13-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***all*** *questions.*
2) Assume suitable data if ***necessary****, but mention it* ***clearly****.*

SECTION – I

2. Solve **any four** : **(4×3=12)**

a) State and prove Varignon's theorem.

b) Discuss the concept of free body diagram with neat example.

c) State assumptions in analysis of perfect frame.

d) Two forces acting at and away from the point having magnitude of 10 kN and 20 kN respectively, having an angle 60° as shown in Fig. 1. Find the resultant.

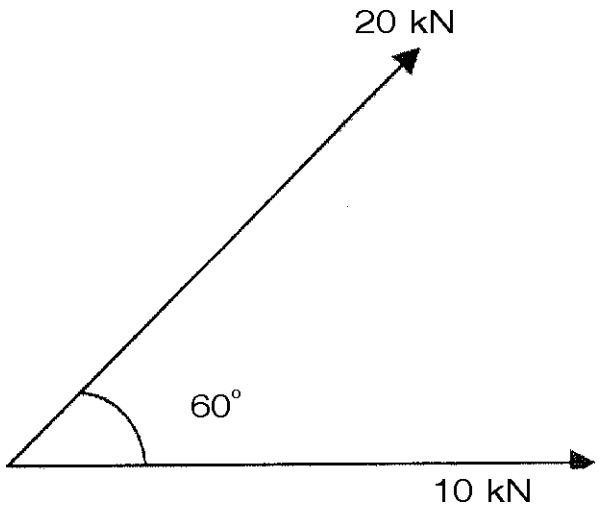


Fig. 1

e) Find the value of the forces P and Q if the system is in equilibrium as shown in Fig. 2.

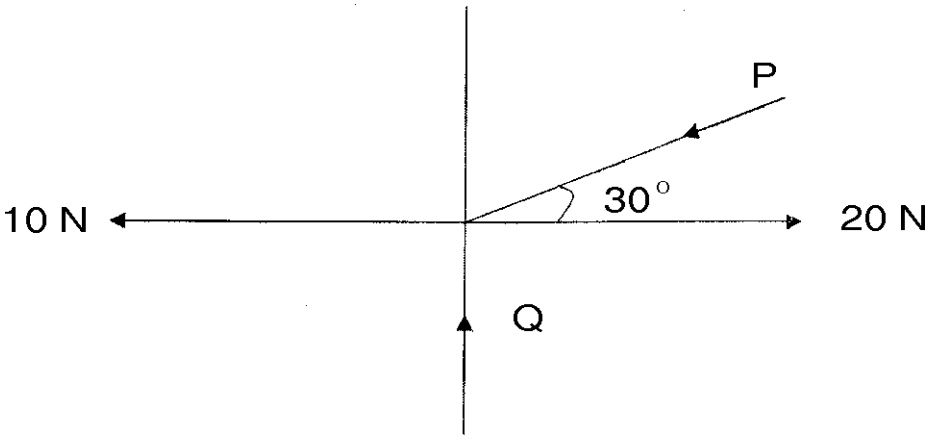


Fig. 2

f) A simply supported beam 3 m span is loaded with uniformly distributed load of 2 kN/m and a point load of 6 kN at 1 m from left hand support. Determine reactions at supports. (Ref. Fig. (A))

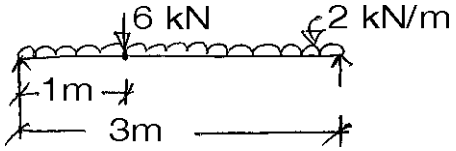


Fig. (A)

3. Solve **any two** : **(8×2=16)**

a) A beam AB 20 m long supported on two intermediate supports 12 m apart, carries a UDL of 6 kN/m and two concentrated load of 30 kN at left end A and 50 kN at the right end B as shown in Fig. 3. How far away should the first support 'C' be located from the end A so the reactions at both the supports are equal ?

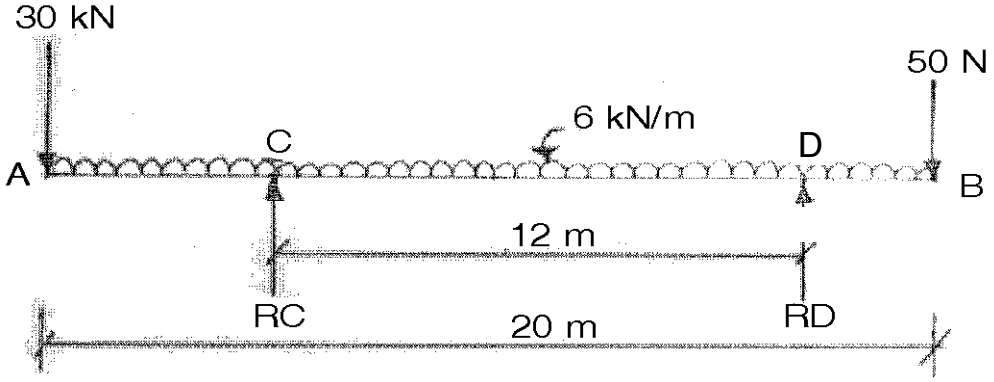


Fig. 3

Set S

b) Determine the forces in all members of a truss shown in Fig. 4.

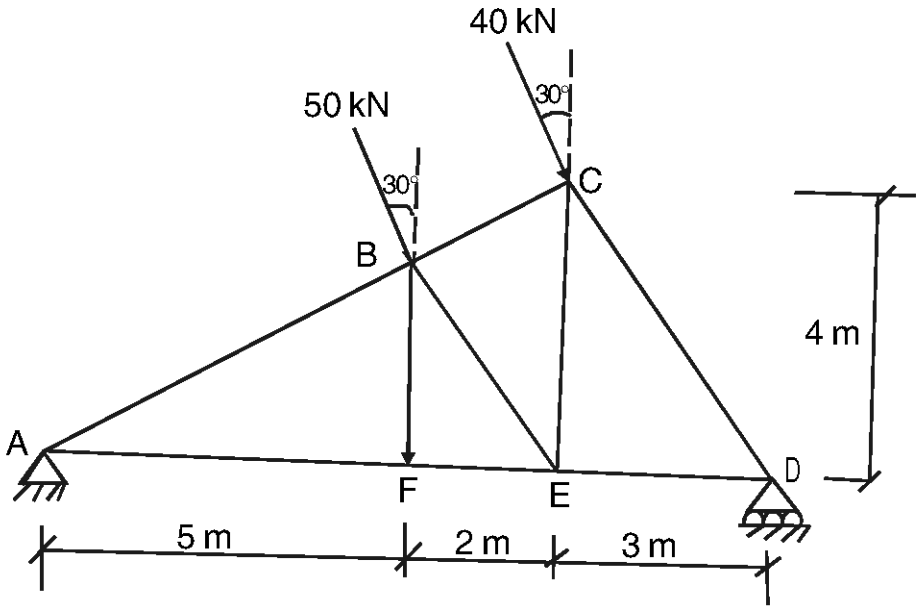


Fig. 4

c) Calculate the moment of inertia of the section shown in Fig. 5 about the centroidal axis parallel to and perpendicular to top edge.

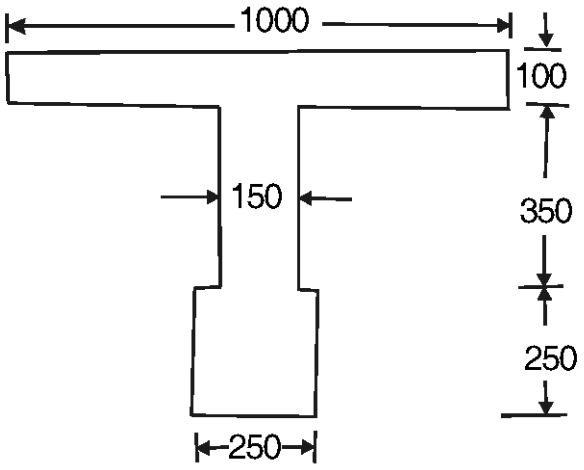


Fig. 5

SECTION – II

4. Solve **any four** : **(4×3=12)**
   a) Derive three equations of motion of a body moving with uniform acceleration.
   b) What is banking of roads ? Why it is required ?
   c) Define
      i) Trajectory ii) Range iii) Projectile
   d) A particle starting from rest moves in a straight line whose equation of motion is given by $s = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle at $t = 5$ sec.
   e) A horse pulling a cart exerts a steady horizontal pull of 300 N and walks at a rate of 4.5 kmph. How much work is done by the horse in 5 min. ?
   f) A car is moving at 72 kmph. If the wheels are of 75 cm diameter, find the angular velocity of the wheel about its axis.

5. Solve **any two** : **(8×2=16)**
   a) Two stations P and Q are 5.2 km apart. An automobile starts from rest from the station P and accelerates uniformly to attain a speed of 48 kmph in 30 seconds. This speed is maintained until the brakes are applied. The automobile comes to rest at the station Q with a uniform retardation of 1 m/s^2. Determine total time required to cover the distance between these two stations.
   b) Determine the tension in the string and acceleration of block A and B weighing 750 N and 250 N connected by an inextensible string as shown in Fig. 6. Assume pulleys as functionless and weight less.

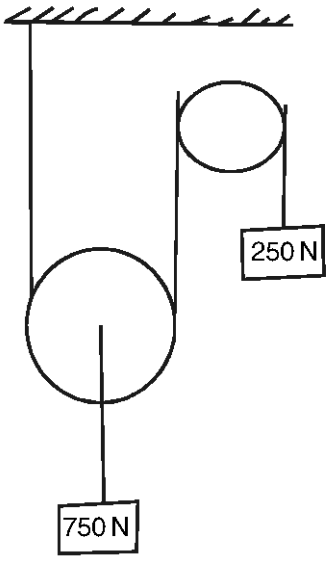


Fig. 6

c) A body weighing 300 N is pushed up a 30° plane by a 400 N force acting parallel to the plane as shown in Fig. 7. If the initial velocity of the body is 1.5 m/sec. and coefficient of kinetic friction is $\mu = 0.2$, what velocity will the body have after moving 6 m ?

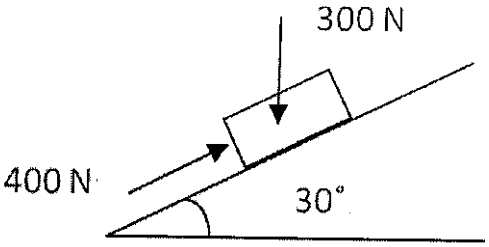


Fig. 7

Set S

SLR-TJ – 3

Seat No.	

Set P

F.E. (Part – I) (CBCS) Examination, 2017
BASIC ELECTRICAL ENGINEERING

Day and Date : Friday, 15-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

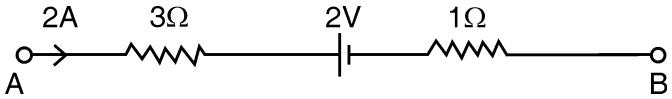
Duration : 30 Minutes Marks : 14

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

1) While calculating R_{th} constant-current sources in the circuit are
   a) Replaced by 'opens'
   b) Replaced by 'shorts'
   c) Treated in parallel with other voltage sources
   d) Converted into equivalent voltage sources

2) If a 220 V heater is used on 110 V supply, consumption of energy will be
   a) one half b) twice c) one fourth d) four times

3) Figure shows a part of closed electrical circuit. Then $V_A - V_B$ is,



   a) – 8 V b) 6 V c) 10 V d) 3 V

4) Magnetic reluctance is
   a) Assistance to magnetic flux b) Permeance to magnetic flux
   c) Magnetic field strength d) Opposition to magnetic flux

5) Two parallel conductor carries the current in same direction, what kind of mutual force they will experience ?
   a) Force of repulsion b) Force of attraction
   c) Force of attraction and attraction d) None of these

6) Frequency of an a.c. quantity is defined as
   a) rev./sec. b) sec./rev. c) cycles/rev. d) cycles/sec.

P.T.O.

7) The RMS value of sinusoidal 200 V peak to peak wave is

a) 200 V b) $100/\sqrt{2}$ c) $200/\sqrt{2}$ d) 100 V

8) In a purely inductive circuit power factor is

a) zero lagging b) unity c) zero leading d) none of these

9) Admittance is reciprocal of

a) Resistance b) Impedance c) Reactance d) Voltage

10) If $Z_1 = 08 - j6\,\Omega$ and $Y_2 = 08 - j6$ mho, then the nature of the two circuits are

a) 1-capacitive, 2-capacitive b) 1-capacitive, 2-inductive

c) 1-inductive, 2-capacitive d) 1-inductive, 2-inductive

11) Three identical resistances connected in star consume 4000W. If these three resistances are connected in delta across the same supply, the power consumed will be

a) 4000 W b) 6000 W c) 8000 W d) 12000 W

12) Transformer cores are laminated in order to

a) Simplify its construction b) Minimize eddy current loss

c) Reduce cost d) Reduce hysteresis loss

13) A transformer having 1000 primary turns is connected to a 250 V a.c. supply. For a secondary voltage of 400 V, the number of secondary turns should be

a) 1600 b) 250 c) 400 d) 1250

14) The back emf in d.c. Motor

a) Opposes the applied voltage b) Aids the applied voltage

c) Aids the armature current d) None of these

———————

SLR-TJ – 3

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
BASIC ELECTRICAL ENGINEERING

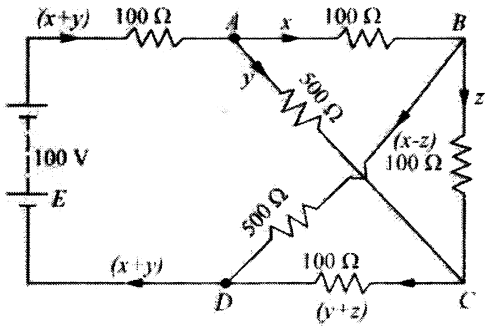
Day and Date : Friday, 15-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four**. **(4×4=16)**

a) A coil has a resistance of 18 ohm when its mean temperature is 20°C & of 20 ohm when its temperature is 50°C. Find its mean temperature rise when its resistance is 21 ohm and surrounding temperature is 15°C.

b) By using Kirchhoff's laws, calculate the branch current in the circuit shown below.



c) State and prove the Maximum Power transfer theorem.

d) A steel ring having cross-sectional area 12.56 cm^2 and mean diameter of 100 mm has a coil of 100 turns wound uniformly around it. A magnetic flux of 2 mWb is to be produced in the ring. Calculate

i) The current required

ii) The relative permeability of steel

iii) Inductance of the coil. From the magnetizing curve for steel where H = 5000AT/m for B = 1.6 tesla.

e) An electric kettle is used to heat 0.5 litre of water from 20°C to the boiling point in 10 minutes, the supply voltage is 230 Volt. The efficiency of the kettle is 80%. Calculate i) the resistance of heating element and ii) The cost of electrical energy consumed at 75 paisa per unit. Assume the specific heat capacity of water is 4190 joule/Kg.K.

f) Define the following term related with alternating quantity
   i) Cycle
   ii) Instantaneous value
   iii) Frequency
   iv) Time period.

3. Solve **any two**. **(2×6=12)**

a) Determine the electrical energy required to raise the temperature of 80 litres of water by 80°C. If the efficiency of the heater = 89.5%, specific heat capacity of water = 4200 J/kg.K. and mass of one litre of water = 1 Kg.

   To what height could a mass of 10 tons be raised with the same expenditure of energy if lifting equipment has an efficiency of 66.5%.

b) Explain the concept of self and mutual inductance.

   A flux of 0.6 mWb is produced by a coil of 1000 turns wound on a ring with a current of 5A in it. Calculate,
   i) Self inductance of coil
   ii) Mutual inductance between the coil, if second coil of 600 turns is uniformly wound on first coil.

c) An alternating current quantity varying sinusoidally with frequency of 50 Hz has RMS value of 20 amps. Write down the equation for the instantaneous value and find instantaneous values after passing through a positive maximum value at
   i) 0.0025 sec.
   ii) 0.0125 sec.
   iii) At what time measured from a positive maximum value, the instantaneous current will be 14.14 A.

SECTION – II

4. Attempt **any four**. **(4×4=16)**

a) Derive the relation between voltage and current for a purely capacitive circuit when ac supply is applied across it.

b) In series RLC circuit R = 10 Ω, L = 0.25 H, C = 25 μF and supply voltage is 230 V, 50 Hz. Calculate total impedance and power in the circuit.

c) Explain principle of operation, working and construction of single phase transformer.

d) Explain the working principle of DC motor.

e) Derive the relation between line and phase voltages and currents in balanced delta connected 3-phase load.

f) A coil takes a current of 2 A lagging 60 degree behind the applied voltage of 200 V at 50 Hz ac supply. Calculate,

i) resistance of coil

ii) inductance of coil

iii) impedance of coil.

5. Solve **any two**. **(2×6=12)**

a) A 40 KVA single phase transformer has iron loss of 450 W. The full load copper loss is 850 watts. Calculate,

i) Efficiency at full load, 0.8 lagging p.f.

ii) KVA supplied at maximum efficiency.

iii) Maximum efficiency at 0.8 lagging p.f.

b) Coil of resistance 15 Ω and inductance 0.05 H is connected in parallel with resistance of 20 Ω. If the circuit is connected to 200 V, 50 Hz supply. Determine,

i) current in each branch

ii) supply current

iii) circuit power factor.

c) The load to a 3 phase supply consists of 3 similar coils connected in star. The line currents are 25 A and KVA and KW inputs are 20 and 11 respectively. Find,

i) Phase and line voltages

ii) KVAR input

iii) Resistance and reactance of each coil.

———————

Set P

SLR-TJ – 3

Seat No.	

Set Q

F.E. (Part – I) (CBCS) Examination, 2017
BASIC ELECTRICAL ENGINEERING

Day and Date : Friday, 15-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) In a purely inductive circuit power factor is
   a) zero lagging b) unity c) zero leading d) none of these

2) Admittance is reciprocal of
   a) Resistance b) Impedance c) Reactance d) Voltage

3) If $Z_1 = 08 - j6\,\Omega$ and $Y_2 = 08 - j6$ mho, then the nature of the two circuits are
   a) 1-capacitive, 2-capacitive b) 1-capacitive, 2-inductive
   c) 1-inductive, 2-capacitive d) 1-inductive, 2-inductive

4) Three identical resistances connected in star consume 4000W. If these three resistances are connected in delta across the same supply, the power consumed will be
   a) 4000 W b) 6000 W c) 8000 W d) 12000 W

5) Transformer cores are laminated in order to
   a) Simplify its construction b) Minimize eddy current loss
   c) Reduce cost d) Reduce hysteresis loss

6) A transformer having 1000 primary turns is connected to a 250 V a.c. supply. For a secondary voltage of 400 V, the number of secondary turns should be
   a) 1600 b) 250 c) 400 d) 1250

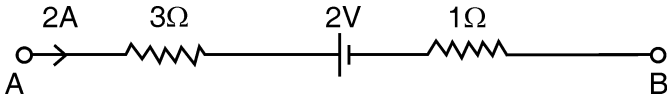
7) The back emf in d.c. Motor
   a) Opposes the applied voltage b) Aids the applied voltage
   c) Aids the armature current d) None of these

P.T.O.

8) While calculating R_{th} constant-current sources in the circuit are
   a) Replaced by 'opens'
   b) Replaced by 'shorts'
   c) Treated in parallel with other voltage sources
   d) Converted into equivalent voltage sources

9) If a 220 V heater is used on 110 V supply, consumption of energy will be
   a) one half b) twice c) one fourth d) four times

10) Figure shows a part of closed electrical circuit. Then $V_A - V_B$ is,



   a) – 8 V b) 6 V c) 10 V d) 3 V

11) Magnetic reluctance is
   a) Assistance to magnetic flux b) Permeance to magnetic flux
   c) Magnetic field strength d) Opposition to magnetic flux

12) Two parallel conductor carries the current in same direction, what kind of mutual force they will experience ?
   a) Force of repulsion b) Force of attraction
   c) Force of attraction and attraction d) None of these

13) Frequency of an a.c. quantity is defined as
   a) rev./sec. b) sec./rev. c) cycles/rev. d) cycles/sec.

14) The RMS value of sinusoidal 200 V peak to peak wave is
   a) 200 V b) $100/\sqrt{2}$ c) $200/\sqrt{2}$ d) 100 V

SLR-TJ – 3

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
BASIC ELECTRICAL ENGINEERING

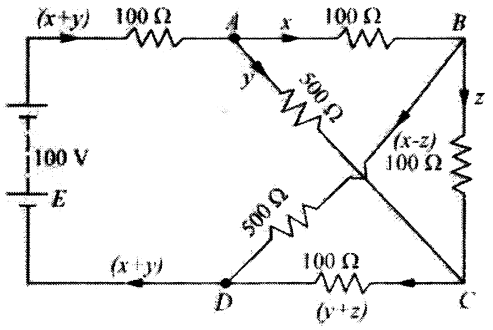
Day and Date : Friday, 15-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four**. **(4×4=16)**

a) A coil has a resistance of 18 ohm when its mean temperature is 20°C & of 20 ohm when its temperature is 50°C. Find its mean temperature rise when its resistance is 21 ohm and surrounding temperature is 15°C.

b) By using Kirchhoff's laws, calculate the branch current in the circuit shown below.



c) State and prove the Maximum Power transfer theorem.

d) A steel ring having cross-sectional area 12.56 cm^2 and mean diameter of 100 mm has a coil of 100 turns wound uniformly around it. A magnetic flux of 2 mWb is to be produced in the ring. Calculate

i) The current required

ii) The relative permeability of steel

iii) Inductance of the coil. From the magnetizing curve for steel where H = 5000AT/m for B = 1.6 tesla.

e) An electric kettle is used to heat 0.5 litre of water from 20°C to the boiling point in 10 minutes, the supply voltage is 230 Volt. The efficiency of the kettle is 80%. Calculate i) the resistance of heating element and ii) The cost of electrical energy consumed at 75 paisa per unit. Assume the specific heat capacity of water is 4190 joule/Kg.K.

f) Define the following term related with alternating quantity
   i) Cycle
   ii) Instantaneous value
   iii) Frequency
   iv) Time period.

3. Solve **any two**. **(2×6=12)**

a) Determine the electrical energy required to raise the temperature of 80 litres of water by 80°C. If the efficiency of the heater = 89.5%, specific heat capacity of water = 4200 J/kg.K. and mass of one litre of water = 1 Kg.

To what height could a mass of 10 tons be raised with the same expenditure of energy if lifting equipment has an efficiency of 66.5%.

b) Explain the concept of self and mutual inductance.

A flux of 0.6 mWb is produced by a coil of 1000 turns wound on a ring with a current of 5A in it. Calculate,
   i) Self inductance of coil
   ii) Mutual inductance between the coil, if second coil of 600 turns is uniformly wound on first coil.

c) An alternating current quantity varying sinusoidally with frequency of 50 Hz has RMS value of 20 amps. Write down the equation for the instantaneous value and find instantaneous values after passing through a positive maximum value at
   i) 0.0025 sec.
   ii) 0.0125 sec.
   iii) At what time measured from a positive maximum value, the instantaneous current will be 14.14 A.

SECTION – II

4. Attempt **any four**. **(4×4=16)**

a) Derive the relation between voltage and current for a purely capacitive circuit when ac supply is applied across it.

b) In series RLC circuit R = 10 Ω, L = 0.25 H, C = 25 μF and supply voltage is 230 V, 50 Hz. Calculate total impedance and power in the circuit.

c) Explain principle of operation, working and construction of single phase transformer.

d) Explain the working principle of DC motor.

e) Derive the relation between line and phase voltages and currents in balanced delta connected 3-phase load.

f) A coil takes a current of 2 A lagging 60 degree behind the applied voltage of 200 V at 50 Hz ac supply. Calculate,

i) resistance of coil

ii) inductance of coil

iii) impedance of coil.

5. Solve **any two**. **(2×6=12)**

a) A 40 KVA single phase transformer has iron loss of 450 W. The full load copper loss is 850 watts. Calculate,

i) Efficiency at full load, 0.8 lagging p.f.

ii) KVA supplied at maximum efficiency.

iii) Maximum efficiency at 0.8 lagging p.f.

b) Coil of resistance 15 Ω and inductance 0.05 H is connected in parallel with resistance of 20 Ω. If the circuit is connected to 200 V, 50 Hz supply. Determine,

i) current in each branch

ii) supply current

iii) circuit power factor.

c) The load to a 3 phase supply consists of 3 similar coils connected in star. The line currents are 25 A and KVA and KW inputs are 20 and 11 respectively. Find,

i) Phase and line voltages

ii) KVAR input

iii) Resistance and reactance of each coil.

———————

Set Q

SLR-TJ – 3

Seat No.	

Set R

F.E. (Part – I) (CBCS) Examination, 2017
BASIC ELECTRICAL ENGINEERING

Day and Date : Friday, 15-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Two parallel conductor carries the current in same direction, what kind of mutual force they will experience ?
   a) Force of repulsion b) Force of attraction
   c) Force of attraction and attraction d) None of these

2) Frequency of an a.c. quantity is defined as
   a) rev./sec. b) sec./rev. c) cycles/rev. d) cycles/sec.

3) The RMS value of sinusoidal 200 V peak to peak wave is
   a) 200 V b) $100/\sqrt{2}$ c) $200/\sqrt{2}$ d) 100 V

4) In a purely inductive circuit power factor is
   a) zero lagging b) unity c) zero leading d) none of these

5) Admittance is reciprocal of
   a) Resistance b) Impedance c) Reactance d) Voltage

6) If $Z_1 = 08 - j6\,\Omega$ and $Y_2 = 08 - j6$ mho, then the nature of the two circuits are
   a) 1-capacitive, 2-capacitive b) 1-capacitive, 2-inductive
   c) 1-inductive, 2-capacitive d) 1-inductive, 2-inductive

7) Three identical resistances connected in star consume 4000W. If these three resistances are connected in delta across the same supply, the power consumed will be
   a) 4000 W b) 6000 W c) 8000 W d) 12000 W

P.T.O.

8) Transformer cores are laminated in order to
   a) Simplify its construction
   b) Minimize eddy current loss
   c) Reduce cost
   d) Reduce hysteresis loss

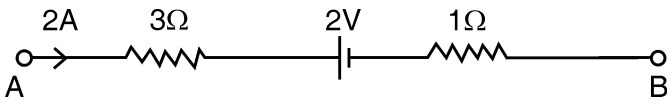
9) A transformer having 1000 primary turns is connected to a 250 V a.c. supply. For a secondary voltage of 400 V, the number of secondary turns should be
   a) 1600 b) 250 c) 400 d) 1250

10) The back emf in d.c. Motor
   a) Opposes the applied voltage
   b) Aids the applied voltage
   c) Aids the armature current
   d) None of these

11) While calculating R_{th} constant-current sources in the circuit are
   a) Replaced by 'opens'
   b) Replaced by 'shorts'
   c) Treated in parallel with other voltage sources
   d) Converted into equivalent voltage sources

12) If a 220 V heater is used on 110 V supply, consumption of energy will be
   a) one half b) twice c) one fourth d) four times

13) Figure shows a part of closed electrical circuit. Then $V_A - V_B$ is,



   a) – 8 V b) 6 V c) 10 V d) 3 V

14) Magnetic reluctance is
   a) Assistance to magnetic flux
   b) Permeance to magnetic flux
   c) Magnetic field strength
   d) Opposition to magnetic flux

———————

SLR-TJ – 3

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
BASIC ELECTRICAL ENGINEERING

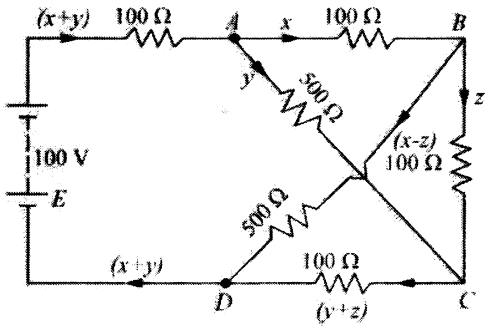
Day and Date : Friday, 15-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four**. **(4×4=16)**

a) A coil has a resistance of 18 ohm when its mean temperature is 20°C & of 20 ohm when its temperature is 50°C. Find its mean temperature rise when its resistance is 21 ohm and surrounding temperature is 15°C.

b) By using Kirchhoff's laws, calculate the branch current in the circuit shown below.



c) State and prove the Maximum Power transfer theorem.

d) A steel ring having cross-sectional area 12.56 cm^2 and mean diameter of 100 mm has a coil of 100 turns wound uniformly around it. A magnetic flux of 2 mWb is to be produced in the ring. Calculate

i) The current required

ii) The relative permeability of steel

iii) Inductance of the coil. From the magnetizing curve for steel where H = 5000AT/m for B = 1.6 tesla.

e) An electric kettle is used to heat 0.5 litre of water from 20°C to the boiling point in 10 minutes, the supply voltage is 230 Volt. The efficiency of the kettle is 80%. Calculate i) the resistance of heating element and ii) The cost of electrical energy consumed at 75 paisa per unit. Assume the specific heat capacity of water is 4190 joule/Kg.K.

f) Define the following term related with alternating quantity
   i) Cycle
   ii) Instantaneous value
   iii) Frequency
   iv) Time period.

3. Solve **any two**. **(2×6=12)**

a) Determine the electrical energy required to raise the temperature of 80 litres of water by 80°C. If the efficiency of the heater = 89.5%, specific heat capacity of water = 4200 J/kg.K. and mass of one litre of water = 1 Kg.

   To what height could a mass of 10 tons be raised with the same expenditure of energy if lifting equipment has an efficiency of 66.5%.

b) Explain the concept of self and mutual inductance.

   A flux of 0.6 mWb is produced by a coil of 1000 turns wound on a ring with a current of 5A in it. Calculate,
   i) Self inductance of coil
   ii) Mutual inductance between the coil, if second coil of 600 turns is uniformly wound on first coil.

c) An alternating current quantity varying sinusoidally with frequency of 50 Hz has RMS value of 20 amps. Write down the equation for the instantaneous value and find instantaneous values after passing through a positive maximum value at
   i) 0.0025 sec.
   ii) 0.0125 sec.
   iii) At what time measured from a positive maximum value, the instantaneous current will be 14.14 A.

SECTION – II

4. Attempt **any four**. **(4×4=16)**

a) Derive the relation between voltage and current for a purely capacitive circuit when ac supply is applied across it.

b) In series RLC circuit R = 10 Ω, L = 0.25 H, C = 25 μF and supply voltage is 230 V, 50 Hz. Calculate total impedance and power in the circuit.

c) Explain principle of operation, working and construction of single phase transformer.

d) Explain the working principle of DC motor.

e) Derive the relation between line and phase voltages and currents in balanced delta connected 3-phase load.

f) A coil takes a current of 2 A lagging 60 degree behind the applied voltage of 200 V at 50 Hz ac supply. Calculate,

i) resistance of coil

ii) inductance of coil

iii) impedance of coil.

5. Solve **any two**. **(2×6=12)**

a) A 40 KVA single phase transformer has iron loss of 450 W. The full load copper loss is 850 watts. Calculate,

i) Efficiency at full load, 0.8 lagging p.f.

ii) KVA supplied at maximum efficiency.

iii) Maximum efficiency at 0.8 lagging p.f.

b) Coil of resistance 15 Ω and inductance 0.05 H is connected in parallel with resistance of 20 Ω. If the circuit is connected to 200 V, 50 Hz supply. Determine,

i) current in each branch

ii) supply current

iii) circuit power factor.

c) The load to a 3 phase supply consists of 3 similar coils connected in star. The line currents are 25 A and KVA and KW inputs are 20 and 11 respectively. Find,

i) Phase and line voltages

ii) KVAR input

iii) Resistance and reactance of each coil.

———————

Set R

SLR-TJ – 3

Seat No.	

Set S

F.E. (Part – I) (CBCS) Examination, 2017
BASIC ELECTRICAL ENGINEERING

Day and Date : Friday, 15-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) If $Z_1 = 08 - j6\,\Omega$ and $Y_2 = 08 - j6$ mho, then the nature of the two circuits are
   a) 1-capacitive, 2-capacitive b) 1-capacitive, 2-inductive
   c) 1-inductive, 2-capacitive d) 1-inductive, 2-inductive

2) Three identical resistances connected in star consume 4000W. If these three resistances are connected in delta across the same supply, the power consumed will be
   a) 4000 W b) 6000 W c) 8000 W d) 12000 W

3) Transformer cores are laminated in order to
   a) Simplify its construction b) Minimize eddy current loss
   c) Reduce cost d) Reduce hysteresis loss

4) A transformer having 1000 primary turns is connected to a 250 V a.c. supply. For a secondary voltage of 400 V, the number of secondary turns should be
   a) 1600 b) 250 c) 400 d) 1250

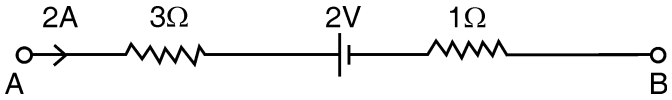
5) The back emf in d.c. Motor
   a) Opposes the applied voltage b) Aids the applied voltage
   c) Aids the armature current d) None of these

6) While calculating R_{th} constant-current sources in the circuit are
   a) Replaced by 'opens'
   b) Replaced by 'shorts'
   c) Treated in parallel with other voltage sources
   d) Converted into equivalent voltage sources

P.T.O.

7) If a 220 V heater is used on 110 V supply, consumption of energy will be
   a) one half b) twice c) one fourth d) four times

8) Figure shows a part of closed electrical circuit. Then $V_A - V_B$ is,



   a) – 8 V b) 6 V c) 10 V d) 3 V

9) Magnetic reluctance is
   a) Assistance to magnetic flux b) Permeance to magnetic flux
   c) Magnetic field strength d) Opposition to magnetic flux

10) Two parallel conductor carries the current in same direction, what kind of mutual force they will experience ?
   a) Force of repulsion b) Force of attraction
   c) Force of attraction and attraction d) None of these

11) Frequency of an a.c. quantity is defined as
   a) rev./sec. b) sec./rev. c) cycles/rev. d) cycles/sec.

12) The RMS value of sinusoidal 200 V peak to peak wave is
   a) 200 V b) $100/\sqrt{2}$ c) $200/\sqrt{2}$ d) 100 V

13) In a purely inductive circuit power factor is
   a) zero lagging b) unity c) zero leading d) none of these

14) Admittance is reciprocal of
   a) Resistance b) Impedance c) Reactance d) Voltage

SLR-TJ – 3

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
BASIC ELECTRICAL ENGINEERING

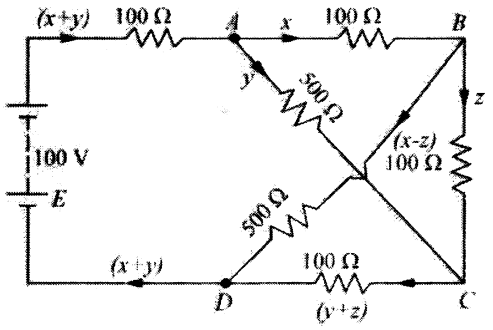
Day and Date : Friday, 15-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

2. Attempt **any four**. **(4×4=16)**

a) A coil has a resistance of 18 ohm when its mean temperature is 20°C & of 20 ohm when its temperature is 50°C. Find its mean temperature rise when its resistance is 21 ohm and surrounding temperature is 15°C.

b) By using Kirchhoff's laws, calculate the branch current in the circuit shown below.



c) State and prove the Maximum Power transfer theorem.

d) A steel ring having cross-sectional area 12.56 cm^2 and mean diameter of 100 mm has a coil of 100 turns wound uniformly around it. A magnetic flux of 2 mWb is to be produced in the ring. Calculate

i) The current required

ii) The relative permeability of steel

iii) Inductance of the coil. From the magnetizing curve for steel where H = 5000AT/m for B = 1.6 tesla.

e) An electric kettle is used to heat 0.5 litre of water from 20°C to the boiling point in 10 minutes, the supply voltage is 230 Volt. The efficiency of the kettle is 80%. Calculate i) the resistance of heating element and ii) The cost of electrical energy consumed at 75 paisa per unit. Assume the specific heat capacity of water is 4190 joule/Kg.K.

f) Define the following term related with alternating quantity
   i) Cycle
   ii) Instantaneous value
   iii) Frequency
   iv) Time period.

3. Solve **any two**. **(2×6=12)**

a) Determine the electrical energy required to raise the temperature of 80 litres of water by 80°C. If the efficiency of the heater = 89.5%, specific heat capacity of water = 4200 J/kg.K. and mass of one litre of water = 1 Kg.

To what height could a mass of 10 tons be raised with the same expenditure of energy if lifting equipment has an efficiency of 66.5%.

b) Explain the concept of self and mutual inductance.

A flux of 0.6 mWb is produced by a coil of 1000 turns wound on a ring with a current of 5A in it. Calculate,
   i) Self inductance of coil
   ii) Mutual inductance between the coil, if second coil of 600 turns is uniformly wound on first coil.

c) An alternating current quantity varying sinusoidally with frequency of 50 Hz has RMS value of 20 amps. Write down the equation for the instantaneous value and find instantaneous values after passing through a positive maximum value at
   i) 0.0025 sec.
   ii) 0.0125 sec.
   iii) At what time measured from a positive maximum value, the instantaneous current will be 14.14 A.

SECTION – II

4. Attempt **any four**. **(4×4=16)**

a) Derive the relation between voltage and current for a purely capacitive circuit when ac supply is applied across it.

b) In series RLC circuit R = 10 Ω, L = 0.25 H, C = 25 μF and supply voltage is 230 V, 50 Hz. Calculate total impedance and power in the circuit.

c) Explain principle of operation, working and construction of single phase transformer.

d) Explain the working principle of DC motor.

e) Derive the relation between line and phase voltages and currents in balanced delta connected 3-phase load.

f) A coil takes a current of 2 A lagging 60 degree behind the applied voltage of 200 V at 50 Hz ac supply. Calculate,

i) resistance of coil

ii) inductance of coil

iii) impedance of coil.

5. Solve **any two**. **(2×6=12)**

a) A 40 KVA single phase transformer has iron loss of 450 W. The full load copper loss is 850 watts. Calculate,

i) Efficiency at full load, 0.8 lagging p.f.

ii) KVA supplied at maximum efficiency.

iii) Maximum efficiency at 0.8 lagging p.f.

b) Coil of resistance 15 Ω and inductance 0.05 H is connected in parallel with resistance of 20 Ω. If the circuit is connected to 200 V, 50 Hz supply. Determine,

i) current in each branch

ii) supply current

iii) circuit power factor.

c) The load to a 3 phase supply consists of 3 similar coils connected in star. The line currents are 25 A and KVA and KW inputs are 20 and 11 respectively. Find,

i) Phase and line voltages

ii) KVAR input

iii) Resistance and reactance of each coil.

———————

Set S

SLR-TJ – 4

Seat No.	

Set P

F.E. (Part – I) (CBCS) Examination, 2017
BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 18-12-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **All** questions are **compulsory**.*
*4) Q. **2** and Q. **4** are short answer type questions.*
*5) Q. **3** and Q. **5** are long answer type questions.*
*6) Neat diagram must be drawn **wherever** necessary.*
*7) Figures to the **right** indicate **full** marks.*
*8) Make suitable assumption **if necessary** and mention them **clearly**.*
*9) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternatives :

1) It is impossible to construct a device which operating in a cycle will produce no effect other than the transfer of heat from a colder body to hotter body.
   a) Kelvin plank law b) Clausius law
   c) Carnot theorem d) None

2) A centrifugal fan forms
   a) Closed system b) Open system
   c) Isolated system d) None of above

3) A perfect gas obeys
   a) Charles law b) Boyle's law
   c) Both a) and b) d) None

P.T.O.

4) Specific heat is the amount of heat required to raise the temperature
   a) By unit degree of a substance b) By unit degree of a unit mass
   c) Of a unit mass by 10° d) None of the above

5) The devices, pumps, compressor, refrigerators, air conditioners which require input energy for their operation are called _____
   a) Power absorbing devices b) Power producing devices
   c) Power transferring devices d) None

6) Steam pressures usually used in thermal power plants are
   a) 5 kg/cm^2 to 10 kg/cm^2 b) 50 kg/cm^2 to 100 kg/cm^2
   c) 110 kg/cm^2 to 170 kg/cm^2 d) 200 kg/cm^2 to 215 kg/cm^2

7) In a thermal power plant, heat from the flue gases is recovered in
   a) Chimney b) De-super heater
   c) Economizer d) Condenser

8) Theoretically, for same swept volume a four stroke cycle engine should develop power as compared to two stroke cycle engine is
   a) Half b) Double c) Same d) Four times

9) Flywheel used in two stroke cycle engine as compared to four stroke cycle engine is
   a) Heavier b) Lighter
   c) Same in weight d) None of the above

10) Idler pulley is used for
   a) Maintaining belt tension b) Changing direction of rotation
   c) Stopping motion completely d) All of the above

11) When a material is heated, its toughness
   a) Increases b) Decreases
   c) Remains same d) None of the above

12) Property of a material, which enables it to resist fracture due to high impact loads, is known as
   a) Elasticity b) Plasticity c) Ductility d) Toughness

13) Which of the following is a sliding part of the lathe ?
   a) Head stock b) Tail stock c) Both a) and b) d) None of these

14) Material used for coating the electrodes is called
   a) Protective layer b) Binder c) Slag d) Flux

SLR-TJ – 4

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 18-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. **2** and Q. **4** are short answer type questions.*
*3) Q. **3** and Q. **5** are long answer type questions.*
*4) Neat diagram must be drawn **whenever** necessary.*
*5) Figures to the **right** indicate **full** marks.*
*6) Make suitable assumption **if necessary** and mention them **clearly**.*
*7) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.*

SECTION – I

2. Answer **any five** of the following : **(5×3=15)**

a) State and explain “Kelvin-Plank” and “Clausius” statements.

b) Prove that internal energy is a property of system.

c) Explain in brief open system. State the type of system for following :

1) Car Engine

2) Domestic refrigerator.

d) Obtain relation between them C_p, C_v, R and C_p, R, γ.

e) Distinguish between centrifugal and reciprocating pump.

f) Explain working of Root blower with neat sketch.

g) Draw a neat sketch of Nuclear power plant.

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

a) The working fluid, in a steady flow process flows at a rate of 220 Kg/min. The fluid rejects 100 KJ/Sec passing through the system. The condition of the fluid at inlet and outlet are as shown in table below :

	Velocity(m/s)	**Pressure (bar)**	**Sp. I.E. (KJ/Kg)**	**Sp. Vol. (m^3/kg)**
Inlet	320	6	2000	0.36
Outlet	140	1.2	1400	1.3

Determine the power capacity of the system in KW. The change in potential energy can be neglected. **5**

b) Explain the working of hydro electric power plant with block diagram. **5**

c) 0.5 kg of air is compressed adiabatically from 160 kpa pressure and 60°C temperature to 0.8 MPa pressure. It is then expanded at constant pressure to reach its original volume. Find gross heat transfer and work transfer. Take C_v = 0.714 KJ/kg-K.C_p = 1.005 KJ/Kg-K. **4**

d) Explain working of impulse type water turbine. **4**

e) What are the functions of following unit in thermal power plant ? **4**

i) Condenser

ii) Economizer

iii) Cooling toweriv

iv) Air preheater.

f) In a non-flow reversible process the pressure and volume are related by $P = V^2+(10/V)$ (Where P is in KN/m^2 and V is in m^3). During the process volume changes from 1.2 m^3 to 4.5 m^3. The heat added during the process is 10 MJ. Find change in internal energy during process. **4**

SECTION – II

4. Answer **any five** of the following : **(5×3=15)**

   a) Compare diesel engine and Petrol Engine.

   b) State the advantages and disadvantages of chain drive over belt drive.

   c) Enlist different types of gear and explain worm and worm wheel gear.

   d) What are the different types of design ? What are common source of design failure ?

   e) Write note on 'aesthetic considerations' in design.

   f) Derive an expression for air standard efficiency of Otto cycle.

   g) Explain with neat sketch brazing process. State its advantages and applications.

5. Solve **any one** out of **(a)** and **(b)** and solve **any two** out of **(c)** to **(f)** : **13**

   a) The following data relates to an open belt drive :

      i) Distance between the two parallel shaft = 4.8 m
      ii) Diameter of larger pulley = 1.5 m
      iii) Diameter of smaller pulley = 1.05 m
      iv) Initial tension in the belt = 3.0 KN
      v) Mass of belt material = 1.5 kg/m
      vi) Coefficient of friction between the belt and pulley = 0.3
      vii) Speed of smaller pulley = 400 rpm

      Calculate power transmitted. **5**

   b) Sketch and describe in brief pillar drilling machine. **5**

   c) 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 and air standard efficiency. **4**

   d) Explain the different modes of failure of mechanical components. **4**

   e) Differentiate between soldering and brazing. **4**

   f) List various types of operations performed on lathe machine and explain turning and facing operation in detail. **4**

Set P

SLR-TJ – 4

Seat No.	

Set Q

F.E. (Part – I) (CBCS) Examination, 2017
BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 18-12-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **All** questions are **compulsory**.*
*4) Q. **2** and Q. **4** are short answer type questions.*
*5) Q. **3** and Q. **5** are long answer type questions.*
*6) Neat diagram must be drawn **wherever** necessary.*
*7) Figures to the **right** indicate **full** marks.*
*8) Make suitable assumption **if necessary** and mention them **clearly**.*
*9) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternatives :

1) Theoretically, for same swept volume a four stroke cycle engine should develop power as compared to two stroke cycle engine is
   a) Half b) Double c) Same d) Four times

2) Flywheel used in two stroke cycle engine as compared to four stroke cycle engine is
   a) Heavier b) Lighter
   c) Same in weight d) None of the above

3) Idler pulley is used for
   a) Maintaining belt tension b) Changing direction of rotation
   c) Stopping motion completely d) All of the above

P.T.O.

4) When a material is heated, its toughness
   a) Increases b) Decreases
   c) Remains same d) None of the above

5) Property of a material, which enables it to resist fracture due to high impact loads, is known as
   a) Elasticity b) Plasticity c) Ductility d) Toughness

6) Which of the following is a sliding part of the lathe ?
   a) Head stock b) Tail stock c) Both a) and b) d) None of these

7) Material used for coating the electrodes is called
   a) Protective layer b) Binder c) Slag d) Flux

8) It is impossible to construct a device which operating in a cycle will produce no effect other than the transfer of heat from a colder body to hotter body.
   a) Kelvin plank law b) Clausius law
   c) Carnot theorem d) None

9) A centrifugal fan forms
   a) Closed system b) Open system
   c) Isolated system d) None of above

10) A perfect gas obeys
   a) Charles law b) Boyle's law
   c) Both a) and b) d) None

11) Specific heat is the amount of heat required to raise the temperature
   a) By unit degree of a substance b) By unit degree of a unit mass
   c) Of a unit mass by 10° d) None of the above

12) The devices, pumps, compressor, refrigerators, air conditioners which require input energy for their operation are called _____
   a) Power absorbing devices b) Power producing devices
   c) Power transferring devices d) None

13) Steam pressures usually used in thermal power plants are
   a) 5 kg/cm^2 to 10 kg/cm^2 b) 50 kg/cm^2 to 100 kg/cm^2
   c) 110 kg/cm^2 to 170 kg/cm^2 d) 200 kg/cm^2 to 215 kg/cm^2

14) In a thermal power plant, heat from the flue gases is recovered in
   a) Chimney b) De-super heater
   c) Economizer d) Condenser

SLR-TJ – 4

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 18-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. **2** and Q. **4** are short answer type questions.*
*3) Q. **3** and Q. **5** are long answer type questions.*
*4) Neat diagram must be drawn **whenever** necessary.*
*5) Figures to the **right** indicate **full** marks.*
*6) Make suitable assumption **if necessary** and mention them **clearly**.*
*7) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.*

SECTION – I

2. Answer **any five** of the following : **(5×3=15)**

a) State and explain “Kelvin-Plank” and “Clausius” statements.

b) Prove that internal energy is a property of system.

c) Explain in brief open system. State the type of system for following :

1) Car Engine

2) Domestic refrigerator.

d) Obtain relation between them C_p, C_v, R and C_p, R, γ.

e) Distinguish between centrifugal and reciprocating pump.

f) Explain working of Root blower with neat sketch.

g) Draw a neat sketch of Nuclear power plant.

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

a) The working fluid, in a steady flow process flows at a rate of 220 Kg/min. The fluid rejects 100 KJ/Sec passing through the system. The condition of the fluid at inlet and outlet are as shown in table below :

	Velocity(m/s)	**Pressure (bar)**	**Sp. I.E. (KJ/Kg)**	**Sp. Vol. (m^3/kg)**
Inlet	320	6	2000	0.36
Outlet	140	1.2	1400	1.3

Determine the power capacity of the system in KW. The change in potential energy can be neglected. **5**

b) Explain the working of hydro electric power plant with block diagram. **5**

c) 0.5 kg of air is compressed adiabatically from 160 kpa pressure and 60°C temperature to 0.8 MPa pressure. It is then expanded at constant pressure to reach its original volume. Find gross heat transfer and work transfer. Take C_v = 0.714 KJ/kg-K.C_p = 1.005 KJ/Kg-K. **4**

d) Explain working of impulse type water turbine. **4**

e) What are the functions of following unit in thermal power plant ? **4**

i) Condenser

ii) Economizer

iii) Cooling toweriv

iv) Air preheater.

f) In a non-flow reversible process the pressure and volume are related by $P = V^2+(10/V)$ (Where P is in KN/m^2 and V is in m^3). During the process volume changes from 1.2 m^3 to 4.5 m^3. The heat added during the process is 10 MJ. Find change in internal energy during process. **4**

SECTION – II

4. Answer **any five** of the following : **(5×3=15)**

   a) Compare diesel engine and Petrol Engine.

   b) State the advantages and disadvantages of chain drive over belt drive.

   c) Enlist different types of gear and explain worm and worm wheel gear.

   d) What are the different types of design ? What are common source of design failure ?

   e) Write note on 'aesthetic considerations' in design.

   f) Derive an expression for air standard efficiency of Otto cycle.

   g) Explain with neat sketch brazing process. State its advantages and applications.

5. Solve **any one** out of **(a)** and **(b)** and solve **any two** out of **(c)** to **(f)** : **13**

   a) The following data relates to an open belt drive :

      i) Distance between the two parallel shaft = 4.8 m
      ii) Diameter of larger pulley = 1.5 m
      iii) Diameter of smaller pulley = 1.05 m
      iv) Initial tension in the belt = 3.0 KN
      v) Mass of belt material = 1.5 kg/m
      vi) Coefficient of friction between the belt and pulley = 0.3
      vii) Speed of smaller pulley = 400 rpm

      Calculate power transmitted. **5**

   b) Sketch and describe in brief pillar drilling machine. **5**

   c) 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 and air standard efficiency. **4**

   d) Explain the different modes of failure of mechanical components. **4**

   e) Differentiate between soldering and brazing. **4**

   f) List various types of operations performed on lathe machine and explain turning and facing operation in detail. **4**

Set Q

SLR-TJ – 4

Seat No.	

Set R

F.E. (Part – I) (CBCS) Examination, 2017
BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 18-12-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **All** questions are **compulsory**.*
*4) Q. **2** and Q. **4** are short answer type questions.*
*5) Q. **3** and Q. **5** are long answer type questions.*
*6) Neat diagram must be drawn **wherever** necessary.*
*7) Figures to the **right** indicate **full** marks.*
*8) Make suitable assumption **if necessary** and mention them **clearly**.*
*9) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternatives :

1) The devices, pumps, compressor, refrigerators, air conditioners which require input energy for their operation are called _____
   a) Power absorbing devices b) Power producing devices
   c) Power transferring devices d) None

2) Steam pressures usually used in thermal power plants are
   a) 5 kg/cm^2 to 10 kg/cm^2 b) 50 kg/cm^2 to 100 kg/cm^2
   c) 110 kg/cm^2 to 170 kg/cm^2 d) 200 kg/cm^2 to 215 kg/cm^2

3) In a thermal power plant, heat from the flue gases is recovered in
   a) Chimney b) De-super heater
   c) Economizer d) Condenser

P.T.O.

4) Theoretically, for same swept volume a four stroke cycle engine should develop power as compared to two stroke cycle engine is
   a) Half b) Double c) Same d) Four times

5) Flywheel used in two stroke cycle engine as compared to four stroke cycle engine is
   a) Heavier b) Lighter
   c) Same in weight d) None of the above

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) When a material is heated, its toughness
   a) Increases b) Decreases
   c) Remains same d) None of the above

8) Property of a material, which enables it to resist fracture due to high impact loads, is known as
   a) Elasticity b) Plasticity c) Ductility d) Toughness

9) Which of the following is a sliding part of the lathe ?
   a) Head stock b) Tail stock c) Both a) and b) d) None of these

10) Material used for coating the electrodes is called
   a) Protective layer b) Binder c) Slag d) Flux

11) It is impossible to construct a device which operating in a cycle will produce no effect other than the transfer of heat from a colder body to hotter body.
   a) Kelvin plank law b) Clausius law
   c) Carnot theorem d) None

12) A centrifugal fan forms
   a) Closed system b) Open system
   c) Isolated system d) None of above

13) A perfect gas obeys
   a) Charles law b) Boyle's law
   c) Both a) and b) d) None

14) Specific heat is the amount of heat required to raise the temperature
   a) By unit degree of a substance b) By unit degree of a unit mass
   c) Of a unit mass by 10° d) None of the above

SLR-TJ – 4

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 18-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. **2** and Q. **4** are short answer type questions.*
*3) Q. **3** and Q. **5** are long answer type questions.*
*4) Neat diagram must be drawn **whenever** necessary.*
*5) Figures to the **right** indicate **full** marks.*
*6) Make suitable assumption **if necessary** and mention them **clearly**.*
*7) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.*

SECTION – I

2. Answer **any five** of the following : **(5×3=15)**

a) State and explain “Kelvin-Plank” and “Clausius” statements.

b) Prove that internal energy is a property of system.

c) Explain in brief open system. State the type of system for following :

1) Car Engine

2) Domestic refrigerator.

d) Obtain relation between them C_p, C_v, R and C_p, R, γ.

e) Distinguish between centrifugal and reciprocating pump.

f) Explain working of Root blower with neat sketch.

g) Draw a neat sketch of Nuclear power plant.

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

a) The working fluid, in a steady flow process flows at a rate of 220 Kg/min. The fluid rejects 100 KJ/Sec passing through the system. The condition of the fluid at inlet and outlet are as shown in table below :

	Velocity(m/s)	**Pressure (bar)**	**Sp. I.E. (KJ/Kg)**	**Sp. Vol. (m^3/kg)**
Inlet	320	6	2000	0.36
Outlet	140	1.2	1400	1.3

Determine the power capacity of the system in KW. The change in potential energy can be neglected. **5**

b) Explain the working of hydro electric power plant with block diagram. **5**

c) 0.5 kg of air is compressed adiabatically from 160 kpa pressure and 60°C temperature to 0.8 MPa pressure. It is then expanded at constant pressure to reach its original volume. Find gross heat transfer and work transfer. Take C_v = 0.714 KJ/kg-K.C_p = 1.005 KJ/Kg-K. **4**

d) Explain working of impulse type water turbine. **4**

e) What are the functions of following unit in thermal power plant ? **4**

i) Condenser

ii) Economizer

iii) Cooling toweriv

iv) Air preheater.

f) In a non-flow reversible process the pressure and volume are related by $P = V^2+(10/V)$ (Where P is in KN/m^2 and V is in m^3). During the process volume changes from 1.2 m^3 to 4.5 m^3. The heat added during the process is 10 MJ. Find change in internal energy during process. **4**

SECTION – II

4. Answer **any five** of the following : **(5×3=15)**

   a) Compare diesel engine and Petrol Engine.

   b) State the advantages and disadvantages of chain drive over belt drive.

   c) Enlist different types of gear and explain worm and worm wheel gear.

   d) What are the different types of design ? What are common source of design failure ?

   e) Write note on 'aesthetic considerations' in design.

   f) Derive an expression for air standard efficiency of Otto cycle.

   g) Explain with neat sketch brazing process. State its advantages and applications.

5. Solve **any one** out of **(a)** and **(b)** and solve **any two** out of **(c)** to **(f)** : **13**

   a) The following data relates to an open belt drive :

      i) Distance between the two parallel shaft = 4.8 m
      ii) Diameter of larger pulley = 1.5 m
      iii) Diameter of smaller pulley = 1.05 m
      iv) Initial tension in the belt = 3.0 KN
      v) Mass of belt material = 1.5 kg/m
      vi) Coefficient of friction between the belt and pulley = 0.3
      vii) Speed of smaller pulley = 400 rpm

      Calculate power transmitted. **5**

   b) Sketch and describe in brief pillar drilling machine. **5**

   c) 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 and air standard efficiency. **4**

   d) Explain the different modes of failure of mechanical components. **4**

   e) Differentiate between soldering and brazing. **4**

   f) List various types of operations performed on lathe machine and explain turning and facing operation in detail. **4**

Set R

SLR-TJ – 4

Seat No.	

Set S

F.E. (Part – I) (CBCS) Examination, 2017
BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 18-12-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **All** questions are **compulsory**.*
*4) Q. **2** and Q. **4** are short answer type questions.*
*5) Q. **3** and Q. **5** are long answer type questions.*
*6) Neat diagram must be drawn **wherever** necessary.*
*7) Figures to the **right** indicate **full** marks.*
*8) Make suitable assumption **if necessary** and mention them **clearly**.*
*9) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternatives :

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) When a material is heated, its toughness
   a) Increases b) Decreases
   c) Remains same d) None of the above

3) Property of a material, which enables it to resist fracture due to high impact loads, is known as
   a) Elasticity b) Plasticity c) Ductility d) Toughness

P.T.O.

4) Which of the following is a sliding part of the lathe ?
   a) Head stock b) Tail stock c) Both a) and b) d) None of these

5) Material used for coating the electrodes is called
   a) Protective layer b) Binder c) Slag d) Flux

6) It is impossible to construct a device which operating in a cycle will produce no effect other than the transfer of heat from a colder body to hotter body.
   a) Kelvin plank law b) Clausius law
   c) Carnot theorem d) None

7) A centrifugal fan forms
   a) Closed system b) Open system
   c) Isolated system d) None of above

8) A perfect gas obeys
   a) Charles law b) Boyle's law
   c) Both a) and b) d) None

9) Specific heat is the amount of heat required to raise the temperature
   a) By unit degree of a substance b) By unit degree of a unit mass
   c) Of a unit mass by 10° d) None of the above

10) The devices, pumps, compressor, refrigerators, air conditioners which require input energy for their operation are called _____
   a) Power absorbing devices b) Power producing devices
   c) Power transferring devices d) None

11) Steam pressures usually used in thermal power plants are
   a) 5 kg/cm^2 to 10 kg/cm^2 b) 50 kg/cm^2 to 100 kg/cm^2
   c) 110 kg/cm^2 to 170 kg/cm^2 d) 200 kg/cm^2 to 215 kg/cm^2

12) In a thermal power plant, heat from the flue gases is recovered in
   a) Chimney b) De-super heater
   c) Economizer d) Condenser

13) Theoretically, for same swept volume a four stroke cycle engine should develop power as compared to two stroke cycle engine is
   a) Half b) Double c) Same d) Four times

14) Flywheel used in two stroke cycle engine as compared to four stroke cycle engine is
   a) Heavier b) Lighter
   c) Same in weight d) None of the above

SLR-TJ – 4

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 18-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. **2** and Q. **4** are short answer type questions.*
*3) Q. **3** and Q. **5** are long answer type questions.*
*4) Neat diagram must be drawn **whenever** necessary.*
*5) Figures to the **right** indicate **full** marks.*
*6) Make suitable assumption **if necessary** and mention them **clearly**.*
*7) **Use** of log tables and non-programmable **single** memory calculator is **allowed**.*

SECTION – I

2. Answer **any five** of the following : **(5×3=15)**

a) State and explain “Kelvin-Plank” and “Clausius” statements.

b) Prove that internal energy is a property of system.

c) Explain in brief open system. State the type of system for following :

1) Car Engine

2) Domestic refrigerator.

d) Obtain relation between them C_p, C_v, R and C_p, R, γ.

e) Distinguish between centrifugal and reciprocating pump.

f) Explain working of Root blower with neat sketch.

g) Draw a neat sketch of Nuclear power plant.

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

a) The working fluid, in a steady flow process flows at a rate of 220 Kg/min. The fluid rejects 100 KJ/Sec passing through the system. The condition of the fluid at inlet and outlet are as shown in table below :

	Velocity(m/s)	**Pressure (bar)**	**Sp. I.E. (KJ/Kg)**	**Sp. Vol. (m^3/kg)**
Inlet	320	6	2000	0.36
Outlet	140	1.2	1400	1.3

Determine the power capacity of the system in KW. The change in potential energy can be neglected. **5**

b) Explain the working of hydro electric power plant with block diagram. **5**

c) 0.5 kg of air is compressed adiabatically from 160 kpa pressure and 60°C temperature to 0.8 MPa pressure. It is then expanded at constant pressure to reach its original volume. Find gross heat transfer and work transfer. Take C_v = 0.714 KJ/kg-K.C_p = 1.005 KJ/Kg-K. **4**

d) Explain working of impulse type water turbine. **4**

e) What are the functions of following unit in thermal power plant ? **4**

i) Condenser

ii) Economizer

iii) Cooling toweriv

iv) Air preheater.

f) In a non-flow reversible process the pressure and volume are related by $P = V^2+(10/V)$ (Where P is in KN/m^2 and V is in m^3). During the process volume changes from 1.2 m^3 to 4.5 m^3. The heat added during the process is 10 MJ. Find change in internal energy during process. **4**

SECTION – II

4. Answer **any five** of the following : **(5×3=15)**

   a) Compare diesel engine and Petrol Engine.

   b) State the advantages and disadvantages of chain drive over belt drive.

   c) Enlist different types of gear and explain worm and worm wheel gear.

   d) What are the different types of design ? What are common source of design failure ?

   e) Write note on 'aesthetic considerations' in design.

   f) Derive an expression for air standard efficiency of Otto cycle.

   g) Explain with neat sketch brazing process. State its advantages and applications.

5. Solve **any one** out of **(a)** and **(b)** and solve **any two** out of **(c)** to **(f)** : **13**

   a) The following data relates to an open belt drive :

      i) Distance between the two parallel shaft = 4.8 m
      ii) Diameter of larger pulley = 1.5 m
      iii) Diameter of smaller pulley = 1.05 m
      iv) Initial tension in the belt = 3.0 KN
      v) Mass of belt material = 1.5 kg/m
      vi) Coefficient of friction between the belt and pulley = 0.3
      vii) Speed of smaller pulley = 400 rpm

      Calculate power transmitted. **5**

   b) Sketch and describe in brief pillar drilling machine. **5**

   c) 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 and air standard efficiency. **4**

   d) Explain the different modes of failure of mechanical components. **4**

   e) Differentiate between soldering and brazing. **4**

   f) List various types of operations performed on lathe machine and explain turning and facing operation in detail. **4**

Set S

SLR-TJ – 5

Seat No.	

Set P

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Wednesday, 20-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

Constants *: 1) Avogadro's no. $N = 6.02\times10^{26}$ /k.mol.*
2) Velocity of light, $c = 3\times10^{8}$ m/sec.
3) Charge of electron, $e = 1.6\times10^{-19}$ C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

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

1) Donor type semiconductor is formed by adding impurity of valency
a) 3 b) 4 c) 5 d) 6

2) The co-ordination number in case of BCC structure is
a) 12 b) 6 c) 4 d) 8

3) The Miller indices of the plane parallel to x and y axes are
a) (1 0 0) b) (0 1 0) c) (0 0 1) d) (1 1 1)

4) The audible range of frequency is
a) 20 Hz to 20 KHz b) 200 KHz to 200 MHz
c) 20 KHz to 20 MHz d) 200 Hz to 200 MHz

5) Optimum reverberation time for music is
a) 0.5 to 1 second b) 0 to 1 second
c) 1 to 2 second d) Above 5 second

6) At velocities which are comparable to velocity of light, the mass of the moving object appears to be _____ than at rest.
   a) Less b) Greater
   c) Remains same d) None of these

7) Time dilation equation is given by
   a) $t = to/\sqrt{1 - v^2/c^2}$ b) $t = to/\sqrt{1 + v^2/c^2}$
   c) $t = to/(1 - v^2/c^2)$ d) $t = to/\sqrt{1 - c^2/v^2}$

SECTION – II

8) In Fraunhoffer diffraction, the source and screen are
   a) at an infinite distance from the obstacle
   b) at finite distances from the obstacle
   c) source at a finite distance and screen at an infinite distance from the obstacle
   d) source at an infinite distance and screen at a finite distance from the obstacle

9) The velocities of E-ray and O-ray are same in a direction
   a) parallel to optic axis
   b) perpendicular to optic axis
   c) making an angle 45° with optic axis
   d) making any angle with optic axis

10) Spontaneous Emission process is mathematically represented by equation
   a) $A + h\gamma \rightarrow A^*$ b) $A^* + h\gamma \rightarrow 2h\gamma + A$
   c) $A^* \rightarrow A + h\gamma$ d) $A^* + h\gamma \rightarrow A + h\gamma$

11) LASER beam is
   a) highly directional b) highly intense
   c) monochromatic d) all of these

12) The diameter of cladding is nearly
   a) 5 μm to 100 μm b) 125 μm
   c) 250 μm d) 500 μm

13) The chain reaction becomes supercritical when the effective multiplication factors K
   a) K = 1 b) K > 1 c) K < 1 d) K = 0

14) The chirality of Zigzag CNT is
   a) (a, 0) b) (a, a) c) (a, b) d) (0, b)

_____

SLR-TJ – 5

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Wednesday, 20-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

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

Constants *: 1) Avogadro's no. $N = 6.02\times10^{26}$ /kmmol.*
2) Velocity of light, $c = 3\times10^{8}$ m/sec.
3) Charge of electron, $e = 1.6\times10^{-19}$ C.

SECTION – I

2. Attempt **any five** of the following : **15**

a) With energy band diagram, explain classification of solids.

b) Define
   i) Unit cell,
   ii) Co-ordination number and
   iii) Atomic packing fraction.

c) What are miller indices ? How they are determined ?

d) State applications of ultrasonic waves.

e) Explain Bragg's law in X-ray diffraction.

f) The volume of a hall is 475 m^3. The area of wall is 200 m^2, area of floor and ceiling each is 100 m^2. If absorption coefficient of the wall, ceiling and floor are 0.025, 0.02 and 0.55 respectively. Calculate the reverberation time for the hall.

g) At what speed the mass of an object will be double of its value at rest.

3. State Hall effect. Derive an expression for Hall voltage and Hall coefficient. **5**

OR

Deduce an expression for Lorentz transformations for space and time co-ordinates.

4. Attempt **any two** of the following : **8**

   a) Explain effect of increase of impurity concentration on fermi level of N type semiconductor.

   b) Explain any four factors affecting architectural acoustics and their remedies.

   c) Define axis of symmetry. Explain it for cubic crystals.

   d) Derive an expression for Length Contraction in special theory of relativity. Hence explain special cases.

SECTION – II

5. Attempt **any five** of the following : **15**

   a) Distinguish between Fresnel and Fraunhoffer class of diffraction.

   b) Explain : Positive and Negative crystals.

   c) Explain with neat diagram

      i) Spontaneous emission

      ii) Stimulated emission.

   d) Write in brief applications of nano materials in electronics, energy and cosmetics.

   e) Explain : Carbon Nitrogen cycle.

   f) In an optical fiber the core material has refractive index 1.6 and clad material is 1.3. What is the value of critical angle and acceptance angle ?

   g) A parallel beam of sodium light (λ = 5890 A°) is allowed to incident normally on transmission grating. Second order spectral lines are found to be deviated through 30°. Calculate the number of lines/cm on the grating.

6. Describe construction and working of He-Ne laser with neat diagrams. **5**

   OR

   Obtain the expression for acceptance angle, NA and fractional refractive index change of an optical fiber.

7. Attempt **any two** of the following : **8**

   a) With neat diagram explain construction and working of Laurent's half shade polarimeter.

   b) Explain the construction and working of semiconductor diode laser with neat diagram.

   c) Explain the main features of the design and working of a nuclear fission reactor.

   d) Write a note on : Classification of optical fibers.

Set P

SLR-TJ – 5

Seat No.	

Set Q

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Wednesday, 20-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

Constants *: 1) Avogadro's no. $N = 6.02\times10^{26}$ /k.mol.*
2) Velocity of light, $c = 3\times10^{8}$ m/sec.
3) Charge of electron, $e = 1.6\times10^{-19}$ C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

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

1) The Miller indices of the plane parallel to x and y axes are
a) (1 0 0) b) (0 1 0) c) (0 0 1) d) (1 1 1)

2) The audible range of frequency is
a) 20 Hz to 20 KHz b) 200 KHz to 200 MHz
c) 20 KHz to 20 MHz d) 200 Hz to 200 MHz

3) Optimum reverberation time for music is
a) 0.5 to 1 second b) 0 to 1 second
c) 1 to 2 second d) Above 5 second

4) At velocities which are comparable to velocity of light, the mass of the moving object appears to be _____ than at rest.
a) Less b) Greater
c) Remains same d) None of these

5) Time dilation equation is given by
a) $t = to/\sqrt{1 - v^2/c^2}$ b) $t = to/\sqrt{1 + v^2/c^2}$
c) $t = to/(1 - v^2/c^2)$ d) $t = to/\sqrt{1 - c^2/v^2}$

P.T.O.

6) Donor type semiconductor is formed by adding impurity of valency
   a) 3 b) 4 c) 5 d) 6

7) The co-ordination number in case of BCC structure is
   a) 12 b) 6 c) 4 d) 8

SECTION – II

8) Spontaneous Emission process is mathematically represented by equation
   a) $A + h\gamma \rightarrow A^*$ b) $A^* + h\gamma \rightarrow 2h\gamma + A$
   c) $A^* \rightarrow A + h\gamma$ d) $A^* + h\gamma \rightarrow A + h\gamma$

9) LASER beam is
   a) highly directional b) highly intense
   c) monochromatic d) all of these

10) The diameter of cladding is nearly
   a) 5 μm to 100 μm b) 125 μm
   c) 250 μm d) 500 μm

11) The chain reaction becomes supercritical when the effective multiplication factors K
   a) $K = 1$ b) $K > 1$ c) $K < 1$ d) $K = 0$

12) The chirality of Zigzag CNT is
   a) (a, 0) b) (a, a) c) (a, b) d) (0, b)

13) In Fraunhoffer diffraction, the source and screen are
   a) at an infinite distance from the obstacle
   b) at finite distances from the obstacle
   c) source at a finite distance and screen at an infinite distance from the obstacle
   d) source at an infinite distance and screen at a finite distance from the obstacle

14) The velocities of E-ray and O-ray are same in a direction
   a) parallel to optic axis
   b) perpendicular to optic axis
   c) making an angle 45° with optic axis
   d) making any angle with optic axis

———————

SLR-TJ – 5

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Wednesday, 20-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

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

Constants *: 1) Avogadro's no. $N = 6.02\times10^{26}$ /kmmol.*
2) Velocity of light, $c = 3\times10^{8}$ m/sec.
3) Charge of electron, $e = 1.6\times10^{-19}$ C.

SECTION – I

2. Attempt **any five** of the following : **15**

a) With energy band diagram, explain classification of solids.

b) Define
   i) Unit cell,
   ii) Co-ordination number and
   iii) Atomic packing fraction.

c) What are miller indices ? How they are determined ?

d) State applications of ultrasonic waves.

e) Explain Bragg's law in X-ray diffraction.

f) The volume of a hall is 475 m^3. The area of wall is 200 m^2, area of floor and ceiling each is 100 m^2. If absorption coefficient of the wall, ceiling and floor are 0.025, 0.02 and 0.55 respectively. Calculate the reverberation time for the hall.

g) At what speed the mass of an object will be double of its value at rest.

3. State Hall effect. Derive an expression for Hall voltage and Hall coefficient. **5**

OR

Deduce an expression for Lorentz transformations for space and time co-ordinates.

Set Q

4. Attempt **any two** of the following : **8**

   a) Explain effect of increase of impurity concentration on fermi level of N type semiconductor.

   b) Explain any four factors affecting architectural acoustics and their remedies.

   c) Define axis of symmetry. Explain it for cubic crystals.

   d) Derive an expression for Length Contraction in special theory of relativity. Hence explain special cases.

SECTION – II

5. Attempt **any five** of the following : **15**

   a) Distinguish between Fresnel and Fraunhoffer class of diffraction.

   b) Explain : Positive and Negative crystals.

   c) Explain with neat diagram

      i) Spontaneous emission

      ii) Stimulated emission.

   d) Write in brief applications of nano materials in electronics, energy and cosmetics.

   e) Explain : Carbon Nitrogen cycle.

   f) In an optical fiber the core material has refractive index 1.6 and clad material is 1.3. What is the value of critical angle and acceptance angle ?

   g) A parallel beam of sodium light (λ = 5890 A°) is allowed to incident normally on transmission grating. Second order spectral lines are found to be deviated through 30°. Calculate the number of lines/cm on the grating.

6. Describe construction and working of He-Ne laser with neat diagrams. **5**

   OR

   Obtain the expression for acceptance angle, NA and fractional refractive index change of an optical fiber.

7. Attempt **any two** of the following : **8**

   a) With neat diagram explain construction and working of Laurent's half shade polarimeter.

   b) Explain the construction and working of semiconductor diode laser with neat diagram.

   c) Explain the main features of the design and working of a nuclear fission reactor.

   d) Write a note on : Classification of optical fibers.

Set Q

———————

SLR-TJ – 5

Seat No.	

Set R

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Wednesday, 20-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

Constants *: 1) Avogadro's no. $N = 6.02\times10^{26}$ /k.mol.*
2) Velocity of light, $c = 3\times10^{8}$ m/sec.
3) Charge of electron, $e = 1.6\times10^{-19}$ C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

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

1) Optimum reverberation time for music is
   a) 0.5 to 1 second b) 0 to 1 second
   c) 1 to 2 second d) Above 5 second

2) At velocities which are comparable to velocity of light, the mass of the moving object appears to be _____ than at rest.
   a) Less b) Greater
   c) Remains same d) None of these

3) Time dilation equation is given by
   a) $t = to/\sqrt{1 - v^2/c^2}$ b) $t = to/\sqrt{1 + v^2/c^2}$
   c) $t = to/(1 - v^2/c^2)$ d) $t = to/\sqrt{1 - c^2/v^2}$

4) The Miller indices of the plane parallel to x and y axes are
   a) (1 0 0) b) (0 1 0) c) (0 0 1) d) (1 1 1)

5) Donor type semiconductor is formed by adding impurity of valency
   a) 3 b) 4 c) 5 d) 6

P.T.O.

6) The co-ordination number in case of BCC structure is
   a) 12 b) 6 c) 4 d) 8

7) The audible range of frequency is
   a) 20 Hz to 20 KHz
   b) 200 KHz to 200 MHz
   c) 20 KHz to 20 MHz
   d) 200 Hz to 200 MHz

SECTION – II

8) The chain reaction becomes supercritical when the effective multiplication factors K
   a) $K = 1$ b) $K > 1$ c) $K < 1$ d) $K = 0$

9) The chirality of Zigzag CNT is
   a) (a, 0) b) (a, a) c) (a, b) d) (0, b)

10) In Fraunhoffer diffraction, the source and screen are
   a) at an infinite distance from the obstacle
   b) at finite distances from the obstacle
   c) source at a finite distance and screen at an infinite distance from the obstacle
   d) source at an infinite distance and screen at a finite distance from the obstacle

11) The velocities of E-ray and O-ray are same in a direction
   a) parallel to optic axis
   b) perpendicular to optic axis
   c) making an angle 45° with optic axis
   d) making any angle with optic axis

12) Spontaneous Emission process is mathematically represented by equation
   a) $A + h\gamma \rightarrow A^*$
   b) $A^* + h\gamma \rightarrow 2h\gamma + A$
   c) $A^* \rightarrow A + h\gamma$
   d) $A^* + h\gamma \rightarrow A + h\gamma$

13) LASER beam is
   a) highly directional
   b) highly intense
   c) monochromatic
   d) all of these

14) The diameter of cladding is nearly
   a) 5 μm to 100 μm
   b) 125 μm
   c) 250 μm
   d) 500 μm

———————

SLR-TJ – 5

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Wednesday, 20-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

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

Constants *: 1) Avogadro's no. N = 6.02×10^{26} /kmmol.*
2) Velocity of light, c = 3×10^{8} m/sec.
3) Charge of electron, e = 1.6×10^{-19} C.

SECTION – I

2. Attempt **any five** of the following : **15**

a) With energy band diagram, explain classification of solids.

b) Define
   i) Unit cell,
   ii) Co-ordination number and
   iii) Atomic packing fraction.

c) What are miller indices ? How they are determined ?

d) State applications of ultrasonic waves.

e) Explain Bragg's law in X-ray diffraction.

f) The volume of a hall is 475 m^3. The area of wall is 200 m^2, area of floor and ceiling each is 100 m^2. If absorption coefficient of the wall, ceiling and floor are 0.025, 0.02 and 0.55 respectively. Calculate the reverberation time for the hall.

g) At what speed the mass of an object will be double of its value at rest.

3. State Hall effect. Derive an expression for Hall voltage and Hall coefficient. **5**

OR

Deduce an expression for Lorentz transformations for space and time co-ordinates.

4. Attempt **any two** of the following : **8**

   a) Explain effect of increase of impurity concentration on fermi level of N type semiconductor.

   b) Explain any four factors affecting architectural acoustics and their remedies.

   c) Define axis of symmetry. Explain it for cubic crystals.

   d) Derive an expression for Length Contraction in special theory of relativity. Hence explain special cases.

SECTION – II

5. Attempt **any five** of the following : **15**

   a) Distinguish between Fresnel and Fraunhoffer class of diffraction.

   b) Explain : Positive and Negative crystals.

   c) Explain with neat diagram

      i) Spontaneous emission

      ii) Stimulated emission.

   d) Write in brief applications of nano materials in electronics, energy and cosmetics.

   e) Explain : Carbon Nitrogen cycle.

   f) In an optical fiber the core material has refractive index 1.6 and clad material is 1.3. What is the value of critical angle and acceptance angle ?

   g) A parallel beam of sodium light (λ = 5890 A°) is allowed to incident normally on transmission grating. Second order spectral lines are found to be deviated through 30°. Calculate the number of lines/cm on the grating.

6. Describe construction and working of He-Ne laser with neat diagrams. **5**

   OR

   Obtain the expression for acceptance angle, NA and fractional refractive index change of an optical fiber.

7. Attempt **any two** of the following : **8**

   a) With neat diagram explain construction and working of Laurent's half shade polarimeter.

   b) Explain the construction and working of semiconductor diode laser with neat diagram.

   c) Explain the main features of the design and working of a nuclear fission reactor.

   d) Write a note on : Classification of optical fibers.

Set R

———————

SLR-TJ – 5

Seat No.	

Set S

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Wednesday, 20-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

Constants *: 1) Avogadro's no. $N = 6.02\times10^{26}$ /k.mol.*
2) Velocity of light, $c = 3\times10^{8}$ m/sec.
3) Charge of electron, $e = 1.6\times10^{-19}$ C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

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

1) The co-ordination number in case of BCC structure is
a) 12 b) 6 c) 4 d) 8

2) The Miller indices of the plane parallel to x and y axes are
a) (1 0 0) b) (0 1 0) c) (0 0 1) d) (1 1 1)

3) The audible range of frequency is
a) 20 Hz to 20 KHz b) 200 KHz to 200 MHz
c) 20 KHz to 20 MHz d) 200 Hz to 200 MHz

4) Optimum reverberation time for music is
a) 0.5 to 1 second b) 0 to 1 second
c) 1 to 2 second d) Above 5 second

5) At velocities which are comparable to velocity of light, the mass of the moving object appears to be _____ than at rest.
a) Less b) Greater
c) Remains same d) None of these

P.T.O.

6) Time dilation equation is given by
   a) $t = to/\sqrt{1 - v^2/c^2}$ b) $t = to/\sqrt{1 + v^2/c^2}$
   c) $t = to/(1 - v^2/c^2)$ d) $t = to/\sqrt{1 - c^2/v^2}$

7) Donor type semiconductor is formed by adding impurity of valency
   a) 3 b) 4 c) 5 d) 6

SECTION – II

8) The diameter of cladding is nearly
   a) 5 μm to 100 μm b) 125 μm
   c) 250 μm d) 500 μm

9) The chain reaction becomes supercritical when the effective multiplication factors K
   a) K = 1 b) K > 1 c) K < 1 d) K = 0

10) The chirality of Zigzag CNT is
   a) (a, 0) b) (a, a) c) (a, b) d) (0, b)

11) In Fraunhoffer diffraction, the source and screen are
   a) at an infinite distance from the obstacle
   b) at finite distances from the obstacle
   c) source at a finite distance and screen at an infinite distance from the obstacle
   d) source at an infinite distance and screen at a finite distance from the obstacle

12) The velocities of E-ray and O-ray are same in a direction
   a) parallel to optic axis
   b) perpendicular to optic axis
   c) making an angle 45° with optic axis
   d) making any angle with optic axis

13) Spontaneous Emission process is mathematically represented by equation
   a) $A + h\gamma \rightarrow A^*$ b) $A^* + h\gamma \rightarrow 2h\gamma + A$
   c) $A^* \rightarrow A + h\gamma$ d) $A^* + h\gamma \rightarrow A + h\gamma$

14) LASER beam is
   a) highly directional b) highly intense
   c) monochromatic d) all of these

———————

SLR-TJ – 5

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Wednesday, 20-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

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

Constants *: 1) Avogadro's no. N = 6.02×10^{26} /kmmol.*
2) Velocity of light, c = 3×10^{8} m/sec.
3) Charge of electron, e = 1.6×10^{-19} C.

SECTION – I

2. Attempt **any five** of the following : **15**

a) With energy band diagram, explain classification of solids.

b) Define
   i) Unit cell,
   ii) Co-ordination number and
   iii) Atomic packing fraction.

c) What are miller indices ? How they are determined ?

d) State applications of ultrasonic waves.

e) Explain Bragg's law in X-ray diffraction.

f) The volume of a hall is 475 m^3. The area of wall is 200 m^2, area of floor and ceiling each is 100 m^2. If absorption coefficient of the wall, ceiling and floor are 0.025, 0.02 and 0.55 respectively. Calculate the reverberation time for the hall.

g) At what speed the mass of an object will be double of its value at rest.

3. State Hall effect. Derive an expression for Hall voltage and Hall coefficient. **5**

OR

Deduce an expression for Lorentz transformations for space and time co-ordinates.

4. Attempt **any two** of the following : **8**

   a) Explain effect of increase of impurity concentration on fermi level of N type semiconductor.

   b) Explain any four factors affecting architectural acoustics and their remedies.

   c) Define axis of symmetry. Explain it for cubic crystals.

   d) Derive an expression for Length Contraction in special theory of relativity. Hence explain special cases.

SECTION – II

5. Attempt **any five** of the following : **15**

   a) Distinguish between Fresnel and Fraunhoffer class of diffraction.

   b) Explain : Positive and Negative crystals.

   c) Explain with neat diagram

      i) Spontaneous emission

      ii) Stimulated emission.

   d) Write in brief applications of nano materials in electronics, energy and cosmetics.

   e) Explain : Carbon Nitrogen cycle.

   f) In an optical fiber the core material has refractive index 1.6 and clad material is 1.3. What is the value of critical angle and acceptance angle ?

   g) A parallel beam of sodium light (λ = 5890 A°) is allowed to incident normally on transmission grating. Second order spectral lines are found to be deviated through 30°. Calculate the number of lines/cm on the grating.

6. Describe construction and working of He-Ne laser with neat diagrams. **5**

   OR

   Obtain the expression for acceptance angle, NA and fractional refractive index change of an optical fiber.

7. Attempt **any two** of the following : **8**

   a) With neat diagram explain construction and working of Laurent's half shade polarimeter.

   b) Explain the construction and working of semiconductor diode laser with neat diagram.

   c) Explain the main features of the design and working of a nuclear fission reactor.

   d) Write a note on : Classification of optical fibers.

Set S

_____

SLR-TJ – 6

Seat No.	

Set P

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING CHEMISTRY

Day and Date : Friday, 22-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Permanent hardness of water cannot be removed by
   a) Adding lime soda b) Zeolite
   c) Boiling d) Ion exchange resine

2) Machine operating under high temperature and loads are best lubricated by
   a) Mineral oils b) Solid lubricants
   c) Greases d) Animal oils

3) A lubricant is used with an object of
   a) Increasing resistance
   b) Increasing frictional heat
   c) Decreasing frictional resistance
   d) Providing direct contact between rubbing surfaces

4) Metal at the top of electrochemical series is
   a) Most stable b) Least active c) Most noble d) Most active

5) Hard water is unfit for use in boilers for steam raising because
   a) The boiling point is high
   b) Steam is generated at high pressure
   c) It leads to scale formation inside the boilers
   d) Water undergoes decomposition into oxygen and hydrogen

6) Tinning is the process of coating iron with
a) Zn b) Sn c) Cu d) Na

7) In green synthesis of adipic acid the reactants are
a) Cyclohexane and hydrogen peroxide
b) Aniline and hydrogen peroxide
c) Cyclohexane and nitric acid
d) None of these

8) Following is a non-petroleum fuel obtained from transesterification of vegetable/ animal oil with alcohol.
a) Kerosene b) Petrol c) Biodiesel d) LPG

9) Number of moles of solute present in 1 kg of solvent is called
a) Normality b) Molarity c) Molality d) Mole fraction

10) A good fuel should have
a) High moisture content
b) Low calorific value
c) Moderate ignition temperature
d) High velocity of combustion

11) Ebonite is
a) Polyethylene b) Highly vulcanized rubber
c) Natural rubber d) Synthetic rubber

12) Bomb calorimeter is an apparatus which is used to find the gross calorific value of
a) Non volatile liquid fuel b) Solid fuel
c) Volatile liquid fuel d) Both a) and b)

13) Which of the following technique is used to analyse the dairy products for aldehydes and ketones ?
a) GLC b) TGA c) DTA d) None of these

14) Highest percentage of carbon is present in
a) Steel b) Wrought iron
c) Cast iron d) Both a) and b)

_____

SLR-TJ – 6

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING CHEMISTRY

Day and Date : Friday, 22-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

N. B. : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicates **full** marks.*
*3) Draw **neat** and labelled diagram **wherever** necessary.*

SECTION – I

2. A) Solve **any two** : **8**
   a) Define corrosion. Explain the mechanism of oxidation corrosion.
   b) Explain the traditional and green pathways for synthesis of Indigo dye.
   c) A sample of water on analysis was found to contain the following impurities in mg/lit. Calculate temporary, permanent and total hardness of water.

Impurities	**Amount**	**Mole Wt.**
$Ca(HCO_3)_2$	30	162
$Mg(HCO_3)_2$	15	146
$CaSO_4$	09	136
$MgCl_2$	08	95

   B) Solve **any two** : **6**
   a) Define Green Chemistry. State any 4 principles of green chemistry.
   b) Explain the EDTA method for estimation of hardness of water.
   c) Explain the weightless method for the measurement of rate of corrosion.

3. A) Solve **any two** : **8**
   a) With the help of suitable diagram explain the zeolite method for softening hard water.
   b) Define lubricant. Write the functions of lubricants.
   c) Explain the Galvanization process for prevention of corrosion.

   B) Solve : **6**
   a) How will you select the lubricant for
      i) IC Engine ii) Gears.
   b) 6 gm of an oil after saponification with 40 ml of N/2 alcoholic KOH solution and on subsequent titration with N/2 HCl gave a titre value of 9 ml to phenolphthalein end point. A blank experiment was conducted without taking the oil and on repeating the same procedure gave a titre value of 40 ml. Calculate the saponification value of the oil sample.

SECTION – II

4. A) Solve **any two** : **8**
   a) Explain Refining of crude petroleum.
   b) Explain with block diagram the gas liquid chromatography.
   c) A sample of coal has following analysis; C = 85%, S = 1.0%, N = 0.3%, H = 8%, O = 5.7%. Find the gross and net calorific value. (Latent heat of steam = 587 cal/gm.)

   B) Solve **any two** : **6**
   a) Explain properties and applications of FRP.
   b) Define :
      i) Degree of polymerization
      ii) Melting temperature
      iii) Glass transition temperature.
   c) What is the weight of $MgSO_4$ required to prepare 750 ml of 0.5 M and 0.1 N solutions ? (Molecular wt of $MgSO_4$ = 120)

5. A) Solve **any two** : **8**
   a) Compare between solid, liquid and gaseous fuel.
   b) Define ceramics. Write the general properties of glass.
   c) Define plastic. Explain different types of plastics.

   B) Solve : **6**
   a) Compare between cast iron and wrought iron.
   b) Calculate the degree of polymerization of vinyl chloride, if the molecular weight of polymer is 1.31×10^5. (Molecular weight of vinyl chloride = 62.5)

   OR

   a) What are conductive polymers ? Write its applications.
   b) A polymer has the following composition 100 molecules of molecular mass 1000; 200 molecules of molecular mass 2000; 500 molecules of molecular mass 5000; Calculate the number average and weight average molecular weights.

———————

SLR-TJ – 6

Seat No.	

Set Q

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING CHEMISTRY

Day and Date : Friday, 22-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Following is a non-petroleum fuel obtained from transesterification of vegetable/ animal oil with alcohol.
a) Kerosene b) Petrol c) Biodiesel d) LPG

2) Number of moles of solute present in 1 kg of solvent is called
a) Normality b) Molarity c) Molality d) Mole fraction

3) A good fuel should have
a) High moisture content
b) Low calorific value
c) Moderate ignition temperature
d) High velocity of combustion

4) Ebonite is
a) Polyethylene b) Highly vulcanized rubber
c) Natural rubber d) Synthetic rubber

5) Bomb calorimeter is an apparatus which is used to find the gross calorific value of
a) Non volatile liquid fuel b) Solid fuel
c) Volatile liquid fuel d) Both a) and b)

P.T.O.

6) Which of the following technique is used to analyse the dairy products for aldehydes and ketones ?
   a) GLC b) TGA c) DTA d) None of these

7) Highest percentage of carbon is present in
   a) Steel b) Wrought iron
   c) Cast iron d) Both a) and b)

8) Permanent hardness of water cannot be removed by
   a) Adding lime soda b) Zeolite
   c) Boiling d) Ion exchange resine

9) Machine operating under high temperature and loads are best lubricated by
   a) Mineral oils b) Solid lubricants
   c) Greases d) Animal oils

10) A lubricant is used with an object of
   a) Increasing resistance
   b) Increasing frictional heat
   c) Decreasing frictional resistance
   d) Providing direct contact between rubbing surfaces

11) Metal at the top of electrochemical series is
   a) Most stable b) Least active c) Most noble d) Most active

12) Hard water is unfit for use in boilers for steam raising because
   a) The boiling point is high
   b) Steam is generated at high pressure
   c) It leads to scale formation inside the boilers
   d) Water undergoes decomposition into oxygen and hydrogen

13) Tinning is the process of coating iron with
   a) Zn b) Sn c) Cu d) Na

14) In green synthesis of adipic acid the reactants are
   a) Cyclohexane and hydrogen peroxide
   b) Aniline and hydrogen peroxide
   c) Cyclohexane and nitric acid
   d) None of these

———————

SLR-TJ – 6

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING CHEMISTRY

Day and Date : Friday, 22-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

N. B. : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicates **full** marks.*
*3) Draw **neat** and labelled diagram **wherever** necessary.*

SECTION – I

2. A) Solve **any two** : **8**
   a) Define corrosion. Explain the mechanism of oxidation corrosion.
   b) Explain the traditional and green pathways for synthesis of Indigo dye.
   c) A sample of water on analysis was found to contain the following impurities in mg/lit. Calculate temporary, permanent and total hardness of water.

Impurities	**Amount**	**Mole Wt.**
$Ca(HCO_3)_2$	30	162
$Mg(HCO_3)_2$	15	146
$CaSO_4$	09	136
$MgCl_2$	08	95

   B) Solve **any two** : **6**
   a) Define Green Chemistry. State any 4 principles of green chemistry.
   b) Explain the EDTA method for estimation of hardness of water.
   c) Explain the weightless method for the measurement of rate of corrosion.

3. A) Solve **any two** : **8**
   a) With the help of suitable diagram explain the zeolite method for softening hard water.
   b) Define lubricant. Write the functions of lubricants.
   c) Explain the Galvanization process for prevention of corrosion.

   B) Solve : **6**
   a) How will you select the lubricant for
      i) IC Engine ii) Gears.
   b) 6 gm of an oil after saponification with 40 ml of N/2 alcoholic KOH solution and on subsequent titration with N/2 HCl gave a titre value of 9 ml to phenolphthalein end point. A blank experiment was conducted without taking the oil and on repeating the same procedure gave a titre value of 40 ml. Calculate the saponification value of the oil sample.

SECTION – II

4. A) Solve **any two** : **8**
   a) Explain Refining of crude petroleum.
   b) Explain with block diagram the gas liquid chromatography.
   c) A sample of coal has following analysis; C = 85%, S = 1.0%, N = 0.3%, H = 8%, O = 5.7%. Find the gross and net calorific value. (Latent heat of steam = 587 cal/gm.)

   B) Solve **any two** : **6**
   a) Explain properties and applications of FRP.
   b) Define :
      i) Degree of polymerization
      ii) Melting temperature
      iii) Glass transition temperature.
   c) What is the weight of $MgSO_4$ required to prepare 750 ml of 0.5 M and 0.1 N solutions ? (Molecular wt of $MgSO_4$ = 120)

5. A) Solve **any two** : **8**
   a) Compare between solid, liquid and gaseous fuel.
   b) Define ceramics. Write the general properties of glass.
   c) Define plastic. Explain different types of plastics.

   B) Solve : **6**
   a) Compare between cast iron and wrought iron.
   b) Calculate the degree of polymerization of vinyl chloride, if the molecular weight of polymer is 1.31×10^5. (Molecular weight of vinyl chloride = 62.5)

   OR

   a) What are conductive polymers ? Write its applications.
   b) A polymer has the following composition 100 molecules of molecular mass 1000; 200 molecules of molecular mass 2000; 500 molecules of molecular mass 5000; Calculate the number average and weight average molecular weights.

———————

SLR-TJ – 6

Seat No.	

Set R

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING CHEMISTRY

Day and Date : Friday, 22-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Hard water is unfit for use in boilers for steam raising because
   a) The boiling point is high
   b) Steam is generated at high pressure
   c) It leads to scale formation inside the boilers
   d) Water undergoes decomposition into oxygen and hydrogen

2) Tinning is the process of coating iron with
   a) Zn b) Sn c) Cu d) Na

3) In green synthesis of adipic acid the reactants are
   a) Cyclohexane and hydrogen peroxide
   b) Aniline and hydrogen peroxide
   c) Cyclohexane and nitric acid
   d) None of these

4) Following is a non-petroleum fuel obtained from transesterification of vegetable/ animal oil with alcohol.
   a) Kerosene b) Petrol c) Biodiesel d) LPG

5) Number of moles of solute present in 1 kg of solvent is called
   a) Normality b) Molarity c) Molality d) Mole fraction

P.T.O.

6) A good fuel should have
   a) High moisture content
   b) Low calorific value
   c) Moderate ignition temperature
   d) High velocity of combustion

7) Ebonite is
   a) Polyethylene
   b) Highly vulcanized rubber
   c) Natural rubber
   d) Synthetic rubber

8) Bomb calorimeter is an apparatus which is used to find the gross calorific value of
   a) Non volatile liquid fuel
   b) Solid fuel
   c) Volatile liquid fuel
   d) Both a) and b)

9) Which of the following technique is used to analyse the dairy products for aldehydes and ketones ?
   a) GLC b) TGA c) DTA d) None of these

10) Highest percentage of carbon is present in
   a) Steel
   b) Wrought iron
   c) Cast iron
   d) Both a) and b)

11) Permanent hardness of water cannot be removed by
   a) Adding lime soda
   b) Zeolite
   c) Boiling
   d) Ion exchange resine

12) Machine operating under high temperature and loads are best lubricated by
   a) Mineral oils
   b) Solid lubricants
   c) Greases
   d) Animal oils

13) A lubricant is used with an object of
   a) Increasing resistance
   b) Increasing frictional heat
   c) Decreasing frictional resistance
   d) Providing direct contact between rubbing surfaces

14) Metal at the top of electrochemical series is
   a) Most stable b) Least active c) Most noble d) Most active

SLR-TJ – 6

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING CHEMISTRY

Day and Date : Friday, 22-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

N. B. : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicates **full** marks.*
*3) Draw **neat** and labelled diagram **wherever** necessary.*

SECTION – I

2. A) Solve **any two** : **8**
   a) Define corrosion. Explain the mechanism of oxidation corrosion.
   b) Explain the traditional and green pathways for synthesis of Indigo dye.
   c) A sample of water on analysis was found to contain the following impurities in mg/lit. Calculate temporary, permanent and total hardness of water.

Impurities	**Amount**	**Mole Wt.**
$Ca(HCO_3)_2$	30	162
$Mg(HCO_3)_2$	15	146
$CaSO_4$	09	136
$MgCl_2$	08	95

   B) Solve **any two** : **6**
   a) Define Green Chemistry. State any 4 principles of green chemistry.
   b) Explain the EDTA method for estimation of hardness of water.
   c) Explain the weightless method for the measurement of rate of corrosion.

3. A) Solve **any two** : **8**
   a) With the help of suitable diagram explain the zeolite method for softening hard water.
   b) Define lubricant. Write the functions of lubricants.
   c) Explain the Galvanization process for prevention of corrosion.

   B) Solve : **6**
   a) How will you select the lubricant for
      i) IC Engine ii) Gears.
   b) 6 gm of an oil after saponification with 40 ml of N/2 alcoholic KOH solution and on subsequent titration with N/2 HCl gave a titre value of 9 ml to phenolphthalein end point. A blank experiment was conducted without taking the oil and on repeating the same procedure gave a titre value of 40 ml. Calculate the saponification value of the oil sample.

SECTION – II

4. A) Solve **any two** : **8**
   a) Explain Refining of crude petroleum.
   b) Explain with block diagram the gas liquid chromatography.
   c) A sample of coal has following analysis; C = 85%, S = 1.0%, N = 0.3%, H = 8%, O = 5.7%. Find the gross and net calorific value. (Latent heat of steam = 587 cal/gm.)

   B) Solve **any two** : **6**
   a) Explain properties and applications of FRP.
   b) Define :
      i) Degree of polymerization
      ii) Melting temperature
      iii) Glass transition temperature.
   c) What is the weight of $MgSO_4$ required to prepare 750 ml of 0.5 M and 0.1 N solutions ? (Molecular wt of $MgSO_4$ = 120)

5. A) Solve **any two** : **8**
   a) Compare between solid, liquid and gaseous fuel.
   b) Define ceramics. Write the general properties of glass.
   c) Define plastic. Explain different types of plastics.

   B) Solve : **6**
   a) Compare between cast iron and wrought iron.
   b) Calculate the degree of polymerization of vinyl chloride, if the molecular weight of polymer is 1.31×10^5. (Molecular weight of vinyl chloride = 62.5)

   OR

   a) What are conductive polymers ? Write its applications.
   b) A polymer has the following composition 100 molecules of molecular mass 1000; 200 molecules of molecular mass 2000; 500 molecules of molecular mass 5000; Calculate the number average and weight average molecular weights.

———————

SLR-TJ – 6

Seat No.	

Set S

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING CHEMISTRY

Day and Date : Friday, 22-12-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) A good fuel should have
   a) High moisture content
   b) Low calorific value
   c) Moderate ignition temperature
   d) High velocity of combustion

2) Ebonite is
   a) Polyethylene
   b) Highly vulcanized rubber
   c) Natural rubber
   d) Synthetic rubber

3) Bomb calorimeter is an apparatus which is used to find the gross calorific value of
   a) Non volatile liquid fuel
   b) Solid fuel
   c) Volatile liquid fuel
   d) Both a) and b)

4) Which of the following technique is used to analyse the dairy products for aldehydes and ketones ?
   a) GLC b) TGA c) DTA d) None of these

5) Highest percentage of carbon is present in
   a) Steel
   b) Wrought iron
   c) Cast iron
   d) Both a) and b)

6) Permanent hardness of water cannot be removed by
   a) Adding lime soda b) Zeolite
   c) Boiling d) Ion exchange resine

7) Machine operating under high temperature and loads are best lubricated by
   a) Mineral oils b) Solid lubricants
   c) Greases d) Animal oils

8) A lubricant is used with an object of
   a) Increasing resistance
   b) Increasing frictional heat
   c) Decreasing frictional resistance
   d) Providing direct contact between rubbing surfaces

9) Metal at the top of electrochemical series is
   a) Most stable b) Least active c) Most noble d) Most active

10) Hard water is unfit for use in boilers for steam raising because
   a) The boiling point is high
   b) Steam is generated at high pressure
   c) It leads to scale formation inside the boilers
   d) Water undergoes decomposition into oxygen and hydrogen

11) Tinning is the process of coating iron with
   a) Zn b) Sn c) Cu d) Na

12) In green synthesis of adipic acid the reactants are
   a) Cyclohexane and hydrogen peroxide
   b) Aniline and hydrogen peroxide
   c) Cyclohexane and nitric acid
   d) None of these

13) Following is a non-petroleum fuel obtained from transesterification of vegetable/ animal oil with alcohol.
   a) Kerosene b) Petrol c) Biodiesel d) LPG

14) Number of moles of solute present in 1 kg of solvent is called
   a) Normality b) Molarity c) Molality d) Mole fraction

SLR-TJ – 6

Seat No.	

F.E. (Part – I) (CBCS) Examination, 2017
ENGINEERING CHEMISTRY

Day and Date : Friday, 22-12-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

N. B. : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicates **full** marks.*
*3) Draw **neat** and labelled diagram **wherever** necessary.*

SECTION – I

2. A) Solve **any two** : **8**
   a) Define corrosion. Explain the mechanism of oxidation corrosion.
   b) Explain the traditional and green pathways for synthesis of Indigo dye.
   c) A sample of water on analysis was found to contain the following impurities in mg/lit. Calculate temporary, permanent and total hardness of water.

Impurities	**Amount**	**Mole Wt.**
$Ca(HCO_3)_2$	30	162
$Mg(HCO_3)_2$	15	146
$CaSO_4$	09	136
$MgCl_2$	08	95

   B) Solve **any two** : **6**
   a) Define Green Chemistry. State any 4 principles of green chemistry.
   b) Explain the EDTA method for estimation of hardness of water.
   c) Explain the weightless method for the measurement of rate of corrosion.

3. A) Solve **any two** : **8**
   a) With the help of suitable diagram explain the zeolite method for softening hard water.
   b) Define lubricant. Write the functions of lubricants.
   c) Explain the Galvanization process for prevention of corrosion.

   B) Solve : **6**
   a) How will you select the lubricant for
      i) IC Engine ii) Gears.
   b) 6 gm of an oil after saponification with 40 ml of N/2 alcoholic KOH solution and on subsequent titration with N/2 HCl gave a titre value of 9 ml to phenolphthalein end point. A blank experiment was conducted without taking the oil and on repeating the same procedure gave a titre value of 40 ml. Calculate the saponification value of the oil sample.

Set S

SECTION – II

4. A) Solve **any two** : **8**
   a) Explain Refining of crude petroleum.
   b) Explain with block diagram the gas liquid chromatography.
   c) A sample of coal has following analysis; C = 85%, S = 1.0%, N = 0.3%, H = 8%, O = 5.7%. Find the gross and net calorific value. (Latent heat of steam = 587 cal/gm.)

   B) Solve **any two** : **6**
   a) Explain properties and applications of FRP.
   b) Define :
      i) Degree of polymerization
      ii) Melting temperature
      iii) Glass transition temperature.
   c) What is the weight of $MgSO_4$ required to prepare 750 ml of 0.5 M and 0.1 N solutions ? (Molecular wt of $MgSO_4$ = 120)

5. A) Solve **any two** : **8**
   a) Compare between solid, liquid and gaseous fuel.
   b) Define ceramics. Write the general properties of glass.
   c) Define plastic. Explain different types of plastics.

   B) Solve : **6**
   a) Compare between cast iron and wrought iron.
   b) Calculate the degree of polymerization of vinyl chloride, if the molecular weight of polymer is 1.31×10^5. (Molecular weight of vinyl chloride = 62.5)

   OR

   a) What are conductive polymers ? Write its applications.
   b) A polymer has the following composition 100 molecules of molecular mass 1000; 200 molecules of molecular mass 2000; 500 molecules of molecular mass 5000; Calculate the number average and weight average molecular weights.

———————

SLR-TJ – 7

Seat No.	

Set P

F.E. (Part – II) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – II (Old)

Day and Date : Tuesday, 21-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) For what value of b the differential equation $(y + x^3)dx + (bx + 2y^3)\,dy = 0$ is exact ?
a) 0 b) 2 c) 1 d) 3

2) The integrating factor of $x\frac{dy}{dx} + (1+x)y = e^x$ is
a) xe^x b) $x + e^x$ c) xe^{-x} d) xlogx

3) The length of normal to a curve y = f(x) is given by
a) $y \cdot \frac{dx}{dy}$ b) $y \cdot \frac{dy}{dx}$ c) $y\sqrt{1+\left(\frac{dx}{dy}\right)^2}$ d) $y\sqrt{1+\left(\frac{dy}{dx}\right)^2}$

4) The orthogonal trajectories of the family of curve $x^2 + y^2 = a^2$, where 'a' is a parameter is
a) $y^2 = mx$ b) $y = mx$ c) $y = mx^2$ d) $y^2 = x^2$

5) If $\frac{dy}{dx} = 1 + xy$ with y(0) = 0, then the Picards first approximation y_1 is
a) x b) x^2 c) 1 + x d) $1 + x^2$

6) For the fourth order Runge-Kutta method, which of the following is correct ?
a) $K_1 = \frac{h}{2} f(x_0, y_0)$ b) $K_2 = h\, f(x_0 + h, y_0 + K_1)$
c) $K_3 = hf(x_0 + \frac{h}{2}, y_0 + \frac{K_2}{2})$ d) $K_4 = \frac{h}{2} f(x_0 + h, y_0 + K_3)$

P.T.O.

7) Divided difference formula is used to find numerical differentiation, when the values of arguments x are
   a) Equally spaced
   b) Unequally spaced
   c) Equally or unequally spaced
   d) None of these

8) The asymptotes to the curve $y^2 = ax^3$ is
   a) $x = a$
   b) $y = a$
   c) $x = 0$
   d) not exists

9) Rectification is the process of finding
   a) double integrals
   b) multiple integrals
   c) length of arc of plane curve
   d) area under plane curve

10) Which of the following is not true ?
   a) $\lceil 0 = \infty$
   b) $\lceil \frac{1}{2} = \sqrt{\pi}$
   c) $\lceil n = (n-1)!$
   d) $\lceil \frac{1}{4} \lceil \frac{3}{4} = \pi$

11) $\beta(3, 1) =$
   a) 3
   b) $\frac{1}{3}$
   c) $\frac{1}{3!}$
   d) 3!

12) By changing the order $\int_0^a \int_0^y f(x,y)\, dxdy$ is equal to
   a) $\int_0^y \int_0^a f(x,y)\, dxdy$
   b) $\int_0^a \int_x^a f(x,y)\, dxdy$
   c) $\int_0^a \int_0^x f(x,y)\, dxdy$
   d) $\int_0^a \int_a^y f(x,y)\, dxdy$

13) $\int_0^1 \int_0^x \int_0^{xy} dxdydz =$
   a) $\frac{1}{10}$
   b) $\frac{1}{6}$
   c) $\frac{1}{7}$
   d) $\frac{1}{8}$

14) Area by curves $r = f(\theta)$, $r = g(\theta)$ intersecting at points (r_1, α) and (r_2, β) is
   a) $\int_\alpha^\beta \int_{g(\theta)}^{f(\theta)} rd\theta dr$
   b) $\int_\alpha^\beta \int_{f(\theta)}^{g(\theta)} rd\theta dr$
   c) $\int_\beta^\alpha \int_{f(\theta)}^{g(\theta)} rd\theta dr$
   d) none of these

SLR-TJ – 7

Seat No.	

F.E. (Part – II) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – II (Old)

Day and Date : Tuesday, 21-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

N.B. *: 1) Attempt* ***any three*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of calculator is* ***allowed****.*

SECTION – I

2. Attempt the following.

a) Solve : $(2x + 2y - 1)\,dx = (x + y + 3)\,dx$. **3**

b) Solve : $\frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$. **3**

c) Solve : $(1+x^2)\frac{dy}{dx} - 2xy = 2x(1+x^2)$ where $y(0) = 1$. **4**

OR

c) Solve $\frac{dr}{d\theta} = r\tan\theta - \frac{r^2}{\cos\theta}$. **4**

3. Attempt the following.

a) Find the orthogonal trajectories of the family of the curve $r = a(\sec\theta + \tan\theta)$ where 'a' is a parameter. **3**

b) If the intercept made by the tangent to the curve at (x, y) on the X-axis is proportional to the ordinate of the point, then find the equation of the curve. **3**

c) The current in a circuit containing an inductance L, resistance R and voltage of $20\cos(5t)$ is given by $L\frac{di}{dt} + Ri = 20\cos(5t)$

if R = 10 ohms, L = 2 henrys and initially there is no current in the circuit, then find current i at any time t. **3**

Set P

4. a) Using Taylor's series method, find y(0.1) correct to three decimal places from $\frac{dy}{dx} = 1 - 2xy$ with y(0) = 1. **3**

   b) Using Euler's method, find an approximate value of y at x = 0.1 from $\frac{dy}{dx} = x + y(x+1)$ with y(0) = 1, taking h = 0.025. **3**

   c) Use Runge-Kutta method of the fourth order to find y(0.1), given that $\frac{dy}{dx} = \frac{1}{x+y}$ with y(0) = 1 in one step. **3**

5. a) Find $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at x = 0.5 and at x = 4 from the following data. **5**

x :	0	1	2	3	4
y :	7	17	45	103	203

   b) Using divided difference formula, find the value of $f'(2)$ and $f''(2)$ from the following data. **4**

x :	0	1	3	6
y = f(x) :	18	10	–18	90

SECTION – II

6. a) Evaluate $\int_0^\infty x^7 e^{-2x^2} dx$. **3**

   b) Evaluate $\int_3^7 \sqrt[4]{(x-3)(7-x)}\, dx$. **3**

   c) Prove that $\int_0^\infty \frac{1-\cos(mx)}{x} e^{-x} dx = \frac{1}{2}\log(m^2+1)$. **3**

7. a) Trace the curve $a^2y^2 = x^3(2a - x)$. **3**

   b) Trace the curve $x = a(\theta - \sin\theta)$, $y = a(1+\cos\theta)$. **3**

   c) Find the perimeter of the cardioid $r = a(1 - \cos\theta)$ **3**

8. a) Evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} x^2 y\,dy\,dx$. **3**

   b) Evaluate $\int_0^{\pi/2} \int_0^{a\cos\theta} \int_0^{\sqrt{a^2-r^2}} r\,dz\,dr\,d\theta$. **3**

   c) Change the order of integration and evaluate **4**

$$\int_0^1 \int_0^{\sqrt{1-x^2}} \frac{e^y}{(1+e^y)\cdot\sqrt{1-x^2-y^2}}\,dx\,dy.$$

OR

   c) Evaluate $\iint (x^2+y^2)\,dx\,dy$ over the area of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. **4**

9. a) Find the area enclosed between the parabola $y = 4x - x^2$ and the line $y = x$. **3**

   b) Find the mass of the lamina bounded by the curves $x = 0$, $y = 0$, $x = 1$ and $y = e^x$ if density at any point of the lamina varies as square of its distance from origin. **3**

   c) Find the volume of the solid generated when the area bounded by $y = x^2$ and $y = 2x$ in the first quadrant is rotated about y – axis. **3**

Set P

SLR-TJ – 7

Seat No.	

Set Q

F.E. (Part – II) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – II (Old)

Day and Date : Tuesday, 21-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) The asymptotes to the curve $y^2 = ax^3$ is
a) $x = a$ b) $y = a$ c) $x = 0$ d) not exists

2) Rectification is the process of finding
a) double integrals b) multiple integrals
c) length of arc of plane curve d) area under plane curve

3) Which of the following is not true ?
a) $\lceil 0 = \infty$ b) $\lceil \frac{1}{2} = \sqrt{\pi}$ c) $\lceil n = (n-1)!$ d) $\lceil \frac{1}{4} \lceil \frac{3}{4} = \pi$

4) $\beta(3, 1) =$
a) 3 b) $\frac{1}{3}$ c) $\frac{1}{3!}$ d) 3!

5) By changing the order $\int_0^a \int_0^y f(x,y)\, dxdy$ is equal to
a) $\int_0^y \int_0^a f(x,y)\, dxdy$ b) $\int_0^a \int_x^a f(x,y)\, dxdy$
c) $\int_0^a \int_0^x f(x,y)\, dxdy$ d) $\int_0^a \int_a^y f(x,y)\, dxdy$

6) $\int_0^1 \int_0^x \int_0^{xy} dxdydz =$

a) $1/10$ b) $1/6$ c) $1/7$ d) $1/8$

7) Area by curves $r = f(\theta)$, $r = g(\theta)$ intersecting at points (r_1, α) and (r_2, β) is

a) $\int_\alpha^\beta \int_{g(\theta)}^{f(\theta)} rd\theta dr$ b) $\int_\alpha^\beta \int_{f(\theta)}^{g(\theta)} rd\theta dr$

c) $\int_\beta^\alpha \int_{f(\theta)}^{g(\theta)} rd\theta dr$ d) none of these

8) For what value of b the differential equation $(y + x^3)dx + (bx + 2y^3)\, dy = 0$ is exact ?

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

9) The integrating factor of $x\frac{dy}{dx} + (1+x)y = e^x$ is

a) xe^x b) $x + e^x$ c) xe^{-x} d) $x\log x$

10) The length of normal to a curve y = f(x) is given by

a) $y \cdot \frac{dx}{dy}$ b) $y \cdot \frac{dy}{dx}$ c) $y\sqrt{1+\left(\frac{dx}{dy}\right)^2}$ d) $y\sqrt{1+\left(\frac{dy}{dx}\right)^2}$

11) The orthogonal trajectories of the family of curve $x^2 + y^2 = a^2$, where 'a' is a parameter is

a) $y^2 = mx$ b) $y = mx$ c) $y = mx^2$ d) $y^2 = x^2$

12) If $\frac{dy}{dx} = 1 + xy$ with y(0) = 0, then the Picards first approximation y_1 is

a) x b) x^2 c) 1 + x d) $1 + x^2$

13) For the fourth order Runge-Kutta method, which of the following is correct ?

a) $K_1 = \frac{h}{2} f(x_0, y_0)$ b) $K_2 = h\, f(x_0 + h, y_0 + K_1)$

c) $K_3 = hf(x_0 + \frac{h}{2}, y_0 + \frac{K_2}{2})$ d) $K_4 = \frac{h}{2} f(x_0 + h, y_0 + K_3)$

14) Divided difference formula is used to find numerical differentiation, when the values of arguments x are

a) Equally spaced b) Unequally spaced

c) Equally or unequally spaced d) None of these

SLR-TJ – 7

Seat No.	

F.E. (Part – II) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – II (Old)

Day and Date : Tuesday, 21-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

N.B. *: 1) Attempt* ***any three*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of calculator is* ***allowed****.*

SECTION – I

2. Attempt the following.

a) Solve : $(2x + 2y - 1)\,dx = (x + y + 3)\,dx$. **3**

b) Solve : $\frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$. **3**

c) Solve : $(1+x^2)\frac{dy}{dx} - 2xy = 2x(1+x^2)$ where $y(0) = 1$. **4**

OR

c) Solve $\frac{dr}{d\theta} = r\tan\theta - \frac{r^2}{\cos\theta}$. **4**

3. Attempt the following.

a) Find the orthogonal trajectories of the family of the curve $r = a(\sec\theta + \tan\theta)$ where 'a' is a parameter. **3**

b) If the intercept made by the tangent to the curve at (x, y) on the X-axis is proportional to the ordinate of the point, then find the equation of the curve. **3**

c) The current in a circuit containing an inductance L, resistance R and voltage of $20\cos(5t)$ is given by $L\frac{di}{dt} + Ri = 20\cos(5t)$

if R = 10 ohms, L = 2 henrys and initially there is no current in the circuit, then find current i at any time t. **3**

Set Q

4. a) Using Taylor's series method, find y(0.1) correct to three decimal places from $\frac{dy}{dx} = 1 - 2xy$ with y(0) = 1. **3**

   b) Using Euler's method, find an approximate value of y at x = 0.1 from $\frac{dy}{dx} = x + y(x+1)$ with y(0) = 1, taking h = 0.025. **3**

   c) Use Runge-Kutta method of the fourth order to find y(0.1), given that $\frac{dy}{dx} = \frac{1}{x+y}$ with y(0) = 1 in one step. **3**

5. a) Find $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at x = 0.5 and at x = 4 from the following data. **5**

x :	0	1	2	3	4
y :	7	17	45	103	203

   b) Using divided difference formula, find the value of $f'(2)$ and $f''(2)$ from the following data. **4**

x :	0	1	3	6
y = f(x) :	18	10	–18	90

SECTION – II

6. a) Evaluate $\int_0^\infty x^7 e^{-2x^2} dx$. **3**

   b) Evaluate $\int_3^7 \sqrt[4]{(x-3)(7-x)}\, dx$. **3**

   c) Prove that $\int_0^\infty \frac{1-\cos(mx)}{x} e^{-x} dx = \frac{1}{2}\log(m^2+1)$. **3**

Set Q

7. a) Trace the curve $a^2y^2 = x^3(2a - x)$. **3**

   b) Trace the curve $x = a(\theta - \sin\theta)$, $y = a(1+\cos\theta)$. **3**

   c) Find the perimeter of the cardioid $r = a(1 - \cos\theta)$ **3**

8. a) Evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} x^2 y\,dy\,dx$. **3**

   b) Evaluate $\int_0^{\pi/2} \int_0^{a\cos\theta} \int_0^{\sqrt{a^2-r^2}} r\,dz\,dr\,d\theta$. **3**

   c) Change the order of integration and evaluate **4**

$$\int_0^1 \int_0^{\sqrt{1-x^2}} \frac{e^y}{(1+e^y)\cdot\sqrt{1-x^2-y^2}}\,dx\,dy.$$

OR

   c) Evaluate $\iint (x^2+y^2)\,dx\,dy$ over the area of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. **4**

9. a) Find the area enclosed between the parabola $y = 4x - x^2$ and the line $y = x$. **3**

   b) Find the mass of the lamina bounded by the curves $x = 0$, $y = 0$, $x = 1$ and $y = e^x$ if density at any point of the lamina varies as square of its distance from origin. **3**

   c) Find the volume of the solid generated when the area bounded by $y = x^2$ and $y = 2x$ in the first quadrant is rotated about y – axis. **3**

Set Q

SLR-TJ – 7

Seat No.	

Set R

F.E. (Part – II) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – II (Old)

Day and Date : Tuesday, 21-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) If $\frac{dy}{dx} = 1 + xy$ with $y(0) = 0$, then the Picards first approximation y_1 is
   a) x b) x^2 c) $1 + x$ d) $1 + x^2$

2) For the fourth order Runge-Kutta method, which of the following is correct ?
   a) $K_1 = \frac{h}{2} f(x_0, y_0)$ b) $K_2 = h\, f(x_0 + h, y_0 + K_1)$
   c) $K_3 = hf(x_0 + \frac{h}{2}, y_0 + \frac{K_2}{2})$ d) $K_4 = \frac{h}{2} f(x_0 + h, y_0 + K_3)$

3) Divided difference formula is used to find numerical differentiation, when the values of arguments x are
   a) Equally spaced b) Unequally spaced
   c) Equally or unequally spaced d) None of these

4) The asymptotes to the curve $y^2 = ax^3$ is
   a) $x = a$ b) $y = a$ c) $x = 0$ d) not exists

5) Rectification is the process of finding
   a) double integrals b) multiple integrals
   c) length of arc of plane curve d) area under plane curve

6) Which of the following is not true ?
   a) $\lceil 0 = \infty$ b) $\lceil \frac{1}{2} = \sqrt{\pi}$ c) $\lceil n = (n-1)!$ d) $\lceil \frac{1}{4} \lceil \frac{3}{4} = \pi$

P.T.O.

7) $\beta(3, 1) =$

a) 3 b) $\frac{1}{3}$ c) $\frac{1}{3!}$ d) 3!

8) By changing the order $\int_0^a \int_0^y f(x,y)\, dxdy$ is equal to

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

c) $\int_0^a \int_0^x f(x,y)\, dxdy$ d) $\int_0^a \int_a^y f(x,y)\, dxdy$

9) $\int_0^1 \int_0^x \int_0^{xy} dxdydz =$

a) $1/10$ b) $1/6$ c) $1/7$ d) $1/8$

10) Area by curves $r = f(\theta)$, $r = g(\theta)$ intersecting at points (r_1, α) and (r_2, β) is

a) $\int_\alpha^\beta \int_{g(\theta)}^{f(\theta)} rd\theta dr$ b) $\int_\alpha^\beta \int_{f(\theta)}^{g(\theta)} rd\theta dr$

c) $\int_\beta^\alpha \int_{f(\theta)}^{g(\theta)} rd\theta dr$ d) none of these

11) For what value of b the differential equation $(y + x^3)dx + (bx + 2y^3)\, dy = 0$ is exact ?

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

12) The integrating factor of $x\frac{dy}{dx} + (1+x)y = e^x$ is

a) xe^x b) $x + e^x$ c) xe^{-x} d) xlogx

13) The length of normal to a curve y = f(x) is given by

a) $y \cdot \frac{dx}{dy}$ b) $y \cdot \frac{dy}{dx}$ c) $y\sqrt{1+\left(\frac{dx}{dy}\right)^2}$ d) $y\sqrt{1+\left(\frac{dy}{dx}\right)^2}$

14) The orthogonal trajectories of the family of curve $x^2 + y^2 = a^2$, where 'a' is a parameter is

a) $y^2 = mx$ b) $y = mx$ c) $y = mx^2$ d) $y^2 = x^2$

SLR-TJ – 7

Seat No.	

F.E. (Part – II) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – II (Old)

Day and Date : Tuesday, 21-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

N.B. *: 1) Attempt* ***any three*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of calculator is* ***allowed****.*

SECTION – I

2. Attempt the following.

a) Solve : $(2x + 2y - 1)\,dx = (x + y + 3)\,dx$. **3**

b) Solve : $\frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$. **3**

c) Solve : $(1+x^2)\frac{dy}{dx} - 2xy = 2x(1+x^2)$ where $y(0) = 1$. **4**

OR

c) Solve $\frac{dr}{d\theta} = r\tan\theta - \frac{r^2}{\cos\theta}$. **4**

3. Attempt the following.

a) Find the orthogonal trajectories of the family of the curve $r = a(\sec\theta + \tan\theta)$ where 'a' is a parameter. **3**

b) If the intercept made by the tangent to the curve at (x, y) on the X-axis is proportional to the ordinate of the point, then find the equation of the curve. **3**

c) The current in a circuit containing an inductance L, resistance R and voltage of $20\cos(5t)$ is given by $L\frac{di}{dt} + Ri = 20\cos(5t)$

if R = 10 ohms, L = 2 henrys and initially there is no current in the circuit, then find current i at any time t. **3**

Set R

4. a) Using Taylor's series method, find y(0.1) correct to three decimal places from $\frac{dy}{dx} = 1 - 2xy$ with y(0) = 1. **3**

   b) Using Euler's method, find an approximate value of y at x = 0.1 from $\frac{dy}{dx} = x + y(x+1)$ with y(0) = 1, taking h = 0.025. **3**

   c) Use Runge-Kutta method of the fourth order to find y(0.1), given that $\frac{dy}{dx} = \frac{1}{x+y}$ with y(0) = 1 in one step. **3**

5. a) Find $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at x = 0.5 and at x = 4 from the following data. **5**

x :	0	1	2	3	4
y :	7	17	45	103	203

   b) Using divided difference formula, find the value of $f'(2)$ and $f''(2)$ from the following data. **4**

x :	0	1	3	6
y = f(x) :	18	10	–18	90

SECTION – II

6. a) Evaluate $\int_0^\infty x^7 e^{-2x^2} dx$. **3**

   b) Evaluate $\int_3^7 \sqrt[4]{(x-3)(7-x)}\, dx$. **3**

   c) Prove that $\int_0^\infty \frac{1-\cos(mx)}{x} e^{-x} dx = \frac{1}{2}\log(m^2+1)$. **3**

Set R

7. a) Trace the curve $a^2y^2 = x^3(2a - x)$. **3**

   b) Trace the curve $x = a(\theta - \sin\theta)$, $y = a(1+\cos\theta)$. **3**

   c) Find the perimeter of the cardioid $r = a(1 - \cos\theta)$ **3**

8. a) Evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} x^2 y\,dy\,dx$. **3**

   b) Evaluate $\int_0^{\pi/2} \int_0^{a\cos\theta} \int_0^{\sqrt{a^2-r^2}} r\,dz\,dr\,d\theta$. **3**

   c) Change the order of integration and evaluate **4**

$$\int_0^1 \int_0^{\sqrt{1-x^2}} \frac{e^y}{(1+e^y)\cdot\sqrt{1-x^2-y^2}}\,dx\,dy.$$

OR

   c) Evaluate $\iint (x^2+y^2)\,dx\,dy$ over the area of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. **4**

9. a) Find the area enclosed between the parabola $y = 4x - x^2$ and the line $y = x$. **3**

   b) Find the mass of the lamina bounded by the curves $x = 0$, $y = 0$, $x = 1$ and $y = e^x$ if density at any point of the lamina varies as square of its distance from origin. **3**

   c) Find the volume of the solid generated when the area bounded by $y = x^2$ and $y = 2x$ in the first quadrant is rotated about y – axis. **3**

Set R

SLR-TJ – 7

Seat No.	

Set S

F.E. (Part – II) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – II (Old)

Day and Date : Tuesday, 21-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Which of the following is not true ?

a) $\lceil 0 = \infty$ b) $\lceil \frac{1}{2} = \sqrt{\pi}$ c) $\lceil n = (n-1)!$ d) $\lceil \frac{1}{4} \lceil \frac{3}{4} = \pi$

2) $\beta(3, 1) =$

a) 3 b) $\frac{1}{3}$ c) $\frac{1}{3!}$ d) 3!

3) By changing the order $\int_0^a \int_0^y f(x,y)\, dxdy$ is equal to

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

c) $\int_0^a \int_0^x f(x,y)\, dxdy$ d) $\int_0^a \int_a^y f(x,y)\, dxdy$

4) $\int_0^1 \int_0^x \int_0^{xy} dxdydz =$

a) $\frac{1}{10}$ b) $\frac{1}{6}$ c) $\frac{1}{7}$ d) $\frac{1}{8}$

P.T.O.

5) Area by curves $r = f(\theta)$, $r = g(\theta)$ intersecting at points (r_1, α) and (r_2, β) is

a) $\int_{\alpha}^{\beta}\int_{g(\theta)}^{f(\theta)} r d\theta dr$ b) $\int_{\alpha}^{\beta}\int_{f(\theta)}^{g(\theta)} r d\theta dr$

c) $\int_{\beta}^{\alpha}\int_{f(\theta)}^{g(\theta)} r d\theta dr$ d) none of these

6) For what value of b the differential equation $(y + x^3)dx + (bx + 2y^3)\,dy = 0$ is exact ?

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

7) The integrating factor of $x\frac{dy}{dx} + (1+x)y = e^x$ is

a) xe^x b) $x + e^x$ c) xe^{-x} d) $x\log x$

8) The length of normal to a curve y = f(x) is given by

a) $y \cdot \frac{dx}{dy}$ b) $y \cdot \frac{dy}{dx}$ c) $y\sqrt{1+\left(\frac{dx}{dy}\right)^2}$ d) $y\sqrt{1+\left(\frac{dy}{dx}\right)^2}$

9) The orthogonal trajectories of the family of curve $x^2 + y^2 = a^2$, where 'a' is a parameter is

a) $y^2 = mx$ b) $y = mx$ c) $y = mx^2$ d) $y^2 = x^2$

10) If $\frac{dy}{dx} = 1 + xy$ with y(0) = 0, then the Picards first approximation y_1 is

a) x b) x^2 c) $1 + x$ d) $1 + x^2$

11) For the fourth order Runge-Kutta method, which of the following is correct ?

a) $K_1 = \frac{h}{2} f(x_0, y_0)$ b) $K_2 = h\, f(x_0 + h, y_0 + K_1)$

c) $K_3 = hf(x_0 + \frac{h}{2}, y_0 + \frac{K_2}{2})$ d) $K_4 = \frac{h}{2} f(x_0 + h, y_0 + K_3)$

12) Divided difference formula is used to find numerical differentiation, when the values of arguments x are

a) Equally spaced b) Unequally spaced
c) Equally or unequally spaced d) None of these

13) The asymptotes to the curve $y^2 = ax^3$ is

a) x = a b) y = a c) x = 0 d) not exists

14) Rectification is the process of finding

a) double integrals b) multiple integrals
c) length of arc of plane curve d) area under plane curve

SLR-TJ – 7

Seat No.	

F.E. (Part – II) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – II (Old)

Day and Date : Tuesday, 21-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

N.B. *: 1) Attempt* ***any three*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of calculator is* ***allowed****.*

SECTION – I

2. Attempt the following.

a) Solve : $(2x + 2y - 1)\,dx = (x + y + 3)\,dx$. **3**

b) Solve : $\frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$. **3**

c) Solve : $(1+x^2)\frac{dy}{dx} - 2xy = 2x(1+x^2)$ where $y(0) = 1$. **4**

OR

c) Solve $\frac{dr}{d\theta} = r\tan\theta - \frac{r^2}{\cos\theta}$. **4**

3. Attempt the following.

a) Find the orthogonal trajectories of the family of the curve $r = a(\sec\theta + \tan\theta)$ where 'a' is a parameter. **3**

b) If the intercept made by the tangent to the curve at (x, y) on the X-axis is proportional to the ordinate of the point, then find the equation of the curve. **3**

c) The current in a circuit containing an inductance L, resistance R and voltage of $20\cos(5t)$ is given by $L\frac{di}{dt} + Ri = 20\cos(5t)$

if R = 10 ohms, L = 2 henrys and initially there is no current in the circuit, then find current i at any time t. **3**

Set S

4. a) Using Taylor's series method, find y(0.1) correct to three decimal places from $\frac{dy}{dx} = 1 - 2xy$ with y(0) = 1. **3**

   b) Using Euler's method, find an approximate value of y at x = 0.1 from $\frac{dy}{dx} = x + y(x+1)$ with y(0) = 1, taking h = 0.025. **3**

   c) Use Runge-Kutta method of the fourth order to find y(0.1), given that $\frac{dy}{dx} = \frac{1}{x+y}$ with y(0) = 1 in one step. **3**

5. a) Find $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at x = 0.5 and at x = 4 from the following data. **5**

x :	0	1	2	3	4
y :	7	17	45	103	203

   b) Using divided difference formula, find the value of $f'(2)$ and $f''(2)$ from the following data. **4**

x :	0	1	3	6
y = f(x) :	18	10	–18	90

SECTION – II

6. a) Evaluate $\int_0^\infty x^7 e^{-2x^2} dx$. **3**

   b) Evaluate $\int_3^7 \sqrt[4]{(x-3)(7-x)}\, dx$. **3**

   c) Prove that $\int_0^\infty \frac{1-\cos(mx)}{x} e^{-x} dx = \frac{1}{2}\log(m^2+1)$. **3**

Set S

7. a) Trace the curve $a^2y^2 = x^3(2a - x)$. **3**

   b) Trace the curve $x = a(\theta - \sin\theta)$, $y = a(1+\cos\theta)$. **3**

   c) Find the perimeter of the cardioid $r = a(1 - \cos\theta)$ **3**

8. a) Evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} x^2 y\,dy\,dx$. **3**

   b) Evaluate $\int_0^{\pi/2} \int_0^{a\cos\theta} \int_0^{\sqrt{a^2-r^2}} r\,dz\,dr\,d\theta$. **3**

   c) Change the order of integration and evaluate **4**

$$\int_0^1 \int_0^{\sqrt{1-x^2}} \frac{e^y}{(1+e^y)\cdot\sqrt{1-x^2-y^2}}\,dx\,dy.$$

OR

   c) Evaluate $\iint (x^2+y^2)\,dx\,dy$ over the area of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. **4**

9. a) Find the area enclosed between the parabola $y = 4x - x^2$ and the line $y = x$. **3**

   b) Find the mass of the lamina bounded by the curves $x = 0$, $y = 0$, $x = 1$ and $y = e^x$ if density at any point of the lamina varies as square of its distance from origin. **3**

   c) Find the volume of the solid generated when the area bounded by $y = x^2$ and $y = 2x$ in the first quadrant is rotated about y – axis. **3**

Set S

SLR-TJ – 8

Seat No.	

Set P

F.E. (Part – II) (Old CGPA) Examination, 2017
BASIC CIVIL ENGINEERING

Day and Date : Wednesday, 22-11-2017 Max. Marks : 70
Time :10.00 a.m. to 1.00.p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

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

1) The method of surveying used for determining the relative heights of points on the surface of the earth is called
   a) Levelling b) Simple levelling
   c) Longitudinal levelling d) Differential levelling

2) The portion of a road surface, which is used by vehicular traffic, is known as
   a) carriage-way b) shoulder
   c) express way d) all of the above

3) The graduations in a prismatic compass
   a) are inverted b) have zero at south
   c) are from 0° to 360° d) all the above

4) Principle of surveying 'working from whole to part' prevents
   a) Linear error b) Angular error
   c) Accumulation of errors d) Chaining

5) 'One link' means distance from
   a) Center to centre of middle rings b) Center to centre of inner rings
   c) Center to centre of outer rings d) All of these

P.T.O.

6) Earth dams, Rock fill dams and solid masonry gravity dams are _____ types of dams.
   a) Old types b) Modern types
   c) Cultural types d) All the above

7) The contour interval is inversely proportional to
   a) Scale of map b) Steepness of area
   c) Extent of area d) Flatter slope

SECTION – II

8) The water cement ratio for good strength and workability should range between
   a) 0.1 to 0.2 b) 0.2 to 0.4
   c) 0.4 to 0.6 d) 0.6 to 0.8

9) Green building are recommended to
   a) Use green color b) Use farm house
   c) Reduce global warming d) Achieve economy

10) The weight of occupants with their belongings, furniture and other movable materials constitute _____ in a building.
   a) Dead load b) Live load
   c) Static load d) Dynamic load

11) Ordinary Portland cement contains _____ Percent of gypsum, to retard the rate of hydration.
   a) 3 b) 5
   c) 7 d) 10

12) M – 15 grade of concrete is equivalent to nominal mix of proportion of cement: sand: coarse aggregates as
   a) 1 : 1 : 2 b) 1 : 1.5 : 3
   c) 1 : 2 : 4 d) 1 : 3 : 6

13) For closed growing crops (such as wheat) the method of irrigation used is
   a) Free flooding b) Border flooding
   c) Check flooding d) Basin flooding

14) The load is transferred to the foundation in framed structure in the following sequence
   a) Beam-column-foundation-slab b) Slab-beam-column-foundation
   c) Slab-column-beam-foundation d) Column-slab-beam-foundation

_____

SLR- TJ – 8

Seat No.	

F.E. (Part – II) (Old CGPA) Examination, 2017
BASIC CIVIL ENGINEERING

Day and Date : Wednesday, 22-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00.p.m.

***Instructions**: 1) Question No.**2** and Question No. **6** are **compulsory** and attempt **any two** questions from **remaining**. (**Each** Section)*

SECTION – I

2. a) What are the sub branches of civil engineering ? **2**

   b) The magnetic bearing observed with a prismatic compass for a closed traverse PQRSP are given below : **8**

Line	PQ	QR	RS	SP
F. B.	198°30′	107°30′	15°00′	219°00′
B. B.	18°30′	288°30′	192°30′	112°30′

   Draw a rough traverse. Calculate included angles and check for angular error. Calculate corrected bearings. Indicate stations free from local attraction and corrections at other stations.

3. a) Draw a sketch Prismatic compass and label it properly. **2**

   b) The following consecutive readings were taken with a dumpy level on a 4 m levelling staff on a continuously sloping ground : 0.285, 1.380, 2.345,3.995 0.750, 3.220, 3.785, 0.900, 1.890, 2.300 and 3.330. The distance between every two consecutive ground points was 30 m. The first reading was taken on a point having R.L. 500.000 m. Enter the data in a standard levelling table. Apply Arithmetic checks (Use Rise and Fall method). **7**

4. a) Write a short note on sources of water. **4**

   b) The area of a plan of an old map plotted to a scale of 1 cm = 10 m. Measures 100 cm^2. The plan is found to have shrunk so that the line originally 10 cm long now measures 9.5 cm, further the 20 m chain used was 8 cm too short. Find the true area of the survey. **5**

5. a) Explain the term W.B.M road. **2**
   b) What are the advantages of railways ? **3**
   c) Explain the term rain water harvesting. **4**

SECTION – II

Note : Question No. **6** is compulsory, solve **any two** questions from Q. No. **7** to Q. No. **9**.

6. A) Discuss the load bearing and framed structure with reference to :
      1) Carpet area
      2) Multistoried construction
      3) Stability against earthquake
      4) Speed of construction
      5) Economy. **5**

   B) State the various principles of Building planning and explain any one with neat sketch. **5**

7. A) Explain what is meant by seasoning and preservation of timber. **5**
   B) What are the types of roofing materials commonly used in building ? **4**

8. A) Explain the importance of glass and plastic as modern building materials. **5**
   B) Write short note of GPS. **4**

9. A) Define sub-structure, superstructure, Explain their different elements with their functions. **5**
   B) Write short note on Green building. **4**

SLR-TJ – 8

Seat No.	

Set Q

F.E. (Part – II) (Old CGPA) Examination, 2017
BASIC CIVIL ENGINEERING

Day and Date : Wednesday, 22-11-2017 Max. Marks : 70
Time :10.00 a.m. to 1.00.p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

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

1) The graduations in a prismatic compass
   a) are inverted b) have zero at south
   c) are from 0° to 360° d) all the above

2) Principle of surveying 'working from whole to part' prevents
   a) Linear error b) Angular error
   c) Accumulation of errors d) Chaining

3) 'One link' means distance from
   a) Center to centre of middle rings b) Center to centre of inner rings
   c) Center to centre of outer rings d) All of these

4) Earth dams, Rock fill dams and solid masonry gravity dams are _____ types of dams.
   a) Old types b) Modern types
   c) Cultural types d) All the above

5) The contour interval is inversely proportional to
   a) Scale of map b) Steepness of area
   c) Extent of area d) Flatter slope

P.T.O.

6) The method of surveying used for determining the relative heights of points on the surface of the earth is called
   a) Levelling
   b) Simple levelling
   c) Longitudinal levelling
   d) Differential levelling

7) The portion of a road surface, which is used by vehicular traffic, is known as
   a) carriage-way
   b) shoulder
   c) express way
   d) all of the above

SECTION – II

8) The weight of occupants with their belongings, furniture and other movable materials constitute _____ in a building.
   a) Dead load
   b) Live load
   c) Static load
   d) Dynamic load

9) Ordinary Portland cement contains _____ Percent of gypsum, to retard the rate of hydration.
   a) 3
   b) 5
   c) 7
   d) 10

10) M – 15 grade of concrete is equivalent to nominal mix of proportion of cement: sand: coarse aggregates as
   a) 1 : 1 : 2
   b) 1 : 1.5 : 3
   c) 1 : 2 : 4
   d) 1 : 3 : 6

11) For closed growing crops (such as wheat) the method of irrigation used is
   a) Free flooding
   b) Border flooding
   c) Check flooding
   d) Basin flooding

12) The load is transferred to the foundation in framed structure in the following sequence
   a) Beam-column-foundation-slab
   b) Slab-beam-column-foundation
   c) Slab-column-beam-foundation
   d) Column-slab-beam-foundation

13) The water cement ratio for good strength and workability should range between
   a) 0.1 to 0.2
   b) 0.2 to 0.4
   c) 0.4 to 0.6
   d) 0.6 to 0.8

14) Green building are recommended to
   a) Use green color
   b) Use farm house
   c) Reduce global warming
   d) Achieve economy

_____

SLR- TJ – 8

Seat No.	

F.E. (Part – II) (Old CGPA) Examination, 2017
BASIC CIVIL ENGINEERING

Day and Date : Wednesday, 22-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00.p.m.

***Instructions**: 1) Question No.**2** and Question No. **6** are **compulsory** and attempt **any two** questions from **remaining**. (**Each** Section)*

SECTION – I

2. a) What are the sub branches of civil engineering ? **2**

   b) The magnetic bearing observed with a prismatic compass for a closed traverse PQRSP are given below : **8**

Line	PQ	QR	RS	SP
F. B.	198°30′	107°30′	15°00′	219°00′
B. B.	18°30′	288°30′	192°30′	112°30′

   Draw a rough traverse. Calculate included angles and check for angular error. Calculate corrected bearings. Indicate stations free from local attraction and corrections at other stations.

3. a) Draw a sketch Prismatic compass and label it properly. **2**

   b) The following consecutive readings were taken with a dumpy level on a 4 m levelling staff on a continuously sloping ground : 0.285, 1.380, 2.345,3.995 0.750, 3.220, 3.785, 0.900, 1.890, 2.300 and 3.330. The distance between every two consecutive ground points was 30 m. The first reading was taken on a point having R.L. 500.000 m. Enter the data in a standard levelling table. Apply Arithmetic checks (Use Rise and Fall method). **7**

4. a) Write a short note on sources of water. **4**

   b) The area of a plan of an old map plotted to a scale of 1 cm = 10 m. Measures 100 cm^2. The plan is found to have shrunk so that the line originally 10 cm long now measures 9.5 cm, further the 20 m chain used was 8 cm too short. Find the true area of the survey. **5**

5. a) Explain the term W.B.M road. **2**
   b) What are the advantages of railways ? **3**
   c) Explain the term rain water harvesting. **4**

SECTION – II

Note : Question No. **6** is compulsory, solve **any two** questions from Q. No. **7** to Q. No. **9**.

6. A) Discuss the load bearing and framed structure with reference to :
      1) Carpet area
      2) Multistoried construction
      3) Stability against earthquake
      4) Speed of construction
      5) Economy. **5**

   B) State the various principles of Building planning and explain any one with neat sketch. **5**

7. A) Explain what is meant by seasoning and preservation of timber. **5**
   B) What are the types of roofing materials commonly used in building ? **4**

8. A) Explain the importance of glass and plastic as modern building materials. **5**
   B) Write short note of GPS. **4**

9. A) Define sub-structure, superstructure, Explain their different elements with their functions. **5**
   B) Write short note on Green building. **4**

SLR-TJ – 8

Seat No.	

Set R

F.E. (Part – II) (Old CGPA) Examination, 2017
BASIC CIVIL ENGINEERING

Day and Date : Wednesday, 22-11-2017 Max. Marks : 70
Time :10.00 a.m. to 1.00.p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

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

1) 'One link' means distance from
   a) Center to centre of middle rings b) Center to centre of inner rings
   c) Center to centre of outer rings d) All of these

2) Earth dams, Rock fill dams and solid masonry gravity dams are _____ types of dams.
   a) Old types b) Modern types
   c) Cultural types d) All the above

3) The contour interval is inversely proportional to
   a) Scale of map b) Steepness of area
   c) Extent of area d) Flatter slope

4) The method of surveying used for determining the relative heights of points on the surface of the earth is called
   a) Levelling b) Simple levelling
   c) Longitudinal levelling d) Differential levelling

5) The portion of a road surface, which is used by vehicular traffic, is known as
   a) carriage-way b) shoulder
   c) express way d) all of the above

P.T.O.

6) The graduations in a prismatic compass
   a) are inverted
   b) have zero at south
   c) are from 0° to 360°
   d) all the above

7) Principle of surveying 'working from whole to part' prevents
   a) Linear error
   b) Angular error
   c) Accumulation of errors
   d) Chaining

SECTION – II

8) M – 15 grade of concrete is equivalent to nominal mix of proportion of cement: sand: coarse aggregates as
   a) 1 : 1 : 2
   b) 1 : 1.5 : 3
   c) 1 : 2 : 4
   d) 1 : 3 : 6

9) For closed growing crops (such as wheat) the method of irrigation used is
   a) Free flooding
   b) Border flooding
   c) Check flooding
   d) Basin flooding

10) The load is transferred to the foundation in framed structure in the following sequence
   a) Beam-column-foundation-slab
   b) Slab-beam-column-foundation
   c) Slab-column-beam-foundation
   d) Column-slab-beam-foundation

11) The water cement ratio for good strength and workability should range between
   a) 0.1 to 0.2
   b) 0.2 to 0.4
   c) 0.4 to 0.6
   d) 0.6 to 0.8

12) Green building are recommended to
   a) Use green color
   b) Use farm house
   c) Reduce global warming
   d) Achieve economy

13) The weight of occupants with their belongings, furniture and other movable materials constitute _____ in a building.
   a) Dead load
   b) Live load
   c) Static load
   d) Dynamic load

14) Ordinary Portland cement contains _____ Percent of gypsum, to retard the rate of hydration.
   a) 3
   b) 5
   c) 7
   d) 10

_____

SLR- TJ – 8

Seat No.	

F.E. (Part – II) (Old CGPA) Examination, 2017
BASIC CIVIL ENGINEERING

Day and Date : Wednesday, 22-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00.p.m.

***Instructions**: 1) Question No.**2** and Question No. **6** are **compulsory** and attempt **any two** questions from **remaining**. (**Each** Section)*

SECTION – I

2. a) What are the sub branches of civil engineering ? **2**

   b) The magnetic bearing observed with a prismatic compass for a closed traverse PQRSP are given below : **8**

Line	PQ	QR	RS	SP
F. B.	198°30′	107°30′	15°00′	219°00′
B. B.	18°30′	288°30′	192°30′	112°30′

   Draw a rough traverse. Calculate included angles and check for angular error. Calculate corrected bearings. Indicate stations free from local attraction and corrections at other stations.

3. a) Draw a sketch Prismatic compass and label it properly. **2**

   b) The following consecutive readings were taken with a dumpy level on a 4 m levelling staff on a continuously sloping ground : 0.285, 1.380, 2.345,3.995 0.750, 3.220, 3.785, 0.900, 1.890, 2.300 and 3.330. The distance between every two consecutive ground points was 30 m. The first reading was taken on a point having R.L. 500.000 m. Enter the data in a standard levelling table. Apply Arithmetic checks (Use Rise and Fall method). **7**

4. a) Write a short note on sources of water. **4**

   b) The area of a plan of an old map plotted to a scale of 1 cm = 10 m. Measures 100 cm^2. The plan is found to have shrunk so that the line originally 10 cm long now measures 9.5 cm, further the 20 m chain used was 8 cm too short. Find the true area of the survey. **5**

5. a) Explain the term W.B.M road. **2**

   b) What are the advantages of railways ? **3**

   c) Explain the term rain water harvesting. **4**

SECTION – II

Note : Question No. **6** is compulsory, solve **any two** questions from Q. No. **7** to Q. No. **9**.

6. A) Discuss the load bearing and framed structure with reference to :
      1) Carpet area
      2) Multistoried construction
      3) Stability against earthquake
      4) Speed of construction
      5) Economy. **5**

   B) State the various principles of Building planning and explain any one with neat sketch. **5**

7. A) Explain what is meant by seasoning and preservation of timber. **5**

   B) What are the types of roofing materials commonly used in building ? **4**

8. A) Explain the importance of glass and plastic as modern building materials. **5**

   B) Write short note of GPS. **4**

9. A) Define sub-structure, superstructure, Explain their different elements with their functions. **5**

   B) Write short note on Green building. **4**

SLR-TJ – 8

Seat No.	

Set S

F.E. (Part – II) (Old CGPA) Examination, 2017
BASIC CIVIL ENGINEERING

Day and Date : Wednesday, 22-11-2017 Max. Marks : 70
Time :10.00 a.m. to 1.00.p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

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

1) Principle of surveying 'working from whole to part' prevents
   a) Linear error b) Angular error
   c) Accumulation of errors d) Chaining

2) 'One link' means distance from
   a) Center to centre of middle rings b) Center to centre of inner rings
   c) Center to centre of outer rings d) All of these

3) Earth dams, Rock fill dams and solid masonry gravity dams are _____ types of dams.
   a) Old types b) Modern types
   c) Cultural types d) All the above

4) The contour interval is inversely proportional to
   a) Scale of map b) Steepness of area
   c) Extent of area d) Flatter slope

5) The method of surveying used for determining the relative heights of points on the surface of the earth is called
   a) Levelling b) Simple levelling
   c) Longitudinal levelling d) Differential levelling

6) The portion of a road surface, which is used by vehicular traffic, is known as
   a) carriage-way b) shoulder
   c) express way d) all of the above

7) The graduations in a prismatic compass
   a) are inverted b) have zero at south
   c) are from 0° to 360° d) all the above

SECTION – II

8) Ordinary Portland cement contains _____ Percent of gypsum, to retard the rate of hydration.
   a) 3 b) 5
   c) 7 d) 10

9) M – 15 grade of concrete is equivalent to nominal mix of proportion of cement: sand: coarse aggregates as
   a) 1 : 1 : 2 b) 1 : 1.5 : 3
   c) 1 : 2 : 4 d) 1 : 3 : 6

10) For closed growing crops (such as wheat) the method of irrigation used is
   a) Free flooding b) Border flooding
   c) Check flooding d) Basin flooding

11) The load is transferred to the foundation in framed structure in the following sequence
   a) Beam-column-foundation-slab b) Slab-beam-column-foundation
   c) Slab-column-beam-foundation d) Column-slab-beam-foundation

12) The water cement ratio for good strength and workability should range between
   a) 0.1 to 0.2 b) 0.2 to 0.4
   c) 0.4 to 0.6 d) 0.6 to 0.8

13) Green building are recommended to
   a) Use green color b) Use farm house
   c) Reduce global warming d) Achieve economy

14) The weight of occupants with their belongings, furniture and other movable materials constitute _____ in a building.
   a) Dead load b) Live load
   c) Static load d) Dynamic load

_____

SLR- TJ – 8

Seat No.	

F.E. (Part – II) (Old CGPA) Examination, 2017
BASIC CIVIL ENGINEERING

Day and Date : Wednesday, 22-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00.p.m.

***Instructions**: 1) Question No.**2** and Question No. **6** are **compulsory** and attempt **any two** questions from **remaining**. (**Each** Section)*

SECTION – I

2. a) What are the sub branches of civil engineering ? **2**

   b) The magnetic bearing observed with a prismatic compass for a closed traverse PQRSP are given below : **8**

Line	PQ	QR	RS	SP
F. B.	198°30′	107°30′	15°00′	219°00′
B. B.	18°30′	288°30′	192°30′	112°30′

   Draw a rough traverse. Calculate included angles and check for angular error. Calculate corrected bearings. Indicate stations free from local attraction and corrections at other stations.

3. a) Draw a sketch Prismatic compass and label it properly. **2**

   b) The following consecutive readings were taken with a dumpy level on a 4 m levelling staff on a continuously sloping ground : 0.285, 1.380, 2.345,3.995 0.750, 3.220, 3.785, 0.900, 1.890, 2.300 and 3.330. The distance between every two consecutive ground points was 30 m. The first reading was taken on a point having R.L. 500.000 m. Enter the data in a standard levelling table. Apply Arithmetic checks (Use Rise and Fall method). **7**

4. a) Write a short note on sources of water. **4**

   b) The area of a plan of an old map plotted to a scale of 1 cm = 10 m. Measures 100 cm^2. The plan is found to have shrunk so that the line originally 10 cm long now measures 9.5 cm, further the 20 m chain used was 8 cm too short. Find the true area of the survey. **5**

5. a) Explain the term W.B.M road. **2**
   b) What are the advantages of railways ? **3**
   c) Explain the term rain water harvesting. **4**

SECTION – II

Note : Question No. **6** is compulsory, solve **any two** questions from Q. No. **7** to Q. No. **9**.

6. A) Discuss the load bearing and framed structure with reference to :
      1) Carpet area
      2) Multistoried construction
      3) Stability against earthquake
      4) Speed of construction
      5) Economy. **5**

   B) State the various principles of Building planning and explain any one with neat sketch. **5**

7. A) Explain what is meant by seasoning and preservation of timber. **5**
   B) What are the types of roofing materials commonly used in building ? **4**

8. A) Explain the importance of glass and plastic as modern building materials. **5**
   B) Write short note of GPS. **4**

9. A) Define sub-structure, superstructure, Explain their different elements with their functions. **5**
   B) Write short note on Green building. **4**

SLR-TJ – 9

Seat No.	

Set **P**

F.E. (Part – II) (Old – CGPA) Examination, 2017
BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date : Thursday, 23-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

*3) Figures to the **right** indicates **maximum** marks.*

*4) Assume **suitable** data if necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

(Basic Electronics)

1. Choose the correct answer : **7**

1) To display the digit 9 in seven segment display,
   a) segments e should be off and all other segments should be turned on
   b) segments e should be on and all other segments should be turned off
   c) segments c should be off and all other segments should be turned on
   d) segments c should be on and all other segments should be turned off

2) A photo diode is an example of light
   a) Source b) Detector c) Coupler d) Isolator

3) Ripple factor of full wave rectifier is
   a) 0.048 b) 0.24 c) 0.48 d) 1.21

4) The 2's complement of 101001 is
   a) 010101 b) 010111 c) 101001 d) 010110

5) β is the current amplification factor for
   a) CC configuration b) CE configuration
   c) CB configuration d) Both a) and c)

P.T.O.

6) The _____ gauge operates on the principle of photo resistivity.
   a) Bonded b) Unbonded
   c) Semiconductor d) Both a) and b)

7) LVDT consists of _____ secondary and _____ primary winding.
   a) one, one b) two, two
   c) two, one d) one, two

SECTION – II

(Computer Programming)

7

8) Diagrammatic or symbolic representation of a an algorithm is called
   a) Data Flow Diagram b) E-R Diagram
   c) Flowchart d) None of these

9) Printf( ) belongs to which library of c
   a) stdlib.h b) stdio.h.
   c) stdout.h d) stdoutput.h

10) & operator returns _____ of a variable.
   a) Name b) Memory address
   c) Value d) None of the above

11) #include is called
   a) Preprocessor directive b) Inclusion directive
   c) File inclusion directive d) None of the mentioned

12) What is the size of a char data type in C ?
   a) 1 byte b) 2 bytes c) 3 bytes d) 4 bytes

13) "%d" access specifier is used for
   a) Integer type b) Character type
   c) Floating type d) None of the above

14) Break statement is used to
   a) Quit a program b) Quit the current iteration
   c) Both of above d) None of above

_____

SLR-TJ – 9

Seat No.	

F.E. (Part – II) (Old – CGPA) Examination, 2017
BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date : Thursday, 23-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicates* ***maximum*** *marks.*
2) Assume ***suitable*** *data if necessary.*

SECTION – I

(Basic Electronics)

2. Solve **any four** questions. **(4×4=16)**

1) Perform subtraction using 2' complement

i) $(673)_8 - (572)_8$

ii) $(84)_{16} - (2A)_{16}$

2) Explain speed measurement technique using photoelectric pick up transducer.

3) Explain construction and operation of photo transistor.

4) Explain working of transistor as an amplifier.

5) Describe the operation of general purpose relay with suitable diagram.

3. Solve **any two** questions. **(2×6=12)**

1) Explain working of full wave rectifier with associated waveforms. Compare half wave rectifier, full wave rectifier and bridge rectifier.

2) Explain unbonded and bonded strain gauge with neat diagrams.

3) Explain with symbol, equation and truth table of following gates :

a) NAND

b) NOR

c) EX – OR

d) EX – NOR

SECTION – II

(Computer Programming)

4. Attempt **any four** : **(4×4=16)**
   a) What is algorithm ? Explain with example.
   b) What are the logical operators used in C ? Explain with example.
   c) Explain increment operator (prefix and postfix) with example.
   d) Write a C program to find largest number among user entered three numbers.
   e) What is string ? Explain ways to initialize the string.

5. Attempt **any two** : **(2×6=12)**
   a) Explain structure concept with sample program to read and display.
   b) What is function ? Compare function call by value and call by reference methods.
   c) Write a program for finding a factorial of a given number.

———————

SLR-TJ – 9

Seat No.	

Set Q

F.E. (Part – II) (Old – CGPA) Examination, 2017
BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date : Thursday, 23-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

*3) Figures to the **right** indicates **maximum** marks.*

*4) Assume **suitable** data if necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

(Basic Electronics)

1. Choose the correct answer : **7**

1) Ripple factor of full wave rectifier is
a) 0.048 b) 0.24 c) 0.48 d) 1.21

2) The 2's complement of 101001 is
a) 010101 b) 010111 c) 101001 d) 010110

3) β is the current amplification factor for
a) CC configuration b) CE configuration
c) CB configuration d) Both a) and c)

4) The _____ gauge operates on the principle of photo resistivity.
a) Bonded b) Unbonded
c) Semiconductor d) Both a) and b)

5) LVDT consists of _____ secondary and _____ primary winding.
a) one, one b) two, two
c) two, one d) one, two

P.T.O.

6) To display the digit 9 in seven segment display,
   a) segments e should be off and all other segments should be turned on
   b) segments e should be on and all other segments should be turned off
   c) segments c should be off and all other segments should be turned on
   d) segments c should be on and all other segments should be turned off

7) A photo diode is an example of light
   a) Source b) Detector c) Coupler d) Isolator

SECTION – II

(Computer Programming)

7

8) & operator returns _____ of a variable.
   a) Name b) Memory address
   c) Value d) None of the above

9) #include is called
   a) Preprocessor directive b) Inclusion directive
   c) File inclusion directive d) None of the mentioned

10) What is the size of a char data type in C ?
   a) 1 byte b) 2 bytes c) 3 bytes d) 4 bytes

11) "%d" access specifier is used for
   a) Integer type b) Character type
   c) Floating type d) None of the above

12) Break statement is used to
   a) Quit a program b) Quit the current iteration
   c) Both of above d) None of above

13) Diagrammatic or symbolic representation of a an algorithm is called
   a) Data Flow Diagram b) E-R Diagram
   c) Flowchart d) None of these

14) Printf( ) belongs to which library of c
   a) stdlib.h b) stdio.h.
   c) stdout.h d) stdoutput.h

_____

SLR-TJ – 9

Seat No.	

F.E. (Part – II) (Old – CGPA) Examination, 2017
BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date : Thursday, 23-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicates* ***maximum*** *marks.*
2) Assume ***suitable*** *data if necessary.*

SECTION – I

(Basic Electronics)

2. Solve **any four** questions. **(4×4=16)**

1) Perform subtraction using 2' complement

i) $(673)_8 - (572)_8$

ii) $(84)_{16} - (2A)_{16}$

2) Explain speed measurement technique using photoelectric pick up transducer.

3) Explain construction and operation of photo transistor.

4) Explain working of transistor as an amplifier.

5) Describe the operation of general purpose relay with suitable diagram.

3. Solve **any two** questions. **(2×6=12)**

1) Explain working of full wave rectifier with associated waveforms. Compare half wave rectifier, full wave rectifier and bridge rectifier.

2) Explain unbonded and bonded strain gauge with neat diagrams.

3) Explain with symbol, equation and truth table of following gates :

a) NAND

b) NOR

c) EX – OR

d) EX – NOR

SECTION – II

(Computer Programming)

4. Attempt **any four** : **(4×4=16)**
   a) What is algorithm ? Explain with example.
   b) What are the logical operators used in C ? Explain with example.
   c) Explain increment operator (prefix and postfix) with example.
   d) Write a C program to find largest number among user entered three numbers.
   e) What is string ? Explain ways to initialize the string.

5. Attempt **any two** : **(2×6=12)**
   a) Explain structure concept with sample program to read and display.
   b) What is function ? Compare function call by value and call by reference methods.
   c) Write a program for finding a factorial of a given number.

———————

SLR-TJ – 9

Seat No.	

Set **R**

F.E. (Part – II) (Old – CGPA) Examination, 2017
BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date : Thursday, 23-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

*3) Figures to the **right** indicates **maximum** marks.*

*4) Assume **suitable** data if necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

(Basic Electronics)

1. Choose the correct answer : **7**

1) β is the current amplification factor for
   a) CC configuration b) CE configuration
   c) CB configuration d) Both a) and c)

2) The _____ gauge operates on the principle of photo resistivity.
   a) Bonded b) Unbonded
   c) Semiconductor d) Both a) and b)

3) LVDT consists of _____ secondary and _____ primary winding.
   a) one, one b) two, two
   c) two, one d) one, two

4) To display the digit 9 in seven segment display,
   a) segments e should be off and all other segments should be turned on
   b) segments e should be on and all other segments should be turned off
   c) segments c should be off and all other segments should be turned on
   d) segments c should be on and all other segments should be turned off

5) A photo diode is an example of light
   a) Source b) Detector c) Coupler d) Isolator

6) Ripple factor of full wave rectifier is
   a) 0.048 b) 0.24 c) 0.48 d) 1.21

7) The 2's complement of 101001 is
   a) 010101 b) 010111 c) 101001 d) 010110

SECTION – II

(Computer Programming)

7

8) What is the size of a char data type in C ?
   a) 1 byte b) 2 bytes c) 3 bytes d) 4 bytes

9) "%d" access specifier is used for
   a) Integer type b) Character type
   c) Floating type d) None of the above

10) Break statement is used to
   a) Quit a program b) Quit the current iteration
   c) Both of above d) None of above

11) Diagrammatic or symbolic representation of a an algorithm is called
   a) Data Flow Diagram b) E-R Diagram
   c) Flowchart d) None of these

12) Printf( ) belongs to which library of c
   a) stdlib.h b) stdio.h.
   c) stdout.h d) stdoutput.h

13) & operator returns _____ of a variable.
   a) Name b) Memory address
   c) Value d) None of the above

14) #include is called
   a) Preprocessor directive b) Inclusion directive
   c) File inclusion directive d) None of the mentioned

_____

SLR-TJ – 9

Seat No.	

F.E. (Part – II) (Old – CGPA) Examination, 2017
BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date : Thursday, 23-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicates* ***maximum*** *marks.*
2) Assume ***suitable*** *data if necessary.*

SECTION – I

(Basic Electronics)

2. Solve **any four** questions. **(4×4=16)**

   1) Perform subtraction using 2' complement
      i) $(673)_8 - (572)_8$
      ii) $(84)_{16} - (2A)_{16}$
   2) Explain speed measurement technique using photoelectric pick up transducer.
   3) Explain construction and operation of photo transistor.
   4) Explain working of transistor as an amplifier.
   5) Describe the operation of general purpose relay with suitable diagram.

3. Solve **any two** questions. **(2×6=12)**

   1) Explain working of full wave rectifier with associated waveforms. Compare half wave rectifier, full wave rectifier and bridge rectifier.
   2) Explain unbonded and bonded strain gauge with neat diagrams.
   3) Explain with symbol, equation and truth table of following gates :
      a) NAND
      b) NOR
      c) EX – OR
      d) EX – NOR

SECTION – II

(Computer Programming)

4. Attempt **any four** : **(4×4=16)**
   a) What is algorithm ? Explain with example.
   b) What are the logical operators used in C ? Explain with example.
   c) Explain increment operator (prefix and postfix) with example.
   d) Write a C program to find largest number among user entered three numbers.
   e) What is string ? Explain ways to initialize the string.

5. Attempt **any two** : **(2×6=12)**
   a) Explain structure concept with sample program to read and display.
   b) What is function ? Compare function call by value and call by reference methods.
   c) Write a program for finding a factorial of a given number.

———————

SLR-TJ – 9

Seat No.	

Set **S**

F.E. (Part – II) (Old – CGPA) Examination, 2017
BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date : Thursday, 23-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

*3) Figures to the **right** indicates **maximum** marks.*

*4) Assume **suitable** data if necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

SECTION – I

(Basic Electronics)

1. Choose the correct answer : **7**

1) The 2's complement of 101001 is
   a) 010101 b) 010111
   c) 101001 d) 010110

2) β is the current amplification factor for
   a) CC configuration b) CE configuration
   c) CB configuration d) Both a) and c)

3) The _____ gauge operates on the principle of photo resistivity.
   a) Bonded b) Unbonded
   c) Semiconductor d) Both a) and b)

4) LVDT consists of _____ secondary and _____ primary winding.
   a) one, one b) two, two
   c) two, one d) one, two

5) To display the digit 9 in seven segment display,
   a) segments e should be off and all other segments should be turned on
   b) segments e should be on and all other segments should be turned off
   c) segments c should be off and all other segments should be turned on
   d) segments c should be on and all other segments should be turned off

6) A photo diode is an example of light
   a) Source b) Detector c) Coupler d) Isolator

7) Ripple factor of full wave rectifier is
   a) 0.048 b) 0.24 c) 0.48 d) 1.21

SECTION – II

(Computer Programming)

7

8) #include is called
   a) Preprocessor directive b) Inclusion directive
   c) File inclusion directive d) None of the mentioned

9) What is the size of a char data type in C ?
   a) 1 byte b) 2 bytes c) 3 bytes d) 4 bytes

10) "%d" access specifier is used for
   a) Integer type b) Character type
   c) Floating type d) None of the above

11) Break statement is used to
   a) Quit a program b) Quit the current iteration
   c) Both of above d) None of above

12) Diagrammatic or symbolic representation of a an algorithm is called
   a) Data Flow Diagram b) E-R Diagram
   c) Flowchart d) None of these

13) Printf( ) belongs to which library of c
   a) stdlib.h b) stdio.h. c) stdout.h d) stdoutput.h

14) & operator returns _____ of a variable.
   a) Name b) Memory address
   c) Value d) None of the above

_____

SLR-TJ – 9

Seat No.	

F.E. (Part – II) (Old – CGPA) Examination, 2017
BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date : Thursday, 23-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicates* ***maximum*** *marks.*
2) Assume ***suitable*** *data if necessary.*

SECTION – I

(Basic Electronics)

2. Solve **any four** questions. **(4×4=16)**

1) Perform subtraction using 2' complement

i) $(673)_8 - (572)_8$

ii) $(84)_{16} - (2A)_{16}$

2) Explain speed measurement technique using photoelectric pick up transducer.

3) Explain construction and operation of photo transistor.

4) Explain working of transistor as an amplifier.

5) Describe the operation of general purpose relay with suitable diagram.

3. Solve **any two** questions. **(2×6=12)**

1) Explain working of full wave rectifier with associated waveforms. Compare half wave rectifier, full wave rectifier and bridge rectifier.

2) Explain unbonded and bonded strain gauge with neat diagrams.

3) Explain with symbol, equation and truth table of following gates :

a) NAND

b) NOR

c) EX – OR

d) EX – NOR

SECTION – II

(Computer Programming)

4. Attempt **any four** : **(4×4=16)**
   a) What is algorithm ? Explain with example.
   b) What are the logical operators used in C ? Explain with example.
   c) Explain increment operator (prefix and postfix) with example.
   d) Write a C program to find largest number among user entered three numbers.
   e) What is string ? Explain ways to initialize the string.

5. Attempt **any two** : **(2×6=12)**
   a) Explain structure concept with sample program to read and display.
   b) What is function ? Compare function call by value and call by reference methods.
   c) Write a program for finding a factorial of a given number.

———————

SLR-TJ – 11

Seat No.	

Set P

F.E. (Part – II) (Old CGPA) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Saturday, 25-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

Constants *: 1) Avogadro's no., N = 6.02 ×10^{26}/k.mol.*
2) Velocity of light, c = 3×10^{8} m/sec.
3) Charge of electron, e = 1.6×10^{-19} C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Accepter type semiconductor is formed by adding impurity of valency
a) 3 b) 4 c) 5 d) 6

2) The Hall coefficient (R_H) is _____ for N-type semiconductor.
a) positive b) negaive
c) no sign d) both a and b

3) The Miller indices of the plane parallel to x and y axes are
a) (1 0 0) b) (0 1 0) c) (0 0 1) d) (1 1 1)

4) The number of atoms per unit cell for FCC structure is
a) 01 b) 02 c) 03 d) 04

5) Sabine's formula is _____ (symbols have their usual meaning).
a) $T = (K \times V)/A$
b) $T = (K \times V)/\Sigma a.s$
c) $T = (K \times V)/ (a1.s1 + a1.s2 + ... + a_n.s_n)$
d) All of these

P.T.O.

6) Ultrasonic waves produced in a medium can be detected by
   a) A telephone
   b) Kundt's tube
   c) Quinck's tube
   d) Spectrometer

7) Einstein's mass energy relation ($E = mc^2$) shows that
   a) mass disappears to reappear as energy
   b) energy disappears to reappear as mass
   c) mass and energy are two different forms of the same entity
   d) all the above statements are correct

8) The resolving power of a grating is
   a) $\lambda/d\lambda$ b) $d\lambda/\lambda$ c) $nNd\lambda$ d) $n(n+1)$

9) The wave front corresponding to e-ray is
   a) plane b) spherical c) cylindrical d) elliptical

10) Stimulated absorption process is mathematically represented by equation
   a) $A + h\gamma \rightarrow A^*$
   b) $A^* + h\gamma \rightarrow A + 2h\gamma$
   c) $A^* \rightarrow A + h\gamma$
   d) $A^* + h\gamma \rightarrow A + h\gamma$

11) The hologram records _____ of the object.
   a) Only intensity variation
   b) Only phase distribution
   c) Both intensity variation and phase distribution
   d) None of these

12) Control rods used in nuclear reactors are made up of
   a) graphite b) plutonium c) boron d) iron

13) In optical fibre the refractive index of cladding is _____ than the refractive index of core.
   a) less b) greater c) equal d) none of these

14) The chirality of armchair CNT is
   a) (a, 0) b) (a, b) c) (a, a) d) (0, b)

_____

SLR-TJ – 11

Seat No.	

F.E. (Part – II) (Old CGPA) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Saturday, 25-11-2017 Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

2. Attempt **any five** of the following : **15**

   a) Explain formation of energy bands in solids.

   b) Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.

   c) State properties of ultrasonic waves.

   d) Derive the expression of time dilation.

   e) Define the term miller indices. How they are determined ?

   f) A classroom has dimensions $25 \times 20 \times 15$ m^3. The reverberation time is 2.5 sec, calculate the total absorption of its surfaces and the average absorption coefficient.

   g) What is speed of clock to keep correct time with respect to an observer, so that it may seem to lose 1 min per day ?

3. What is Hall effect ? Derive the relation for Hall voltage and Hall coefficient. **5**

4. Attempt **any two** of the following : **8**

   a) Define atomic packing factor and obtain its values for SC, BCC and FCC crystals.

   b) Derive Einstein's expression for mass-energy equivalence.

   c) Explain the factors affecting the architectural acoustics and their remedies.

SECTION – II

5. Attempt **any five** of the following : **15**

   a) Explain with diagram
      i) Stimulated emission
      ii) Spontaneous emission.

b) Distinguish between Fresnel and Fraunhoffer diffraction.

c) State application of LASER beam.

d) Explain nuclear chain reaction with neat diagram.

e) State the applications of nanotechnology.

f) Determine the acceptance angle and numerical aperture of a step index fiber when the core refractive index $n_1 = 1.4$ and the cladding refractive index $n_2 = 1.38$.

g) Monochromatic light of wavelength 6560A° falls normally on a grating. The spectral line is diffracted at an angle of 19.15° from the normal in first order. Find the grating element.

6. Obtain the expression for acceptance angle, numerical aperture and fractional refractive index change of an optical fiber. **5**

OR

Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : **8**

a) Derive an expression for the resolving power of a plane diffraction grating.

b) What is Holography ? Explain construction and reconstruction of hologram with neat diagram.

c) Explain in detail classification of optical fiber cable.

———————

SLR-TJ – 11

Seat No.	

Set Q

F.E. (Part – II) (Old CGPA) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Saturday, 25-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

Constants *: 1) Avogadro's no., $N = 6.02 \times 10^{26}$/k.mol.*
2) Velocity of light, $c = 3 \times 10^{8}$ m/sec.
3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) The resolving power of a grating is
a) $\lambda/d\lambda$ b) $d\lambda/\lambda$ c) $nNd\lambda$ d) n(n+1)

2) The wave front corresponding to e-ray is
a) plane b) spherical c) cylindrical d) elliptical

3) Stimulated absorption process is mathematically represented by equation
a) $A + h\gamma \rightarrow A^*$ b) $A^* + h\gamma \rightarrow A + 2h\gamma$
c) $A^* \rightarrow A + h\gamma$ d) $A^* + h\gamma \rightarrow A + h\gamma$

4) The hologram records _____ of the object.
a) Only intensity variation
b) Only phase distribution
c) Both intensity variation and phase distribution
d) None of these

5) Control rods used in nuclear reactors are made up of
a) graphite b) plutonium c) boron d) iron

6) In optical fibre the refractive index of cladding is _____ than the refractive index of core.
   a) less b) greater c) equal d) none of these

7) The chirality of armchair CNT is
   a) (a, 0) b) (a, b) c) (a, a) d) (0, b)

8) Accepter type semiconductor is formed by adding impurity of valency
   a) 3 b) 4 c) 5 d) 6

9) The Hall coefficient (R_H) is _____ for N-type semiconductor.
   a) positive b) negaive
   c) no sign d) both a and b

10) The Miller indices of the plane parallel to x and y axes are
   a) (1 0 0) b) (0 1 0) c) (0 0 1) d) (1 1 1)

11) The number of atoms per unit cell for FCC structure is
   a) 01 b) 02 c) 03 d) 04

12) Sabine's formula is _____ (symbols have their usual meaning).
   a) $T = (K \times V)/A$
   b) $T = (K \times V)/\sum a.s$
   c) $T = (K \times V)/ (a1.s1 + a1.s2 + ... + a_n.s_n)$
   d) All of these

13) Ultrasonic waves produced in a medium can be detected by
   a) A telephone b) Kundt's tube
   c) Quinck's tube d) Spectrometer

14) Einstein's mass energy relation ($E = mc^2$) shows that
   a) mass disappears to reappear as energy
   b) energy disappears to reappear as mass
   c) mass and energy are two different forms of the same entity
   d) all the above statements are correct

_____

SLR-TJ – 11

Seat No.	

F.E. (Part – II) (Old CGPA) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Saturday, 25-11-2017 Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

2. Attempt **any five** of the following : **15**

   a) Explain formation of energy bands in solids.

   b) Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.

   c) State properties of ultrasonic waves.

   d) Derive the expression of time dilation.

   e) Define the term miller indices. How they are determined ?

   f) A classroom has dimensions $25 \times 20 \times 15$ m^3. The reverberation time is 2.5 sec, calculate the total absorption of its surfaces and the average absorption coefficient.

   g) What is speed of clock to keep correct time with respect to an observer, so that it may seem to lose 1 min per day ?

3. What is Hall effect ? Derive the relation for Hall voltage and Hall coefficient. **5**

4. Attempt **any two** of the following : **8**

   a) Define atomic packing factor and obtain its values for SC, BCC and FCC crystals.

   b) Derive Einstein's expression for mass-energy equivalence.

   c) Explain the factors affecting the architectural acoustics and their remedies.

SECTION – II

5. Attempt **any five** of the following : **15**

   a) Explain with diagram
      i) Stimulated emission
      ii) Spontaneous emission.

b) Distinguish between Fresnel and Fraunhoffer diffraction.

c) State application of LASER beam.

d) Explain nuclear chain reaction with neat diagram.

e) State the applications of nanotechnology.

f) Determine the acceptance angle and numerical aperture of a step index fiber when the core refractive index $n_1 = 1.4$ and the cladding refractive index $n_2 = 1.38$.

g) Monochromatic light of wavelength 6560A° falls normally on a grating. The spectral line is diffracted at an angle of 19.15° from the normal in first order. Find the grating element.

6. Obtain the expression for acceptance angle, numerical aperture and fractional refractive index change of an optical fiber. **5**

OR

Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : **8**

a) Derive an expression for the resolving power of a plane diffraction grating.

b) What is Holography ? Explain construction and reconstruction of hologram with neat diagram.

c) Explain in detail classification of optical fiber cable.

———————

SLR-TJ – 11

Seat No.	

Set R

F.E. (Part – II) (Old CGPA) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Saturday, 25-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

Constants *: 1) Avogadro's no., N = 6.02 ×10^{26}/k.mol.*
2) Velocity of light, c = 3×10^{8} m/sec.
3) Charge of electron, e = 1.6×10^{-19} C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Sabine's formula is _____ (symbols have their usual meaning).
   a) $T = (K \times V)/A$
   b) $T = (K \times V)/\sum a.s$
   c) $T = (K \times V)/ (a1.s1 + a1.s2 + ... + a_n.s_n)$
   d) All of these

2) Ultrasonic waves produced in a medium can be detected by
   a) A telephone b) Kundt's tube
   c) Quinck's tube d) Spectrometer

3) Einstein's mass energy relation ($E = mc^2$) shows that
   a) mass disappears to reappear as energy
   b) energy disappears to reappear as mass
   c) mass and energy are two different forms of the same entity
   d) all the above statements are correct

4) The resolving power of a grating is
   a) $\lambda/d\lambda$ b) $d\lambda/\lambda$ c) $nNd\lambda$ d) n(n+1)

5) The wave front corresponding to e-ray is
   a) plane b) spherical c) cylindrical d) elliptical

6) Stimulated absorption process is mathematically represented by equation
   a) $A + h\gamma \rightarrow A^*$ b) $A^* + h\gamma \rightarrow A + 2h\gamma$
   c) $A^* \rightarrow A + h\gamma$ d) $A^* + h\gamma \rightarrow A + h\gamma$

7) The hologram records _____ of the object.
   a) Only intensity variation
   b) Only phase distribution
   c) Both intensity variation and phase distribution
   d) None of these

8) Control rods used in nuclear reactors are made up of
   a) graphite b) plutonium c) boron d) iron

9) In optical fibre the refractive index of cladding is _____ than the refractive index of core.
   a) less b) greater c) equal d) none of these

10) The chirality of armchair CNT is
   a) (a, 0) b) (a, b) c) (a, a) d) (0, b)

11) Accepter type semiconductor is formed by adding impurity of valency
   a) 3 b) 4 c) 5 d) 6

12) The Hall coefficient (R_H) is _____ for N-type semiconductor.
   a) positive b) negaive
   c) no sign d) both a and b

13) The Miller indices of the plane parallel to x and y axes are
   a) (1 0 0) b) (0 1 0) c) (0 0 1) d) (1 1 1)

14) The number of atoms per unit cell for FCC structure is
   a) 01 b) 02 c) 03 d) 04

_____

SLR-TJ – 11

Seat No.	

F.E. (Part – II) (Old CGPA) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Saturday, 25-11-2017 Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

2. Attempt **any five** of the following : **15**

   a) Explain formation of energy bands in solids.

   b) Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.

   c) State properties of ultrasonic waves.

   d) Derive the expression of time dilation.

   e) Define the term miller indices. How they are determined ?

   f) A classroom has dimensions $25 \times 20 \times 15$ m^3. The reverberation time is 2.5 sec, calculate the total absorption of its surfaces and the average absorption coefficient.

   g) What is speed of clock to keep correct time with respect to an observer, so that it may seem to lose 1 min per day ?

3. What is Hall effect ? Derive the relation for Hall voltage and Hall coefficient. **5**

4. Attempt **any two** of the following : **8**

   a) Define atomic packing factor and obtain its values for SC, BCC and FCC crystals.

   b) Derive Einstein's expression for mass-energy equivalence.

   c) Explain the factors affecting the architectural acoustics and their remedies.

SECTION – II

5. Attempt **any five** of the following : **15**

   a) Explain with diagram
      i) Stimulated emission
      ii) Spontaneous emission.

b) Distinguish between Fresnel and Fraunhoffer diffraction.

c) State application of LASER beam.

d) Explain nuclear chain reaction with neat diagram.

e) State the applications of nanotechnology.

f) Determine the acceptance angle and numerical aperture of a step index fiber when the core refractive index $n_1 = 1.4$ and the cladding refractive index $n_2 = 1.38$.

g) Monochromatic light of wavelength 6560A° falls normally on a grating. The spectral line is diffracted at an angle of 19.15° from the normal in first order. Find the grating element.

6. Obtain the expression for acceptance angle, numerical aperture and fractional refractive index change of an optical fiber. **5**

OR

Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : **8**

a) Derive an expression for the resolving power of a plane diffraction grating.

b) What is Holography ? Explain construction and reconstruction of hologram with neat diagram.

c) Explain in detail classification of optical fiber cable.

———————

SLR-TJ – 11

Seat No.	

Set S

F.E. (Part – II) (Old CGPA) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Saturday, 25-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

Constants *: 1) Avogadro's no., $N = 6.02 \times 10^{26}$/k.mol.*
2) Velocity of light, $c = 3 \times 10^{8}$ m/sec.
3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Stimulated absorption process is mathematically represented by equation
   a) $A + h\gamma \rightarrow A^*$ b) $A^* + h\gamma \rightarrow A + 2h\gamma$
   c) $A^* \rightarrow A + h\gamma$ d) $A^* + h\gamma \rightarrow A + h\gamma$

2) The hologram records _____ of the object.
   a) Only intensity variation
   b) Only phase distribution
   c) Both intensity variation and phase distribution
   d) None of these

3) Control rods used in nuclear reactors are made up of
   a) graphite b) plutonium c) boron d) iron

4) In optical fibre the refractive index of cladding is _____ than the refractive index of core.
   a) less b) greater c) equal d) none of these

5) The chirality of armchair CNT is
   a) (a, 0) b) (a, b) c) (a, a) d) (0, b)

6) Accepter type semiconductor is formed by adding impurity of valency
   a) 3 b) 4 c) 5 d) 6

7) The Hall coefficient (R_H) is _____ for N-type semiconductor.
   a) positive b) negaive
   c) no sign d) both a and b

8) The Miller indices of the plane parallel to x and y axes are
   a) (1 0 0) b) (0 1 0) c) (0 0 1) d) (1 1 1)

9) The number of atoms per unit cell for FCC structure is
   a) 01 b) 02 c) 03 d) 04

10) Sabine's formula is _____ (symbols have their usual meaning).
   a) $T = (K \times V)/A$
   b) $T = (K \times V)/\sum a.s$
   c) $T = (K \times V)/ (a1.s1 + a1.s2 + ... + a_n.s_n)$
   d) All of these

11) Ultrasonic waves produced in a medium can be detected by
   a) A telephone b) Kundt's tube
   c) Quinck's tube d) Spectrometer

12) Einstein's mass energy relation ($E = mc^2$) shows that
   a) mass disappears to reappear as energy
   b) energy disappears to reappear as mass
   c) mass and energy are two different forms of the same entity
   d) all the above statements are correct

13) The resolving power of a grating is
   a) $\lambda/d\lambda$ b) $d\lambda/\lambda$ c) $nNd\lambda$ d) n(n+1)

14) The wave front corresponding to e-ray is
   a) plane b) spherical c) cylindrical d) elliptical

_____

SLR-TJ – 11

Seat No.	

F.E. (Part – II) (Old CGPA) Examination, 2017
ENGINEERING PHYSICS

Day and Date : Saturday, 25-11-2017 Marks : 56

Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

2. Attempt **any five** of the following : **15**

   a) Explain formation of energy bands in solids.

   b) Calculate no. of atoms per unit cell for SC, BCC and FCC crystal.

   c) State properties of ultrasonic waves.

   d) Derive the expression of time dilation.

   e) Define the term miller indices. How they are determined ?

   f) A classroom has dimensions $25 \times 20 \times 15$ m^3. The reverberation time is 2.5 sec, calculate the total absorption of its surfaces and the average absorption coefficient.

   g) What is speed of clock to keep correct time with respect to an observer, so that it may seem to lose 1 min per day ?

3. What is Hall effect ? Derive the relation for Hall voltage and Hall coefficient. **5**

4. Attempt **any two** of the following : **8**

   a) Define atomic packing factor and obtain its values for SC, BCC and FCC crystals.

   b) Derive Einstein's expression for mass-energy equivalence.

   c) Explain the factors affecting the architectural acoustics and their remedies.

SECTION – II

5. Attempt **any five** of the following : **15**

   a) Explain with diagram
      i) Stimulated emission
      ii) Spontaneous emission.

b) Distinguish between Fresnel and Fraunhoffer diffraction.

c) State application of LASER beam.

d) Explain nuclear chain reaction with neat diagram.

e) State the applications of nanotechnology.

f) Determine the acceptance angle and numerical aperture of a step index fiber when the core refractive index $n_1 = 1.4$ and the cladding refractive index $n_2 = 1.38$.

g) Monochromatic light of wavelength 6560A° falls normally on a grating. The spectral line is diffracted at an angle of 19.15° from the normal in first order. Find the grating element.

6. Obtain the expression for acceptance angle, numerical aperture and fractional refractive index change of an optical fiber. **5**

OR

Describe He-Ne laser with its construction and working.

7. Attempt **any two** of the following : **8**

a) Derive an expression for the resolving power of a plane diffraction grating.

b) What is Holography ? Explain construction and reconstruction of hologram with neat diagram.

c) Explain in detail classification of optical fiber cable.

———————

SLR-TJ – 12

Seat No.	

Set P

F.E. (Part – II) (Old) Examination, 2017
ENGINEERING CHEMISTRY (CGPA)

Day and Date : Monday, 27-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct option. **14**

1) EDTA method of determining hardness of water can be used to determine
   a) All types of hardness
   b) Temporary hardness only
   c) Permanent hardness only
   d) Alkaline hardness only

2) Coagulants help in the setting of
   a) Dissolved impurities only
   b) Fine suspended matter only
   c) Colloidal particles only
   d) Both b) and c)

3) Anodic coating protects the underlying metal
   a) Due to its noble character
   b) Sacrificially
   c) Due to its high electrode potential
   d) Due to both b) and c)

4) Suitable lubricant for delicate instruments is
   a) greases b) graphite
   c) hazel nut oil d) all of these

5) Which of the following is condensed phase rule equation ?
   a) $F = C - P + 1$ b) $F = C - P + 2$
   c) $F = C + P - 2$ d) $C = F - P + 2$

P.T.O.

6) Metal at the top of electromotive series is
   a) most stable b) least active
   c) most noble d) most active

7) When graphite is dispersed in water, it is called
   a) aquadag b) oildag
   c) blended oil d) all of these

8) Most commonly used vulcanizing agent is
   a) S_8 b) Cl_2
   c) ZnO d) All of these

9) Plastic which does not soften on heating is called as
   a) Thermo softening plastic b) Thermosetting plastic
   c) Thermo unit plastic d) Thermoplastic

10) The lowest calorific value is of
   a) Peat b) Lignite
   c) Bituminous d) Anthracite

11) Anthracite
   a) Lowest rank coal b) Highest rank coal
   c) Both a) and b) d) Contains no moisture

12) Which of the following gas cannot be used as carrier gas for gas liquid chromatography ?
   a) O_2 b) N_2 c) Ar d) He

13) Major component of Portland cement is
   a) Tri calcium silicate b) CaO
   c) MgO d) $CaSO_4$

14) UV absorbing component in optical glass is
   a) Barium oxide b) Boron oxide
   c) Cerium oxide d) Sodium oxide

———————

SLR-TJ – 12

Seat No.	

F.E. (Part – II) (Old) Examination, 2017
ENGINEERING CHEMISTRY (CGPA)

Day and Date : Monday, 27-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. A) Attempt **any two** : **8**
   a) Define hardness. Explain reverse osmosis process.
   b) Describe water system with phase diagram.
   c) On analysis water was found to contain following impurities expressed in ppm.

Impurities	**Amount**	**Mol. Wt.**
$Ca(HCO_3)_2$	70.00	162
$Mg(HCO_3)_2$	55.00	146
$CaSO_4$	33.00	136
$CaCl_2$	20.00	111

   Calculate temporary, permanent and total hardness of water.

   B) Attempt **any two** : **6**
   a) Explain mechanism of extreme pressure lubrication.
   b) Define corrosion. Explain hydrogen evolution mechanism of corrosion.
   c) Write a short note on metal cladding.

3. A) i) Write a note on solid lubricatns. **3**
   ii) Define BOD. How will you determine the BOD of water ? **3**

OR

   A) i) What are the merits and demerits of phase rule ? **3**
   ii) Define lubricant. Explain functions of lubricants. **3**

   B) Attempt **any two** : **8**
   i) Explain Galvanization process of prevention of corrosion.
   ii) How will you select lubricant for
   a) Gears
   b) Transformers ?
   iii) Explain scale and sludge formation in boilers.

SECTION – II

4. A) Attempt **any two** : **8**

i) Define propellant. Explain different types of propellant.

ii) Define conductive polymer. Write applications of conductive polymers.

iii) During the determination of calorific value of solid fuel by Bomb calorimeter the following result were obtained.

a) Water equivalent of the calorimeter	= 570 gm
b) Water taken in the calorimeter	= 1500 gm
c) Observed rise in temp	= 3.70° C
d) Acid correction	= 0.5 kcal.
e) Fuse Wire correction	= 4.20 cal.
f) Cooling correction	= 0.05° C
g) Latent Heat of Steam	= 587 cal/gm
h) % of hydrogen	= 6.5%
i) Weight of solid fuel	= 1.650 gm

Calculate the high calorific value and low calorific value of the solid fuel.

B) Solve **any two** : **6**

i) Explain compound constituents of cement.

ii) Write properties and application steel.

iii) Write difference between thermosetting and thermo softening plastics.

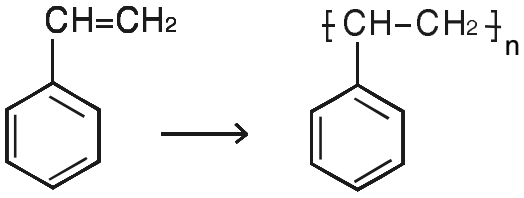
5. A) i) Write the chemical reaction involved in Vulcanization of natural rubber. **2**

ii) How much $CaCl_2$ is required to prepare 250 ml of 0.05 N and 0.5 N aqueous solution ? (Mol Wt of $CaCl_2$ = 111). **4**

OR

i) Define chromatography. Explain instrumentation of GLC. **4**

ii) Calculate degree of polymerization of polystyrene having mol. wt 3200. (At. wt of C = 12 Cl = 35.5, H = 1) **2**



B) Attempt **any two** : **8**

i) Define glass. Explain manufacturing of glass.

ii) Explain properties and application Buna-S and epoxy resin.

iii) Define Coal. Explain different types of coal.

SLR-TJ – 12

Seat No.	

Set Q

F.E. (Part – II) (Old) Examination, 2017
ENGINEERING CHEMISTRY (CGPA)

Day and Date : Monday, 27-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct option. **14**

1) Most commonly used vulcanizing agent is
   a) S_8 b) Cl_2
   c) ZnO d) All of these

2) Plastic which does not soften on heating is called as
   a) Thermo softening plastic b) Thermosetting plastic
   c) Thermo unit plastic d) Thermoplastic

3) The lowest calorific value is of
   a) Peat b) Lignite
   c) Bituminous d) Anthracite

4) Anthracite
   a) Lowest rank coal b) Highest rank coal
   c) Both a) and b) d) Contains no moisture

5) Which of the following gas cannot be used as carrier gas for gas liquid chromatography ?
   a) O_2 b) N_2 c) Ar d) He

6) Major component of Portland cement is
   a) Tri calcium silicate b) CaO
   c) MgO d) $CaSO_4$

7) UV absorbing component in optical glass is
   a) Barium oxide b) Boron oxide
   c) Cerium oxide d) Sodium oxide

P.T.O.

8) EDTA method of determining hardness of water can be used to determine
   a) All types of hardness
   b) Temporary hardness only
   c) Permanent hardness only
   d) Alkaline hardness only

9) Coagulants help in the setting of
   a) Dissolved impurities only
   b) Fine suspended matter only
   c) Colloidal particles only
   d) Both b) and c)

10) Anodic coating protects the underlying metal
   a) Due to its noble character
   b) Sacrificially
   c) Due to its high electrode potential
   d) Due to both b) and c)

11) Suitable lubricant for delicate instruments is
   a) greases b) graphite
   c) hazel nut oil d) all of these

12) Which of the following is condensed phase rule equation ?
   a) $F = C - P + 1$ b) $F = C - P + 2$
   c) $F = C + P - 2$ d) $C = F - P + 2$

13) Metal at the top of electromotive series is
   a) most stable b) least active
   c) most noble d) most active

14) When graphite is dispersed in water, it is called
   a) aquadag b) oildag
   c) blended oil d) all of these

———————

SLR-TJ – 12

Seat No.	

F.E. (Part – II) (Old) Examination, 2017
ENGINEERING CHEMISTRY (CGPA)

Day and Date : Monday, 27-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. A) Attempt **any two** : **8**
   a) Define hardness. Explain reverse osmosis process.
   b) Describe water system with phase diagram.
   c) On analysis water was found to contain following impurities expressed in ppm.

Impurities	**Amount**	**Mol. Wt.**
$Ca(HCO_3)_2$	70.00	162
$Mg(HCO_3)_2$	55.00	146
$CaSO_4$	33.00	136
$CaCl_2$	20.00	111

   Calculate temporary, permanent and total hardness of water.

   B) Attempt **any two** : **6**
   a) Explain mechanism of extreme pressure lubrication.
   b) Define corrosion. Explain hydrogen evolution mechanism of corrosion.
   c) Write a short note on metal cladding.

3. A) i) Write a note on solid lubricatns. **3**
   ii) Define BOD. How will you determine the BOD of water ? **3**

OR

   A) i) What are the merits and demerits of phase rule ? **3**
   ii) Define lubricant. Explain functions of lubricants. **3**

   B) Attempt **any two** : **8**
   i) Explain Galvanization process of prevention of corrosion.
   ii) How will you select lubricant for
   a) Gears
   b) Transformers ?
   iii) Explain scale and sludge formation in boilers.

Set Q

SECTION – II

4. A) Attempt **any two** : **8**

i) Define propellant. Explain different types of propellant.

ii) Define conductive polymer. Write applications of conductive polymers.

iii) During the determination of calorific value of solid fuel by Bomb calorimeter the following result were obtained.

a) Water equivalent of the calorimeter	= 570 gm
b) Water taken in the calorimeter	= 1500 gm
c) Observed rise in temp	= 3.70° C
d) Acid correction	= 0.5 kcal.
e) Fuse Wire correction	= 4.20 cal.
f) Cooling correction	= 0.05° C
g) Latent Heat of Steam	= 587 cal/gm
h) % of hydrogen	= 6.5%
i) Weight of solid fuel	= 1.650 gm

Calculate the high calorific value and low calorific value of the solid fuel.

B) Solve **any two** : **6**

i) Explain compound constituents of cement.

ii) Write properties and application steel.

iii) Write difference between thermosetting and thermo softening plastics.

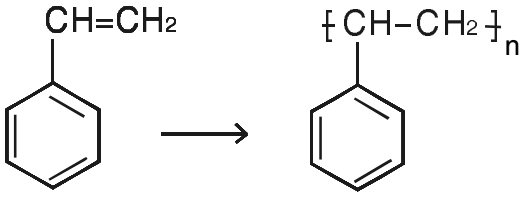
5. A) i) Write the chemical reaction involved in Vulcanization of natural rubber. **2**

ii) How much $CaCl_2$ is required to prepare 250 ml of 0.05 N and 0.5 N aqueous solution ? (Mol Wt of $CaCl_2$ = 111). **4**

OR

i) Define chromatography. Explain instrumentation of GLC. **4**

ii) Calculate degree of polymerization of polystyrene having mol. wt 3200. (At. wt of C = 12 Cl = 35.5, H = 1) **2**



B) Attempt **any two** : **8**

i) Define glass. Explain manufacturing of glass.

ii) Explain properties and application Buna-S and epoxy resin.

iii) Define Coal. Explain different types of coal.

SLR-TJ – 12

Seat No.	

Set **R**

F.E. (Part – II) (Old) Examination, 2017
ENGINEERING CHEMISTRY (CGPA)

Day and Date : Monday, 27-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct option. **14**

1) Which of the following is condensed phase rule equation ?
   a) $F = C - P + 1$ b) $F = C - P + 2$
   c) $F = C + P - 2$ d) $C = F - P + 2$

2) Metal at the top of electromotive series is
   a) most stable b) least active
   c) most noble d) most active

3) When graphite is dispersed in water, it is called
   a) aquadag b) oildag
   c) blended oil d) all of these

4) Most commonly used vulcanizing agent is
   a) S_8 b) Cl_2
   c) ZnO d) All of these

5) Plastic which does not soften on heating is called as
   a) Thermo softening plastic b) Thermosetting plastic
   c) Thermo unit plastic d) Thermoplastic

6) The lowest calorific value is of
   a) Peat b) Lignite
   c) Bituminous d) Anthracite

7) Anthracite
   a) Lowest rank coal b) Highest rank coal
   c) Both a) and b) d) Contains no moisture

P.T.O.

8) Which of the following gas cannot be used as carrier gas for gas liquid chromatography ?
   a) O_2 b) N_2 c) Ar d) He
9) Major component of Portland cement is
   a) Tri calcium silicate b) CaO
   c) MgO d) $CaSO_4$
10) UV absorbing component in optical glass is
   a) Barium oxide b) Boron oxide
   c) Cerium oxide d) Sodium oxide
11) EDTA method of determining hardness of water can be used to determine
   a) All types of hardness
   b) Temporary hardness only
   c) Permanent hardness only
   d) Alkaline hardness only
12) Coagulants help in the setting of
   a) Dissolved impurities only
   b) Fine suspended matter only
   c) Colloidal particles only
   d) Both b) and c)
13) Anodic coating protects the underlying metal
   a) Due to its noble character
   b) Sacrificially
   c) Due to its high electrode potential
   d) Due to both b) and c)
14) Suitable lubricant for delicate instruments is
   a) greases b) graphite
   c) hazel nut oil d) all of these

———————

SLR-TJ – 12

Seat No.	

F.E. (Part – II) (Old) Examination, 2017
ENGINEERING CHEMISTRY (CGPA)

Day and Date : Monday, 27-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. A) Attempt **any two** : **8**
   a) Define hardness. Explain reverse osmosis process.
   b) Describe water system with phase diagram.
   c) On analysis water was found to contain following impurities expressed in ppm.

Impurities	**Amount**	**Mol. Wt.**
$Ca(HCO_3)_2$	70.00	162
$Mg(HCO_3)_2$	55.00	146
$CaSO_4$	33.00	136
$CaCl_2$	20.00	111

   Calculate temporary, permanent and total hardness of water.

   B) Attempt **any two** : **6**
   a) Explain mechanism of extreme pressure lubrication.
   b) Define corrosion. Explain hydrogen evolution mechanism of corrosion.
   c) Write a short note on metal cladding.

3. A) i) Write a note on solid lubricatns. **3**
   ii) Define BOD. How will you determine the BOD of water ? **3**

OR

A) i) What are the merits and demerits of phase rule ? **3**
   ii) Define lubricant. Explain functions of lubricants. **3**

   B) Attempt **any two** : **8**
   i) Explain Galvanization process of prevention of corrosion.
   ii) How will you select lubricant for
      a) Gears
      b) Transformers ?
   iii) Explain scale and sludge formation in boilers.

Set R

SECTION – II

4. A) Attempt **any two** : **8**

i) Define propellant. Explain different types of propellant.

ii) Define conductive polymer. Write applications of conductive polymers.

iii) During the determination of calorific value of solid fuel by Bomb calorimeter the following result were obtained.

a) Water equivalent of the calorimeter	= 570 gm
b) Water taken in the calorimeter	= 1500 gm
c) Observed rise in temp	= 3.70° C
d) Acid correction	= 0.5 kcal.
e) Fuse Wire correction	= 4.20 cal.
f) Cooling correction	= 0.05° C
g) Latent Heat of Steam	= 587 cal/gm
h) % of hydrogen	= 6.5%
i) Weight of solid fuel	= 1.650 gm

Calculate the high calorific value and low calorific value of the solid fuel.

B) Solve **any two** : **6**

i) Explain compound constituents of cement.

ii) Write properties and application steel.

iii) Write difference between thermosetting and thermo softening plastics.

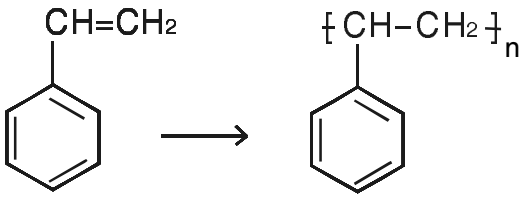
5. A) i) Write the chemical reaction involved in Vulcanization of natural rubber. **2**

ii) How much $CaCl_2$ is required to prepare 250 ml of 0.05 N and 0.5 N aqueous solution ? (Mol Wt of $CaCl_2$ = 111). **4**

OR

i) Define chromatography. Explain instrumentation of GLC. **4**

ii) Calculate degree of polymerization of polystyrene having mol. wt 3200. (At. wt of C = 12 Cl = 35.5, H = 1) **2**



B) Attempt **any two** : **8**

i) Define glass. Explain manufacturing of glass.

ii) Explain properties and application Buna-S and epoxy resin.

iii) Define Coal. Explain different types of coal.

SLR-TJ – 12

Seat No.	

Set **S**

F.E. (Part – II) (Old) Examination, 2017
ENGINEERING CHEMISTRY (CGPA)

Day and Date : Monday, 27-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct option. **14**

1) The lowest calorific value is of
   a) Peat b) Lignite
   c) Bituminous d) Anthracite

2) Anthracite
   a) Lowest rank coal b) Highest rank coal
   c) Both a) and b) d) Contains no moisture

3) Which of the following gas cannot be used as carrier gas for gas liquid chromatography ?
   a) O_2 b) N_2 c) Ar d) He

4) Major component of Portland cement is
   a) Tri calcium silicate b) CaO
   c) MgO d) $CaSO_4$

5) UV absorbing component in optical glass is
   a) Barium oxide b) Boron oxide
   c) Cerium oxide d) Sodium oxide

6) EDTA method of determining hardness of water can be used to determine
   a) All types of hardness
   b) Temporary hardness only
   c) Permanent hardness only
   d) Alkaline hardness only

P.T.O.

7) Coagulants help in the setting of
   a) Dissolved impurities only
   b) Fine suspended matter only
   c) Colloidal particles only
   d) Both b) and c)

8) Anodic coating protects the underlying metal
   a) Due to its noble character
   b) Sacrificially
   c) Due to its high electrode potential
   d) Due to both b) and c)

9) Suitable lubricant for delicate instruments is
   a) greases b) graphite
   c) hazel nut oil d) all of these

10) Which of the following is condensed phase rule equation ?
   a) $F = C - P + 1$ b) $F = C - P + 2$
   c) $F = C + P - 2$ d) $C = F - P + 2$

11) Metal at the top of electromotive series is
   a) most stable b) least active
   c) most noble d) most active

12) When graphite is dispersed in water, it is called
   a) aquadag b) oildag
   c) blended oil d) all of these

13) Most commonly used vulcanizing agent is
   a) S_8 b) Cl_2
   c) ZnO d) All of these

14) Plastic which does not soften on heating is called as
   a) Thermo softening plastic b) Thermosetting plastic
   c) Thermo unit plastic d) Thermoplastic

———————

SLR-TJ – 12

Seat No.	

F.E. (Part – II) (Old) Examination, 2017
ENGINEERING CHEMISTRY (CGPA)

Day and Date : Monday, 27-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

2. A) Attempt **any two** : **8**
   a) Define hardness. Explain reverse osmosis process.
   b) Describe water system with phase diagram.
   c) On analysis water was found to contain following impurities expressed in ppm.

Impurities	**Amount**	**Mol. Wt.**
$Ca(HCO_3)_2$	70.00	162
$Mg(HCO_3)_2$	55.00	146
$CaSO_4$	33.00	136
$CaCl_2$	20.00	111

   Calculate temporary, permanent and total hardness of water.

   B) Attempt **any two** : **6**
   a) Explain mechanism of extreme pressure lubrication.
   b) Define corrosion. Explain hydrogen evolution mechanism of corrosion.
   c) Write a short note on metal cladding.

3. A) i) Write a note on solid lubricatns. **3**
   ii) Define BOD. How will you determine the BOD of water ? **3**

OR

   A) i) What are the merits and demerits of phase rule ? **3**
   ii) Define lubricant. Explain functions of lubricants. **3**

   B) Attempt **any two** : **8**
   i) Explain Galvanization process of prevention of corrosion.
   ii) How will you select lubricant for
   a) Gears
   b) Transformers ?
   iii) Explain scale and sludge formation in boilers.

Set S

SECTION – II

4. A) Attempt **any two** : **8**

i) Define propellant. Explain different types of propellant.

ii) Define conductive polymer. Write applications of conductive polymers.

iii) During the determination of calorific value of solid fuel by Bomb calorimeter the following result were obtained.

a) Water equivalent of the calorimeter	= 570 gm
b) Water taken in the calorimeter	= 1500 gm
c) Observed rise in temp	= 3.70° C
d) Acid correction	= 0.5 kcal.
e) Fuse Wire correction	= 4.20 cal.
f) Cooling correction	= 0.05° C
g) Latent Heat of Steam	= 587 cal/gm
h) % of hydrogen	= 6.5%
i) Weight of solid fuel	= 1.650 gm

Calculate the high calorific value and low calorific value of the solid fuel.

B) Solve **any two** : **6**

i) Explain compound constituents of cement.

ii) Write properties and application steel.

iii) Write difference between thermosetting and thermo softening plastics.

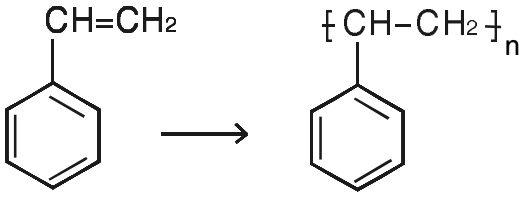
5. A) i) Write the chemical reaction involved in Vulcanization of natural rubber. **2**

ii) How much $CaCl_2$ is required to prepare 250 ml of 0.05 N and 0.5 N aqueous solution ? (Mol Wt of $CaCl_2$ = 111). **4**

OR

i) Define chromatography. Explain instrumentation of GLC. **4**

ii) Calculate degree of polymerization of polystyrene having mol. wt 3200. (At. wt of C = 12 Cl = 35.5, H = 1) **2**



B) Attempt **any two** : **8**

i) Define glass. Explain manufacturing of glass.

ii) Explain properties and application Buna-S and epoxy resin.

iii) Define Coal. Explain different types of coal.

SLR-TJ – 13

Seat No.	

Set **P**

F.E. (Part – II) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – II (New)

Day and Date : Tuesday, 21-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) To solve the differential equation $(x - y - 2)\,dx - (2x - 2y - 3)\,dy = 0$, we shall put _____
a) $y = vx$ b) $x - y = v$ c) $x + y = v$ d) $x = X + h, y = Y + k$

2) The orthogonal trajectories of a family of the curve $xy = a$ is
a) $x^2 + y^2 = c$ b) $y^2 = 4cx$ c) $x = cy$ d) $x^2 - y^2 = c$

3) If $\vec{r} = xi + yj + zk$, then $\text{div}\,\vec{r}$ = ————————
a) 0 b) 1 c) 3 d) 2

4) If $\phi(x, y, z) = c$ represents a family of surface, then the unit normal vector to this surface is
a) $\frac{\nabla\phi}{|\nabla\phi|}$ b) $\nabla\phi$ c) $|\nabla\phi|$ d) $\nabla \cdot (\nabla\phi)$

5) The magnitude of velocity vector of a particle moving along the curve $\vec{r} = 2\sin 3t\, i + 2\cos 3t\, j + 8t\, k$, at any time t is
a) 2 b) 4 c) 8 d) 10

6) In D'Alemberts ratio test, if $\lim_{n\to\infty} \frac{u_n}{u_{n+1}} = 1$, then
a) The series $\sum u_n$ is converges b) The series $\sum u_n$ is diverges
c) The test fails d) The series $\sum u_n$ is oscillatory

P.T.O.

7) The factorial seires $\sum_{n=1}^{\infty} \frac{1}{n!}$ is

a) Convergent b) Divergent
c) Oscillatry d) Conditionally convergent

8) For an integer m > 1, if $\beta(m,1) = 1$ then m is equal to

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

9) Asymptote parallel to Y-axis to the curve $xy^2 = a^2(a - x)$ is

a) y = a b) X-axis c) x = a d) x = 0

10) The value of $\int_0^1 \int_0^1 dxdy$ is

a) $1/3$ b) $2/3$ c) 1 d) 3

11) The value of $\lfloor -1 =$ _____

a) ∞ b) – 1 c) 0 d) 1

12) The density of any point varies as the distance of the point P(x, y) from the Y-axis then the density ρ equal to

a) kxy b) kx c) ky d) $k(x^2 + y^2)$

13) By changing the order of integration $\int_0^{\infty} \int_x^{\infty} f(x,y)\, dxdy$ we get

a) $\int_0^{\infty} \int_0^{y} f(x,y)dxdy$ b) $\int_0^{\infty} \int_0^{x} f(x,y)\, dx\, dy$

c) $\int_x^{\infty} \int_0^{\infty} f(x,y)\, dxdy$ d) $\int_0^{\infty} \int_0^{\infty} f(x,y)\, dx\, dy$

14) The length of the arc of the curve $r = f(\theta)$ from $\theta = \theta_1$ to $\theta = \theta_2$ is

a) $\int_{\theta_1}^{\theta_2} \left[r^2 + \left(\frac{dr}{d\theta} \right)^2 \right] d\theta$ b) $\int_{\theta_1}^{\theta_2} \left[r + \frac{dr}{d\theta} \right]^2 d\theta$

c) $\int_{\theta_1}^{\theta_2} \sqrt{r^2 + \left(\frac{dr}{d\theta} \right)^2}\, d\theta$ d) $\int_{\theta_1}^{\theta_2} \sqrt{r^2 + \left(\frac{d\theta}{dr} \right)^2}\, d\theta$

SLR-TJ – 13

Seat No.	

F.E. (Part – II) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – II (New)

Day and Date : Tuesday, 21-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of non-programmable calculator is* ***allowed****.*

SECTION – I

2. Solve **any three** from the following : **9**

a) Solve : $(x + y - 1)\,dx + (2x + 2y - 3)\,dy = 0$.

b) Find orthogonal trajectories of a family of curve $x^2 + 2y^2 - y = a$, where 'a' is parameter.

c) A particle is moves along the curve $\vec{r} = (t^3 - 4t)\,i + (t^2 + 4t)\,j + (8t^2 - 3t^3)k$, where t denotes time. Find the tangential components of acceleration at time $t = 2$.

d) If $\vec{A} = x^2zi - 2y^3z^2j + xy^2zk$, then find div $\vec{A}$ and curl $\vec{A}$ at point $(1, -1, 1)$.

e) Test the convergence of $\sum_{n=1}^{\infty}\left(\sqrt{n^3+1}-\sqrt{n^3}\right)$ by using comparison test.

3. Solve **any three** from the following : **9**

a) Solve : $(2xy + e^y)\,dx + (x^2 + xe^y)\,dy = 0$, given that $y = 1$ when $x = 1$.

b) Solve $(x^2 + 1)^2\frac{dy}{dx} + 4x\,(x^2 + 1)\,y = 2$.

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

d) Solve : $\frac{dy}{dx}$ + tan x. tany = cosx.secy.

e) Test the convergence of $\sum_{n=1}^{\infty} \frac{n^3+2}{2^n+2}$ by using D'Alemberts ratio test.

4. Solve **any two** from the following : **10**

a) A body of mass m falling from rest, is subjected to the force of gravity and an air resistance is equal to the k times the square of velocity. If it falls through a distance x and possesses a velocity 'v' at that instant, then prove that $x = \frac{m}{2k}\log\left(\frac{a^2}{a^2-v^2}\right)$ where $mg = ka^2$.

b) Define absolute and conditional convergence. Examine whether the series $5 - \frac{10}{3} + \frac{20}{9} - \frac{40}{27} + \ldots$ is absolutely convergent or conditionally convergent.

c) Find the directional derivative of scalar point function $\phi = x^2y + y^2z + xz^2$ at point (1, 2, 1) in the direction normal to the surface $x^2 + y^2 - xz^2 = 1$ at (1, 1, 1).

SECTION – II

5. Attempt **any three** from the following : **(3×3=9)**

a) Prove that $\int_0^{\infty} \frac{\log(1+ax^2)}{x^2}\,dx = \pi\sqrt{a}$, where a > 0.

b) Evaluate $\int_0^{\infty} \frac{x^b}{b^x}\,dx$.

c) Trace the curve r = a sin (3θ).

d) Evaluate $\int_0^{a\sqrt{3}} \int_0^{\sqrt{x^2+a^2}} \frac{x}{y^2+x^2+a^2}\, dy\, dx$.

e) Trace the curve $x = a(t + \sin t)$; $y = a(1 + \cos t)$.

6. Attempt **any three** from the following : **(3×3=9)**

a) Evaluate $\int_0^a x^3(a^3 - x^3)^{3/2}\, dx$.

b) Change to polar and evaluate :

$$\int_0^{\frac{a}{\sqrt{2}}} \int_y^{\sqrt{a^2-y^2}} \log(x^2 + y^2)\, dx\, dy.$$

c) Trace the curve $y^2(a^2 + x^2) = x^2(a^2 - x^2)$.

d) Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} y\, dz\, dx\, dy$.

e) Evaluate $\int\int xy\ (x + y)\, dx\, dy$ over the area bounded by $y = x^2$ and $y = x$.

7. Attempt **any two** from the following : **(2×5=10)**

a) Find the double integration the area bounded by the parabola $y^2 = 4x$ and the line $y = 2x - 4$.

b) Find the length of the curve $x = a(\theta - \sin\theta)$; $y = a(1 - \cos\theta)$ from $\theta = 0$ to $\theta = 2\pi$.

c) Prove that $\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}\, dx = \beta(m, n)$.

Set P

SLR-TJ – 13

Seat No.	

Set Q

F.E. (Part – II) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – II (New)

Day and Date : Tuesday, 21-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) For an integer m > 1, if $\beta(m,1) = 1$ then m is equal to
a) $\frac{1}{m}$ b) 1 c) $\frac{1}{m!}$ d) $\frac{1}{m+1}$

2) Asymptote parallel to Y-axis to the curve $xy^2 = a^2(a - x)$ is
a) y = a b) X-axis c) x = a d) x = 0

3) The value of $\int_0^1 \int_0^1 dxdy$ is
a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) 1 d) 3

4) The value of $\lfloor -1 =$ _____
a) ∞ b) – 1 c) 0 d) 1

5) The density of any point varies as the distance of the point P(x, y) from the Y-axis then the density ρ equal to
a) kxy b) kx c) ky d) $k(x^2 + y^2)$

6) By changing the order of integration $\int_0^\infty \int_x^\infty f(x,y)\, dxdy$ we get
a) $\int_0^\infty \int_0^y f(x,y)dxdy$ b) $\int_0^\infty \int_0^x f(x,y)\, dx\, dy$
c) $\int_x^\infty \int_0^\infty f(x,y)\, dxdy$ d) $\int_0^\infty \int_0^\infty f(x,y)\, dx\, dy$

P.T.O.

7) The length of the arc of the curve r = f(θ) from $\theta = \theta_1$ to $\theta = \theta_2$ is

a) $\int_{\theta_1}^{\theta_2} \left[r^2 + \left(\frac{dr}{d\theta} \right)^2 \right] d\theta$ b) $\int_{\theta_1}^{\theta_2} \left[r + \frac{dr}{d\theta} \right]^2 d\theta$

c) $\int_{\theta_1}^{\theta_2} \sqrt{r^2 + \left(\frac{dr}{d\theta} \right)^2}\, d\theta$ d) $\int_{\theta_1}^{\theta_2} \sqrt{r^2 + \left(\frac{d\theta}{dr} \right)^2}\, d\theta$

8) To solve the differential equation $(x - y - 2)\,dx - (2x - 2y - 3)\,dy = 0$, we shall put _____

a) $y = vx$ b) $x - y = v$ c) $x + y = v$ d) $x = X + h, y = Y + k$

9) The orthogonal trajectories of a family of the curve $xy = a$ is

a) $x^2 + y^2 = c$ b) $y^2 = 4cx$ c) $x = cy$ d) $x^2 - y^2 = c$

10) If $\vec{r} = xi + yj + zk$, then div $\vec{r}$ = ————————

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

11) If $\phi(x, y, z) = c$ represents a family of surface, then the unit normal vector to this surface is

a) $\frac{\nabla\phi}{|\nabla\phi|}$ b) $\nabla\phi$ c) $|\nabla\phi|$ d) $\nabla \cdot (\nabla\phi)$

12) The magnitude of velocity vector of a particle moving along the curve $\vec{r} = 2\sin 3t\, i + 2\cos 3t\, j + 8t\, k$, at any time t is

a) 2 b) 4 c) 8 d) 10

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

a) The series $\sum u_n$ is converges b) The series $\sum u_n$ is diverges

c) The test fails d) The series $\sum u_n$ is oscillatory

14) The factorial seires $\sum_{n=1}^{\infty} \frac{1}{n!}$ is

a) Convergent b) Divergent

c) Oscillatry d) Conditionally convergent

————————

SLR-TJ – 13

Seat No.	

F.E. (Part – II) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – II (New)

Day and Date : Tuesday, 21-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of non-programmable calculator is* ***allowed****.*

SECTION – I

2. Solve **any three** from the following : **9**

a) Solve : $(x + y - 1)\,dx + (2x + 2y - 3)\,dy = 0$.

b) Find orthogonal trajectories of a family of curve $x^2 + 2y^2 - y = a$, where 'a' is parameter.

c) A particle is moves along the curve $\vec{r} = (t^3 - 4t)\,i + (t^2 + 4t)\,j + (8t^2 - 3t^3)k$, where t denotes time. Find the tangential components of acceleration at time $t = 2$.

d) If $\vec{A} = x^2zi - 2y^3z^2j + xy^2zk$, then find div $\vec{A}$ and curl $\vec{A}$ at point $(1, -1, 1)$.

e) Test the convergence of $\sum_{n=1}^{\infty}\left(\sqrt{n^3+1}-\sqrt{n^3}\right)$ by using comparison test.

3. Solve **any three** from the following : **9**

a) Solve : $(2xy + e^y)\,dx + (x^2 + xe^y)\,dy = 0$, given that $y = 1$ when $x = 1$.

b) Solve $(x^2 + 1)^2\frac{dy}{dx} + 4x\,(x^2 + 1)\,y = 2$.

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

d) Solve : $\frac{dy}{dx}$ + tan x. tany = cosx.secy.

e) Test the convergence of $\sum_{n=1}^{\infty} \frac{n^3+2}{2^n+2}$ by using D'Alemberts ratio test.

4. Solve **any two** from the following : **10**

a) A body of mass m falling from rest, is subjected to the force of gravity and an air resistance is equal to the k times the square of velocity. If it falls through a distance x and possesses a velocity 'v' at that instant, then prove that $x = \frac{m}{2k}\log\left(\frac{a^2}{a^2-v^2}\right)$ where $mg = ka^2$.

b) Define absolute and conditional convergence. Examine whether the series $5 - \frac{10}{3} + \frac{20}{9} - \frac{40}{27} + \ldots$ is absolutely convergent or conditionally convergent.

c) Find the directional derivative of scalar point function $\phi = x^2y + y^2z + xz^2$ at point (1, 2, 1) in the direction normal to the surface $x^2 + y^2 - xz^2 = 1$ at (1, 1, 1).

SECTION – II

5. Attempt **any three** from the following : **(3×3=9)**

a) Prove that $\int_0^{\infty} \frac{\log(1+ax^2)}{x^2}\,dx = \pi\sqrt{a}$, where a > 0.

b) Evaluate $\int_0^{\infty} \frac{x^b}{b^x}\,dx$.

c) Trace the curve r = a sin (3θ).

d) Evaluate $\int_0^{a\sqrt{3}} \int_0^{\sqrt{x^2+a^2}} \frac{x}{y^2+x^2+a^2}\, dy\, dx$.

e) Trace the curve $x = a(t + \sin t)$; $y = a(1 + \cos t)$.

6. Attempt **any three** from the following : **(3×3=9)**

a) Evaluate $\int_0^a x^3(a^3 - x^3)^{3/2}\, dx$.

b) Change to polar and evaluate :

$$\int_0^{\frac{a}{\sqrt{2}}} \int_y^{\sqrt{a^2-y^2}} \log(x^2 + y^2)\, dx\, dy.$$

c) Trace the curve $y^2(a^2 + x^2) = x^2(a^2 - x^2)$.

d) Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} y\, dz\, dx\, dy$.

e) Evaluate $\int\int xy\ (x + y)\, dx\, dy$ over the area bounded by $y = x^2$ and $y = x$.

7. Attempt **any two** from the following : **(2×5=10)**

a) Find the double integration the area bounded by the parabola $y^2 = 4x$ and the line $y = 2x - 4$.

b) Find the length of the curve $x = a(\theta - \sin\theta)$; $y = a(1 - \cos\theta)$ from $\theta = 0$ to $\theta = 2\pi$.

c) Prove that $\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}\, dx = \beta(m, n)$.

Set Q

SLR-TJ – 13

Seat No.	

Set R

F.E. (Part – II) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – II (New)

Day and Date : Tuesday, 21-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) The magnitude of velocity vector of a particle moving along the curve $\vec{r} = 2\sin 3t\, i + 2\cos 3t\, j + 8t\, k$, at any time t is

a) 2 b) 4 c) 8 d) 10

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

a) The series $\sum u_n$ is converges b) The series $\sum u_n$ is diverges
c) The test fails d) The series $\sum u_n$ is oscillatory

3) The factorial seires $\sum_{n=1}^{\infty} \frac{1}{n!}$ is

a) Convergent b) Divergent
c) Oscillatry d) Conditionally convergent

4) For an integer m > 1, if $\beta(m,1) = 1$ then m is equal to

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

5) Asymptote parallel to Y-axis to the curve $xy^2 = a^2(a - x)$ is

a) y = a b) X-axis c) x = a d) x = 0

P.T.O.

6) The value of $\int_0^1 \int_0^1 dxdy$ is

a) $1/3$ b) $2/3$ c) 1 d) 3

7) The value of $\lfloor -1 =$ _____

a) ∞ b) -1 c) 0 d) 1

8) The density of any point varies as the distance of the point P(x, y) from the Y-axis then the density ρ equal to

a) kxy b) kx c) ky d) $k(x^2 + y^2)$

9) By changing the order of integration $\int_0^\infty \int_x^\infty f(x,y)\ dxdy$ we get

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

c) $\int_x^\infty \int_0^\infty f(x,y)\,dxdy$ d) $\int_0^\infty \int_0^\infty f(x,y)\,dx\,dy$

10) The length of the arc of the curve $r = f(\theta)$ from $\theta = \theta_1$ to $\theta = \theta_2$ is

a) $\int_{\theta_1}^{\theta_2} \left[r^2 + \left(\frac{dr}{d\theta}\right)^2\right] d\theta$ b) $\int_{\theta_1}^{\theta_2} \left[r + \frac{dr}{d\theta}\right]^2 d\theta$

c) $\int_{\theta_1}^{\theta_2} \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2}\, d\theta$ d) $\int_{\theta_1}^{\theta_2} \sqrt{r^2 + \left(\frac{d\theta}{dr}\right)^2}\, d\theta$

11) To solve the differential equation $(x - y - 2)\,dx - (2x - 2y - 3)\,dy = 0$, we shall put _____

a) $y = vx$ b) $x - y = v$ c) $x + y = v$ d) $x = X + h, y = Y + k$

12) The orthogonal trajectories of a family of the curve $xy = a$ is

a) $x^2 + y^2 = c$ b) $y^2 = 4cx$ c) $x = cy$ d) $x^2 - y^2 = c$

13) If $\vec{r} = xi + yj + zk$, then $\text{div}\,\vec{r} =$ _____

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

14) If $\phi(x, y, z) = c$ represents a family of surface, then the unit normal vector to this surface is

a) $\frac{\nabla\phi}{|\nabla\phi|}$ b) $\nabla\phi$ c) $|\nabla\phi|$ d) $\nabla \cdot (\nabla\phi)$

_____

SLR-TJ – 13

Seat No.	

F.E. (Part – II) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – II (New)

Day and Date : Tuesday, 21-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of non-programmable calculator is* ***allowed****.*

SECTION – I

2. Solve **any three** from the following : **9**

a) Solve : $(x + y - 1)\,dx + (2x + 2y - 3)\,dy = 0$.

b) Find orthogonal trajectories of a family of curve $x^2 + 2y^2 - y = a$, where 'a' is parameter.

c) A particle is moves along the curve $\vec{r} = (t^3 - 4t)\,i + (t^2 + 4t)\,j + (8t^2 - 3t^3)k$, where t denotes time. Find the tangential components of acceleration at time $t = 2$.

d) If $\vec{A} = x^2zi - 2y^3z^2j + xy^2zk$, then find div $\vec{A}$ and curl $\vec{A}$ at point $(1, -1, 1)$.

e) Test the convergence of $\sum_{n=1}^{\infty}\left(\sqrt{n^3+1}-\sqrt{n^3}\right)$ by using comparison test.

3. Solve **any three** from the following : **9**

a) Solve : $(2xy + e^y)\,dx + (x^2 + xe^y)\,dy = 0$, given that $y = 1$ when $x = 1$.

b) Solve $(x^2 + 1)^2\frac{dy}{dx} + 4x\,(x^2 + 1)\,y = 2$.

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

d) Solve : $\frac{dy}{dx}$ + tan x. tany = cosx.secy.

e) Test the convergence of $\sum_{n=1}^{\infty} \frac{n^3+2}{2^n+2}$ by using D'Alemberts ratio test.

4. Solve **any two** from the following : **10**

a) A body of mass m falling from rest, is subjected to the force of gravity and an air resistance is equal to the k times the square of velocity. If it falls through a distance x and possesses a velocity 'v' at that instant, then prove that $x = \frac{m}{2k}\log\left(\frac{a^2}{a^2-v^2}\right)$ where $mg = ka^2$.

b) Define absolute and conditional convergence. Examine whether the series $5 - \frac{10}{3} + \frac{20}{9} - \frac{40}{27} + \ldots$ is absolutely convergent or conditionally convergent.

c) Find the directional derivative of scalar point function $\phi = x^2y + y^2z + xz^2$ at point (1, 2, 1) in the direction normal to the surface $x^2 + y^2 - xz^2 = 1$ at (1, 1, 1).

SECTION – II

5. Attempt **any three** from the following : **(3×3=9)**

a) Prove that $\int_0^{\infty} \frac{\log(1+ax^2)}{x^2}\,dx = \pi\sqrt{a}$, where a > 0.

b) Evaluate $\int_0^{\infty} \frac{x^b}{b^x}\,dx$.

c) Trace the curve r = a sin (3θ).

d) Evaluate $\int_0^{a\sqrt{3}} \int_0^{\sqrt{x^2+a^2}} \frac{x}{y^2+x^2+a^2}\, dy\, dx$.

e) Trace the curve $x = a(t + \sin t)$; $y = a(1 + \cos t)$.

6. Attempt **any three** from the following : **(3×3=9)**

a) Evaluate $\int_0^a x^3(a^3 - x^3)^{3/2}\, dx$.

b) Change to polar and evaluate :

$$\int_0^{\frac{a}{\sqrt{2}}} \int_y^{\sqrt{a^2-y^2}} \log(x^2 + y^2)\, dx\, dy.$$

c) Trace the curve $y^2(a^2 + x^2) = x^2(a^2 - x^2)$.

d) Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} y\, dz\, dx\, dy$.

e) Evaluate $\int\int xy\ (x + y)\, dx\, dy$ over the area bounded by $y = x^2$ and $y = x$.

7. Attempt **any two** from the following : **(2×5=10)**

a) Find the double integration the area bounded by the parabola $y^2 = 4x$ and the line $y = 2x - 4$.

b) Find the length of the curve $x = a(\theta - \sin\theta)$; $y = a(1 - \cos\theta)$ from $\theta = 0$ to $\theta = 2\pi$.

c) Prove that $\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}\, dx = \beta(m, n)$.

Set R

SLR-TJ – 13

Seat No.	

Set S

F.E. (Part – II) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – II (New)

Day and Date : Tuesday, 21-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) The value of $\int_0^1 \int_0^1 dxdy$ is

a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) 1 d) 3

2) The value of $\lfloor -1 =$ _____

a) ∞ b) -1 c) 0 d) 1

3) The density of any point varies as the distance of the point P(x, y) from the Y-axis then the density ρ equal to

a) kxy b) kx c) ky d) $k(x^2 + y^2)$

4) By changing the order of integration $\int_0^\infty \int_x^\infty f(x,y)\, dxdy$ we get

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

c) $\int_x^\infty \int_0^\infty f(x,y)\, dxdy$ d) $\int_0^\infty \int_0^\infty f(x,y)\, dx\, dy$

5) The length of the arc of the curve r = f(θ) from $\theta = \theta_1$ to $\theta = \theta_2$ is

a) $\int_{\theta_1}^{\theta_2} \left[r^2 + \left(\frac{dr}{d\theta} \right)^2 \right] d\theta$ b) $\int_{\theta_1}^{\theta_2} \left[r + \frac{dr}{d\theta} \right]^2 d\theta$

c) $\int_{\theta_1}^{\theta_2} \sqrt{r^2 + \left(\frac{dr}{d\theta} \right)^2}\, d\theta$ d) $\int_{\theta_1}^{\theta_2} \sqrt{r^2 + \left(\frac{d\theta}{dr} \right)^2}\, d\theta$

6) To solve the differential equation (x – y – 2) dx – (2x – 2y – 3) dy = 0, we shall put _____

a) y = vx b) x – y = v c) x + y = v d) x = X + h, y = Y + k

7) The orthogonal trajectories of a family of the curve xy = a is

a) $x^2 + y^2 = c$ b) $y^2 = 4cx$ c) x = cy d) $x^2 - y^2 = c$

8) If $\vec{r}$ = xi + yj+ zk, then div $\vec{r}$ = ————————

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

9) If ϕ (x, y, z) = c represents a family of surface, then the unit normal vector to this surface is

a) $\frac{\nabla\phi}{|\nabla\phi|}$ b) $\nabla\phi$ c) $|\nabla\phi|$ d) $\nabla \cdot (\nabla\phi)$

10) The magnitude of velocity vector of a particle moving along the curve $\vec{r}$ = 2sin3t i + 2cos 3t j + 8t k, at any time t is

a) 2 b) 4 c) 8 d) 10

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

a) The series $\sum u_n$ is converges b) The series $\sum u_n$ is diverges

c) The test fails d) The series $\sum u_n$ is oscillatory

12) The factorial seires $\sum_{n=1}^{\infty} \frac{1}{n!}$ is

a) Convergent b) Divergent

c) Oscillatry d) Conditionally convergent

13) For an integer m > 1, if β (m,1) = 1 then m is equal to

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

14) Asymptote parallel to Y-axis to the curve $xy^2 = a^2(a - x)$ is

a) y = a b) X-axis c) x = a d) x = 0

SLR-TJ – 13

Seat No.	

F.E. (Part – II) (CBCS) Examination, 2017
ENGINEERING MATHEMATICS – II (New)

Day and Date : Tuesday, 21-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of non-programmable calculator is* ***allowed****.*

SECTION – I

2. Solve **any three** from the following : **9**

a) Solve : $(x + y - 1)\,dx + (2x + 2y - 3)\,dy = 0$.

b) Find orthogonal trajectories of a family of curve $x^2 + 2y^2 - y = a$, where 'a' is parameter.

c) A particle is moves along the curve $\vec{r} = (t^3 - 4t)\,i + (t^2 + 4t)\,j + (8t^2 - 3t^3)k$, where t denotes time. Find the tangential components of acceleration at time $t = 2$.

d) If $\vec{A} = x^2zi - 2y^3z^2j + xy^2zk$, then find div $\vec{A}$ and curl $\vec{A}$ at point $(1, -1, 1)$.

e) Test the convergence of $\sum_{n=1}^{\infty}\left(\sqrt{n^3+1}-\sqrt{n^3}\right)$ by using comparison test.

3. Solve **any three** from the following : **9**

a) Solve : $(2xy + e^y)\,dx + (x^2 + xe^y)\,dy = 0$, given that $y = 1$ when $x = 1$.

b) Solve $(x^2 + 1)^2\frac{dy}{dx} + 4x\,(x^2 + 1)\,y = 2$.

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

d) Solve : $\frac{dy}{dx}$ + tan x. tany = cosx.secy.

e) Test the convergence of $\sum_{n=1}^{\infty} \frac{n^3+2}{2^n+2}$ by using D'Alemberts ratio test.

4. Solve **any two** from the following : **10**

a) A body of mass m falling from rest, is subjected to the force of gravity and an air resistance is equal to the k times the square of velocity. If it falls through a distance x and possesses a velocity 'v' at that instant, then prove that $x = \frac{m}{2k}\log\left(\frac{a^2}{a^2-v^2}\right)$ where $mg = ka^2$.

b) Define absolute and conditional convergence. Examine whether the series $5 - \frac{10}{3} + \frac{20}{9} - \frac{40}{27} + \ldots$ is absolutely convergent or conditionally convergent.

c) Find the directional derivative of scalar point function $\phi = x^2y + y^2z + xz^2$ at point (1, 2, 1) in the direction normal to the surface $x^2 + y^2 - xz^2 = 1$ at (1, 1, 1).

SECTION – II

5. Attempt **any three** from the following : **(3×3=9)**

a) Prove that $\int_0^{\infty} \frac{\log(1+ax^2)}{x^2}\,dx = \pi\sqrt{a}$, where a > 0.

b) Evaluate $\int_0^{\infty} \frac{x^b}{b^x}\,dx$.

c) Trace the curve r = a sin (3θ).

d) Evaluate $\int_0^{a\sqrt{3}} \int_0^{\sqrt{x^2+a^2}} \frac{x}{y^2+x^2+a^2}\, dy\, dx$.

e) Trace the curve $x = a(t + \sin t)$; $y = a(1 + \cos t)$.

6. Attempt **any three** from the following : **(3×3=9)**

a) Evaluate $\int_0^a x^3(a^3 - x^3)^{3/2}\, dx$.

b) Change to polar and evaluate :

$$\int_0^{\frac{a}{\sqrt{2}}} \int_y^{\sqrt{a^2-y^2}} \log(x^2 + y^2)\, dx\, dy.$$

c) Trace the curve $y^2(a^2 + x^2) = x^2(a^2 - x^2)$.

d) Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} y\, dz\, dx\, dy$.

e) Evaluate $\int\int xy\ (x + y)\, dx\, dy$ over the area bounded by $y = x^2$ and $y = x$.

7. Attempt **any two** from the following : **(2×5=10)**

a) Find the double integration the area bounded by the parabola $y^2 = 4x$ and the line $y = 2x - 4$.

b) Find the length of the curve $x = a(\theta - \sin\theta)$; $y = a(1 - \cos\theta)$ from $\theta = 0$ to $\theta = 2\pi$.

c) Prove that $\int_0^\infty \frac{x^{m-1}}{(1+x)^{m+n}}\, dx = \beta(m, n)$.

Set S

SLR-TJ – 14

Seat No.	

Set P

F.E. (Part – II) (CBCS Pattern) Examination, 2017
BASIC CIVIL ENGINEERING (New)

Day and Date : Wednesday, 22-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Civil engineer has to play a role in
   a) Construction of house b) Surveying
   c) Design of a framed structure d) Electrification of a building

2) Equivalent representative fraction of nominal scale 1 cm = 100 m will be
   a) 1/10 b) 1/100 c) 1/1000 d) 1/10000

3) The angle between two mirrors of the optical square is
   a) 25° b) 45° c) 63° d) 65°

4) If Reduced Bearing of a line is S 30° 30′ W, its Whole circle bearing is
   a) 30° 30′ b) 149° 30′ c) 180° 30′ d) 210° 30′

5) Fly leveling is used for
   a) Establishment of new B.M. b) Checking purpose
   c) Survey in hilly area d) Road survey

6) The soil over which the road structure rests is the foundation soil and is known as
   a) Formation level b) Sub grade
   c) Sub base d) Base

P.T.O.

7) Ujjani Dam is an example of
   a) River Irrigation b) Storage Irrigation
   c) Lift Irrigation d) Percolation Tanks

8) A foundation made up of thick R.C.C. slab covering entire bottom of the structure is called as
   a) Slab foundation b) Flat foundation
   c) Raft foundation d) Combined foundation

9) The effect achieved by making the best of small portions of room by deriving maximum benefit from minimum dimensions is treated as
   a) Grouping b) Circulation c) Roominess d) Flexibility

10) Bricks should not break, when struck against another brick or when dropped from a height of
   a) 0.5 m b) 1.0 m c) 1.5 m d) 0.75 m

11) The load is transferred to the foundation in framed structure in the following sequence
   a) Beam-column-foundation-slab b) Slab-column-beam-foundation
   c) Slab-beam-column-foundation d) Column-slab-beam-foundation

12) Eco friendly construction encourages
   a) Use of cheap material b) Use of locally available material
   c) Use of costly material d) None of these

13) GIS stands for
   a) Geographic Information System b) Geologic Information System
   c) Global Information System d) None of these

14) A masonry wall needs ———————— for safety against earthquake forces.
   a) Use of through stones
   b) Continuous band at plinth, lintel and sill
   c) Both a)and b)
   d) None of these

———————

SLR-TJ – 14

Seat No.	

F.E. (Part – II) (CBCS Pattern) Examination, 2017
BASIC CIVIL ENGINEERING (New)

Day and Date : Wednesday, 22-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

2. Solve **any four** out of following seven questions. **(4×3=12)**

a) Give applications of Civil Engineering to other branches of Engineering.

b) How Civil Engineer plays his role in construction of a house ? Write in short.

c) What is an offset? Enlist equipments used for taking offsets.

d) Define Plane and Geodetic Surveying.

e) What are the advantages of contour map ?

f) What are the types of Canals? Draw a neat sketch.

g) Draw a neat sketch of cross section of a State Highway showing different components.

3. Solve **any two** out of following three questions. **(8×2=16)**

a) The distance between two stations A and B was measured with 30 m chain. The total length of line AB as observed and recorded was 3820 m. The length of the chain was checked at start, at every km of chaining and at the end. The results are noted below.

Chainage in Km	0 (Stn. A)	1	2	3	3.820 (Stn.B)
Chain length in m	30.00	30.10	30.16	29.90	29.85

Find the true distance AB.

b) Observed quadrantal bearings in a compass traverse QRSTPQ are given below :

Line	QR	RS	ST	TP	PQ
F.B.	N(43° 30′) E	N(31° 45′) W	S(61° 00′) W	S(5° 30′) E	S(62° 00′) E
B.B.	S(45° 30′) W	S(31° 45′) E	N(61° 00′) E	N(7° 30′) W	N(64° 00′) W

i) Find out included angles. Apply checks.
ii) Find out corrected bearings in the same system of bearings.
iii) Tabulate the results. Draw the traverse.

c) The following consecutive readings were taken on a 3 m leveling staff with dumpy level at a common interval of 20 m.

0.385, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625,2.005, 3.110, 4.485

The very first reading was taken on a point having RL 208.125. Calculate the gradient of line joining first point and last point. Use Rise and Fall method.

SECTION – II

4. Solve **any four** out of following six questions. **(4×4=16)**

a) What do you understand by the term foundation? What are the objectives of providing foundation ?

b) What are the requirements of earthquake resistant structure ?

c) A rectangular plot 20m × 25m (20 m dimension facing road) is to have three storeyed building of equal built up area on each storey. Front and rear margins are 3 m. side margins are 2.5m. FSI limit is 1.5. Find the limit on built up area.

d) State the characteristics of bricks.

e) State different grades of concrete and mention their uses.

f) Discuss the concept of green building.

5. Solve **any two** out of following three questions. **(6×2=12)**

a) Draw a neat sectional elevation showing different components of building. Also state the functions of these components.

b) Explain following principles of planning
i) Privacy ii) Grouping iii) Roominess

c) Define remote sensing. State applications of remote sensing in various fields.

———————

Set P

SLR-TJ – 14

Seat No.	

Set Q

F.E. (Part – II) (CBCS Pattern) Examination, 2017
BASIC CIVIL ENGINEERING (New)

Day and Date : Wednesday, 22-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) A foundation made up of thick R.C.C. slab covering entire bottom of the structure is called as
   a) Slab foundation b) Flat foundation
   c) Raft foundation d) Combined foundation

2) The effect achieved by making the best of small portions of room by deriving maximum benefit from minimum dimensions is treated as
   a) Grouping b) Circulation c) Roominess d) Flexibility

3) Bricks should not break, when struck against another brick or when dropped from a height of
   a) 0.5 m b) 1.0 m c) 1.5 m d) 0.75 m

4) The load is transferred to the foundation in framed structure in the following sequence
   a) Beam-column-foundation-slab b) Slab-column-beam-foundation
   c) Slab-beam-column-foundation d) Column-slab-beam-foundation

5) Eco friendly construction encourages
   a) Use of cheap material b) Use of locally available material
   c) Use of costly material d) None of these

P.T.O.

6) GIS stands for
   a) Geographic Information System b) Geologic Information System
   c) Global Information System d) None of these

7) A masonry wall needs ———————— for safety against earthquake forces.
   a) Use of through stones
   b) Continuous band at plinth, lintel and sill
   c) Both a)and b)
   d) None of these

8) Civil engineer has to play a role in
   a) Construction of house b) Surveying
   c) Design of a framed structure d) Electrification of a building

9) Equivalent representative fraction of nominal scale 1 cm = 100 m will be
   a) 1/10 b) 1/100 c) 1/1000 d) 1/10000

10) The angle between two mirrors of the optical square is
   a) 25° b) 45° c) 63° d) 65°

11) If Reduced Bearing of a line is S 30° 30′ W, its Whole circle bearing is
   a) 30° 30′ b) 149° 30′ c) 180° 30′ d) 210° 30′

12) Fly leveling is used for
   a) Establishment of new B.M. b) Checking purpose
   c) Survey in hilly area d) Road survey

13) The soil over which the road structure rests is the foundation soil and is known as
   a) Formation level b) Sub grade
   c) Sub base d) Base

14) Ujjani Dam is an example of
   a) River Irrigation b) Storage Irrigation
   c) Lift Irrigation d) Percolation Tanks

———————

SLR-TJ – 14

Seat No.	

F.E. (Part – II) (CBCS Pattern) Examination, 2017
BASIC CIVIL ENGINEERING (New)

Day and Date : Wednesday, 22-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

2. Solve **any four** out of following seven questions. **(4×3=12)**

a) Give applications of Civil Engineering to other branches of Engineering.

b) How Civil Engineer plays his role in construction of a house ? Write in short.

c) What is an offset? Enlist equipments used for taking offsets.

d) Define Plane and Geodetic Surveying.

e) What are the advantages of contour map ?

f) What are the types of Canals? Draw a neat sketch.

g) Draw a neat sketch of cross section of a State Highway showing different components.

3. Solve **any two** out of following three questions. **(8×2=16)**

a) The distance between two stations A and B was measured with 30 m chain. The total length of line AB as observed and recorded was 3820 m. The length of the chain was checked at start, at every km of chaining and at the end. The results are noted below.

Chainage in Km	0 (Stn. A)	1	2	3	3.820 (Stn.B)
Chain length in m	30.00	30.10	30.16	29.90	29.85

Find the true distance AB.

b) Observed quadrantal bearings in a compass traverse QRSTPQ are given below :

Line	QR	RS	ST	TP	PQ
F.B.	N(43° 30′) E	N(31° 45′) W	S(61° 00′) W	S(5° 30′) E	S(62° 00′) E
B.B.	S(45° 30′) W	S(31° 45′) E	N(61° 00′) E	N(7° 30′) W	N(64° 00′) W

i) Find out included angles. Apply checks.
ii) Find out corrected bearings in the same system of bearings.
iii) Tabulate the results. Draw the traverse.

c) The following consecutive readings were taken on a 3 m leveling staff with dumpy level at a common interval of 20 m.

0.385, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625,2.005, 3.110, 4.485

The very first reading was taken on a point having RL 208.125. Calculate the gradient of line joining first point and last point. Use Rise and Fall method.

SECTION – II

4. Solve **any four** out of following six questions. **(4×4=16)**

a) What do you understand by the term foundation? What are the objectives of providing foundation ?

b) What are the requirements of earthquake resistant structure ?

c) A rectangular plot 20m × 25m (20 m dimension facing road) is to have three storeyed building of equal built up area on each storey. Front and rear margins are 3 m. side margins are 2.5m. FSI limit is 1.5. Find the limit on built up area.

d) State the characteristics of bricks.

e) State different grades of concrete and mention their uses.

f) Discuss the concept of green building.

5. Solve **any two** out of following three questions. **(6×2=12)**

a) Draw a neat sectional elevation showing different components of building. Also state the functions of these components.

b) Explain following principles of planning
i) Privacy ii) Grouping iii) Roominess

c) Define remote sensing. State applications of remote sensing in various fields.

———————

Set Q

SLR-TJ – 14

Seat No.	

Set R

F.E. (Part – II) (CBCS Pattern) Examination, 2017
BASIC CIVIL ENGINEERING (New)

Day and Date : Wednesday, 22-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Fly leveling is used for
   a) Establishment of new B.M. b) Checking purpose
   c) Survey in hilly area d) Road survey

2) The soil over which the road structure rests is the foundation soil and is known as
   a) Formation level b) Sub grade
   c) Sub base d) Base

3) Ujjani Dam is an example of
   a) River Irrigation b) Storage Irrigation
   c) Lift Irrigation d) Percolation Tanks

4) A foundation made up of thick R.C.C. slab covering entire bottom of the structure is called as
   a) Slab foundation b) Flat foundation
   c) Raft foundation d) Combined foundation

5) The effect achieved by making the best of small portions of room by deriving maximum benefit from minimum dimensions is treated as
   a) Grouping b) Circulation c) Roominess d) Flexibility

P.T.O.

6) Bricks should not break, when struck against another brick or when dropped from a height of

a) 0.5 m b) 1.0 m c) 1.5 m d) 0.75 m

7) The load is transferred to the foundation in framed structure in the following sequence

a) Beam-column-foundation-slab b) Slab-column-beam-foundation

c) Slab-beam-column-foundation d) Column-slab-beam-foundation

8) Eco friendly construction encourages

a) Use of cheap material b) Use of locally available material

c) Use of costly material d) None of these

9) GIS stands for

a) Geographic Information System b) Geologic Information System

c) Global Information System d) None of these

10) A masonry wall needs ———————— for safety against earthquake forces.

a) Use of through stones

b) Continuous band at plinth, lintel and sill

c) Both a)and b)

d) None of these

11) Civil engineer has to play a role in

a) Construction of house b) Surveying

c) Design of a framed structure d) Electrification of a building

12) Equivalent representative fraction of nominal scale 1 cm = 100 m will be

a) 1/10 b) 1/100 c) 1/1000 d) 1/10000

13) The angle between two mirrors of the optical square is

a) 25° b) 45° c) 63° d) 65°

14) If Reduced Bearing of a line is S 30° 30′ W, its Whole circle bearing is

a) 30° 30′ b) 149° 30′ c) 180° 30′ d) 210° 30′

———————

SLR-TJ – 14

Seat No.	

F.E. (Part – II) (CBCS Pattern) Examination, 2017
BASIC CIVIL ENGINEERING (New)

Day and Date : Wednesday, 22-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

2. Solve **any four** out of following seven questions. **(4×3=12)**

a) Give applications of Civil Engineering to other branches of Engineering.

b) How Civil Engineer plays his role in construction of a house ? Write in short.

c) What is an offset? Enlist equipments used for taking offsets.

d) Define Plane and Geodetic Surveying.

e) What are the advantages of contour map ?

f) What are the types of Canals? Draw a neat sketch.

g) Draw a neat sketch of cross section of a State Highway showing different components.

3. Solve **any two** out of following three questions. **(8×2=16)**

a) The distance between two stations A and B was measured with 30 m chain. The total length of line AB as observed and recorded was 3820 m. The length of the chain was checked at start, at every km of chaining and at the end. The results are noted below.

Chainage in Km	0 (Stn. A)	1	2	3	3.820 (Stn.B)
Chain length in m	30.00	30.10	30.16	29.90	29.85

Find the true distance AB.

b) Observed quadrantal bearings in a compass traverse QRSTPQ are given below :

Line	QR	RS	ST	TP	PQ
F.B.	N(43° 30′) E	N(31° 45′) W	S(61° 00′) W	S(5° 30′) E	S(62° 00′) E
B.B.	S(45° 30′) W	S(31° 45′) E	N(61° 00′) E	N(7° 30′) W	N(64° 00′) W

i) Find out included angles. Apply checks.
ii) Find out corrected bearings in the same system of bearings.
iii) Tabulate the results. Draw the traverse.

c) The following consecutive readings were taken on a 3 m leveling staff with dumpy level at a common interval of 20 m.

0.385, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625,2.005, 3.110, 4.485

The very first reading was taken on a point having RL 208.125. Calculate the gradient of line joining first point and last point. Use Rise and Fall method.

SECTION – II

4. Solve **any four** out of following six questions. **(4×4=16)**

a) What do you understand by the term foundation? What are the objectives of providing foundation ?

b) What are the requirements of earthquake resistant structure ?

c) A rectangular plot 20m × 25m (20 m dimension facing road) is to have three storeyed building of equal built up area on each storey. Front and rear margins are 3 m. side margins are 2.5m. FSI limit is 1.5. Find the limit on built up area.

d) State the characteristics of bricks.

e) State different grades of concrete and mention their uses.

f) Discuss the concept of green building.

5. Solve **any two** out of following three questions. **(6×2=12)**

a) Draw a neat sectional elevation showing different components of building. Also state the functions of these components.

b) Explain following principles of planning
i) Privacy ii) Grouping iii) Roominess

c) Define remote sensing. State applications of remote sensing in various fields.

———————

Set R

SLR-TJ – 14

Seat No.	

Set S

F.E. (Part – II) (CBCS Pattern) Examination, 2017
BASIC CIVIL ENGINEERING (New)

Day and Date : Wednesday, 22-11-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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

1) Bricks should not break, when struck against another brick or when dropped from a height of

a) 0.5 m b) 1.0 m c) 1.5 m d) 0.75 m

2) The load is transferred to the foundation in framed structure in the following sequence

a) Beam-column-foundation-slab b) Slab-column-beam-foundation
c) Slab-beam-column-foundation d) Column-slab-beam-foundation

3) Eco friendly construction encourages

a) Use of cheap material b) Use of locally available material
c) Use of costly material d) None of these

4) GIS stands for

a) Geographic Information System
b) Geologic Information System
c) Global Information System
d) None of these

P.T.O.

5) A masonry wall needs ———————— for safety against earthquake forces.
   a) Use of through stones
   b) Continuous band at plinth, lintel and sill
   c) Both a)and b)
   d) None of these

6) Civil engineer has to play a role in
   a) Construction of house
   b) Surveying
   c) Design of a framed structure
   d) Electrification of a building

7) Equivalent representative fraction of nominal scale 1 cm = 100 m will be
   a) 1/10 b) 1/100 c) 1/1000 d) 1/10000

8) The angle between two mirrors of the optical square is
   a) 25° b) 45° c) 63° d) 65°

9) If Reduced Bearing of a line is S 30° 30′ W, its Whole circle bearing is
   a) 30° 30′ b) 149° 30′ c) 180° 30′ d) 210° 30′

10) Fly leveling is used for
   a) Establishment of new B.M.
   b) Checking purpose
   c) Survey in hilly area
   d) Road survey

11) The soil over which the road structure rests is the foundation soil and is known as
   a) Formation level
   b) Sub grade
   c) Sub base
   d) Base

12) Ujjani Dam is an example of
   a) River Irrigation
   b) Storage Irrigation
   c) Lift Irrigation
   d) Percolation Tanks

13) A foundation made up of thick R.C.C. slab covering entire bottom of the structure is called as
   a) Slab foundation
   b) Flat foundation
   c) Raft foundation
   d) Combined foundation

14) The effect achieved by making the best of small portions of room by deriving maximum benefit from minimum dimensions is treated as
   a) Grouping b) Circulation c) Roominess d) Flexibility

———————

SLR-TJ – 14

Seat No.	

F.E. (Part – II) (CBCS Pattern) Examination, 2017
BASIC CIVIL ENGINEERING (New)

Day and Date : Wednesday, 22-11-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

2. Solve **any four** out of following seven questions. **(4×3=12)**

a) Give applications of Civil Engineering to other branches of Engineering.

b) How Civil Engineer plays his role in construction of a house ? Write in short.

c) What is an offset? Enlist equipments used for taking offsets.

d) Define Plane and Geodetic Surveying.

e) What are the advantages of contour map ?

f) What are the types of Canals? Draw a neat sketch.

g) Draw a neat sketch of cross section of a State Highway showing different components.

3. Solve **any two** out of following three questions. **(8×2=16)**

a) The distance between two stations A and B was measured with 30 m chain. The total length of line AB as observed and recorded was 3820 m. The length of the chain was checked at start, at every km of chaining and at the end. The results are noted below.

Chainage in Km	0 (Stn. A)	1	2	3	3.820 (Stn.B)
Chain length in m	30.00	30.10	30.16	29.90	29.85

Find the true distance AB.

b) Observed quadrantal bearings in a compass traverse QRSTPQ are given below :

Line	QR	RS	ST	TP	PQ
F.B.	N(43° 30′) E	N(31° 45′) W	S(61° 00′) W	S(5° 30′) E	S(62° 00′) E
B.B.	S(45° 30′) W	S(31° 45′) E	N(61° 00′) E	N(7° 30′) W	N(64° 00′) W

i) Find out included angles. Apply checks.
ii) Find out corrected bearings in the same system of bearings.
iii) Tabulate the results. Draw the traverse.

c) The following consecutive readings were taken on a 3 m leveling staff with dumpy level at a common interval of 20 m.

0.385, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625,2.005, 3.110, 4.485

The very first reading was taken on a point having RL 208.125. Calculate the gradient of line joining first point and last point. Use Rise and Fall method.

SECTION – II

4. Solve **any four** out of following six questions. **(4×4=16)**

a) What do you understand by the term foundation? What are the objectives of providing foundation ?

b) What are the requirements of earthquake resistant structure ?

c) A rectangular plot 20m × 25m (20 m dimension facing road) is to have three storeyed building of equal built up area on each storey. Front and rear margins are 3 m. side margins are 2.5m. FSI limit is 1.5. Find the limit on built up area.

d) State the characteristics of bricks.

e) State different grades of concrete and mention their uses.

f) Discuss the concept of green building.

5. Solve **any two** out of following three questions. **(6×2=12)**

a) Draw a neat sectional elevation showing different components of building. Also state the functions of these components.

b) Explain following principles of planning
i) Privacy ii) Grouping iii) Roominess

c) Define remote sensing. State applications of remote sensing in various fields.

———————

Set S

SLR-TJ – 15

Seat No.	

Set P

F.E. (Part – II) (New CBCS) Examination, 2017
BASIC ELECTRONICS

Day and Date : Thursday, 23-11-2017 Max. Marks : 35
Time : 10.00 a.m. to 12.00 noon

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. No. **1** is **compulsory**. It should be solved in **first 15 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 15 Minutes Marks : 7

1. Choose the correct answer : **7**

1) The Boolean expression $A(\overline{A+B})$ is equal to
   a) A b) 1
   c) Zero d) A + B

2) Two's complement representation of a number $(-17)_{10}$ is
   a) $(11101110)_2$ b) $(11101111)_2$
   c) $(00010001)_2$ d) $(00010010)_2$

3) Lowest output resistance is obtained in
   a) Common base configuration
   b) Common emitter configuration
   c) Common collector configuration
   d) Both a) and b)

4) Thermocouple is _____ transducer and it is used for measurement of
   a) Passive, temperature b) Active, light sensitivity
   c) Active, displacement d) Active, temperature

P.T.O.

5) Rectification efficiency of a full wave bridge rectifier will be
   a) 81.2% b) 40.6%
   c) 48% d) 100%

6) Ideal diode in forward bias offers _____ resistance and it is equivalent to _____ switch.
   a) Zero, open b) Zero, closed
   c) Infinite, closed d) Infinite, open

7) A PN junction which emits light when it is forward biased is known as
   a) Light dependent resistor b) Light emitting diode
   c) Photo diode d) Photo transistor

_____

SLR-TJ – 15

Seat No.	

F.E. (Part – II) (New CBCS) Examination, 2017
BASIC ELECTRONICS

Day and Date : Thursday, 23-11-2017 Marks : 28
Time : 10.00 a.m. to 12.00 noon

SECTION – I

2. Attempt **any two** : **(2×3=6)**
   1) Draw and explain working of LED as 7-segment display.
   2) Explain working of BJT transistor as a switch.
   3) Draw circuit diagram and explain V-I characteristics of PN junction diode.

3. Attempt **any two** : **(2×4=8)**
   1) Explain working of zener as a regulator with diagram.
   2) For bridge rectifier, derive for
      i) I_{DC} ii) V_{rms} iii) Ripple factor iv) Efficiency
   3) Draw input and output characteristics of common base and common emitter configuration.

SECTION – II

4. Attempt **any two** : **(2×3=6)**
   1) What is NTC and PTC ? Explain each with example.
   2) Explain strain gauge transducer and also define gauge factor.
   3) Explain following gates with symbol, equation and truth table.
      i) XNOR ii) OR iii) NAND

5. Attempt **any two** : **(2×4=8)**
   1) Derive basic gates using NOR universal gate.
   2) State and prove distributive law and commutative law.
   3) Perform the following arithmetic operations using 2's complement method. Show the result in decimal form
      i) $(35)_{10} - (27)_{10}$ ii) $(56)_8 - (45)_8$

Set P

Set P

SLR-TJ – 15

Seat No.	

Set Q

F.E. (Part – II) (New CBCS) Examination, 2017
BASIC ELECTRONICS

Day and Date : Thursday, 23-11-2017 Max. Marks : 35
Time : 10.00 a.m. to 12.00 noon

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. No. **1** is **compulsory**. It should be solved in **first 15 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 15 Minutes Marks : 7

1. Choose the correct answer : **7**

1) Lowest output resistance is obtained in
   a) Common base configuration
   b) Common emitter configuration
   c) Common collector configuration
   d) Both a) and b)

2) Rectification efficiency of a full wave bridge rectifier will be
   a) 81.2% b) 40.6%
   c) 48% d) 100%

3) A PN junction which emits light when it is forward biased is known as
   a) Light dependent resistor b) Light emitting diode
   c) Photo diode d) Photo transistor

4) The Boolean expression $A(\overline{A+B})$ is equal to
   a) A b) 1
   c) Zero d) A + B

P.T.O.

5) Ideal diode in forward bias offers _____ resistance and it is equivalent to _____ switch.
   a) Zero, open
   b) Zero, closed
   c) Infinite, closed
   d) Infinite, open

6) Two's complement representation of a number $(-17)_{10}$ is
   a) $(11101110)_2$
   b) $(11101111)_2$
   c) $(00010001)_2$
   d) $(00010010)_2$

7) Thermocouple is _____ transducer and it is used for measurement of
   a) Passive, temperature
   b) Active, light sensitivity
   c) Active, displacement
   d) Active, temperature

_____

SLR-TJ – 15

Seat No.	

F.E. (Part – II) (New CBCS) Examination, 2017
BASIC ELECTRONICS

Day and Date : Thursday, 23-11-2017 Marks : 28
Time : 10.00 a.m. to 12.00 noon

SECTION – I

2. Attempt **any two** : **(2×3=6)**
   1) Draw and explain working of LED as 7-segment display.
   2) Explain working of BJT transistor as a switch.
   3) Draw circuit diagram and explain V-I characteristics of PN junction diode.

3. Attempt **any two** : **(2×4=8)**
   1) Explain working of zener as a regulator with diagram.
   2) For bridge rectifier, derive for
      i) I_{DC} ii) V_{rms} iii) Ripple factor iv) Efficiency
   3) Draw input and output characteristics of common base and common emitter configuration.

SECTION – II

4. Attempt **any two** : **(2×3=6)**
   1) What is NTC and PTC ? Explain each with example.
   2) Explain strain gauge transducer and also define gauge factor.
   3) Explain following gates with symbol, equation and truth table.
      i) XNOR ii) OR iii) NAND

5. Attempt **any two** : **(2×4=8)**
   1) Derive basic gates using NOR universal gate.
   2) State and prove distributive law and commutative law.
   3) Perform the following arithmetic operations using 2's complement method. Show the result in decimal form
      i) $(35)_{10} - (27)_{10}$ ii) $(56)_8 - (45)_8$

Set Q

Set Q

SLR-TJ – 15

Seat No.	

Set R

F.E. (Part – II) (New CBCS) Examination, 2017
BASIC ELECTRONICS

Day and Date : Thursday, 23-11-2017 Max. Marks : 35
Time : 10.00 a.m. to 12.00 noon

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. No. **1** is **compulsory**. It should be solved in **first 15 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 15 Minutes Marks : 7

1. Choose the correct answer : **7**

1) Thermocouple is _____ transducer and it is used for measurement of
   a) Passive, temperature
   b) Active, light sensitivity
   c) Active, displacement
   d) Active, temperature

2) Lowest output resistance is obtained in
   a) Common base configuration
   b) Common emitter configuration
   c) Common collector configuration
   d) Both a) and b)

3) Rectification efficiency of a full wave bridge rectifier will be
   a) 81.2%
   b) 40.6%
   c) 48%
   d) 100%

4) A PN junction which emits light when it is forward biased is known as
   a) Light dependent resistor
   b) Light emitting diode
   c) Photo diode
   d) Photo transistor

P.T.O.

5) Two's complement representation of a number $(-17)_{10}$ is
   a) $(11101110)_2$ b) $(11101111)_2$
   c) $(00010001)_2$ d) $(00010010)_2$

6) The Boolean expression $A(\overline{A+B})$ is equal to
   a) A b) 1
   c) Zero d) A + B

7) Ideal diode in forward bias offers _____ resistance and it is equivalent to _____ switch.
   a) Zero, open b) Zero, closed
   c) Infinite, closed d) Infinite, open

_____

SLR-TJ – 15

Seat No.	

F.E. (Part – II) (New CBCS) Examination, 2017
BASIC ELECTRONICS

Day and Date : Thursday, 23-11-2017 Marks : 28
Time : 10.00 a.m. to 12.00 noon

SECTION – I

2. Attempt **any two** : **(2×3=6)**
   1) Draw and explain working of LED as 7-segment display.
   2) Explain working of BJT transistor as a switch.
   3) Draw circuit diagram and explain V-I characteristics of PN junction diode.

3. Attempt **any two** : **(2×4=8)**
   1) Explain working of zener as a regulator with diagram.
   2) For bridge rectifier, derive for
      i) I_{DC} ii) V_{rms} iii) Ripple factor iv) Efficiency
   3) Draw input and output characteristics of common base and common emitter configuration.

SECTION – II

4. Attempt **any two** : **(2×3=6)**
   1) What is NTC and PTC ? Explain each with example.
   2) Explain strain gauge transducer and also define gauge factor.
   3) Explain following gates with symbol, equation and truth table.
      i) XNOR ii) OR iii) NAND

5. Attempt **any two** : **(2×4=8)**
   1) Derive basic gates using NOR universal gate.
   2) State and prove distributive law and commutative law.
   3) Perform the following arithmetic operations using 2's complement method. Show the result in decimal form
      i) $(35)_{10} - (27)_{10}$ ii) $(56)_8 - (45)_8$

Set R

Set R

SLR-TJ – 15

Seat No.	

Set **S**

F.E. (Part – II) (New CBCS) Examination, 2017
BASIC ELECTRONICS

Day and Date : Thursday, 23-11-2017 Max. Marks : 35
Time : 10.00 a.m. to 12.00 noon

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Q. No. **1** is **compulsory**. It should be solved in **first 15 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 15 Minutes Marks : 7

1. Choose the correct answer : **7**

1) Ideal diode in forward bias offers _____ resistance and it is equivalent to _____ switch.
   a) Zero, open b) Zero, closed
   c) Infinite, closed d) Infinite, open

2) Thermocouple is _____ transducer and it is used for measurement of
   a) Passive, temperature b) Active, light sensitivity
   c) Active, displacement d) Active, temperature

3) The Boolean expression $A(\overline{A+B})$ is equal to
   a) A b) 1
   c) Zero d) A + B

4) Rectification efficiency of a full wave bridge rectifier will be
   a) 81.2% b) 40.6%
   c) 48% d) 100%

P.T.O.

5) Lowest output resistance is obtained in
   a) Common base configuration
   b) Common emitter configuration
   c) Common collector configuration
   d) Both a) and b)

6) A PN junction which emits light when it is forward biased is known as
   a) Light dependent resistor
   b) Light emitting diode
   c) Photo diode
   d) Photo transistor

7) Two's complement representation of a number $(-17)_{10}$ is
   a) $(11101110)_2$
   b) $(11101111)_2$
   c) $(00010001)_2$
   d) $(00010010)_2$

———————

SLR-TJ – 15

Seat No.	

F.E. (Part – II) (New CBCS) Examination, 2017
BASIC ELECTRONICS

Day and Date : Thursday, 23-11-2017 Marks : 28
Time : 10.00 a.m. to 12.00 noon

SECTION – I

2. Attempt **any two** : **(2×3=6)**
   1) Draw and explain working of LED as 7-segment display.
   2) Explain working of BJT transistor as a switch.
   3) Draw circuit diagram and explain V-I characteristics of PN junction diode.

3. Attempt **any two** : **(2×4=8)**
   1) Explain working of zener as a regulator with diagram.
   2) For bridge rectifier, derive for
      i) I_{DC} ii) V_{rms} iii) Ripple factor iv) Efficiency
   3) Draw input and output characteristics of common base and common emitter configuration.

SECTION – II

4. Attempt **any two** : **(2×3=6)**
   1) What is NTC and PTC ? Explain each with example.
   2) Explain strain gauge transducer and also define gauge factor.
   3) Explain following gates with symbol, equation and truth table.
      i) XNOR ii) OR iii) NAND

5. Attempt **any two** : **(2×4=8)**
   1) Derive basic gates using NOR universal gate.
   2) State and prove distributive law and commutative law.
   3) Perform the following arithmetic operations using 2's complement method. Show the result in decimal form
      i) $(35)_{10} – (27)_{10}$ ii) $(56)_8 – (45)_8$

Set S

Set S

SLR-TJ – 601

Seat No.	

Set P

T.E. (Part – I) (All Branches) (CGPA) Examination, 2017
SOCIOLOGY
Introduction to Sociology (Self Learning) (HSS)

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 Noon

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

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **10**

1) The term sociology was for the first time coined by
   a) Auguste Comte b) Ginsberg
   c) Aristotle d) Socrates

2) Sociology as a subject deals with _____
   a) Man and society
   b) Human associations
   c) Social relations among individuals
   d) Rights and duties of the citizens

3) Which of the following is not a characteristic of primary group ?
   a) Formality b) Closeness
   c) Familiarity d) Integrity

4) The nature of urbanization is _____
   a) Pioneering b) Static
   c) Dynamic d) Homogeneous

5) Social change is responsible for _____
   a) Social progress b) Social evolution
   c) Social disorganisation d) All the above

P.T.O.

6) An unskilled worker becomes semiskilled and later on skilled. What type of mobility is this ?
   a) Intra generational occupational mobility
   b) Inter generational occupational mobility
   c) Vertical social mobility
   d) Horizontal social mobility

7) Who has been initiated the Narmada Bachao Andolan (Movement) ?
   a) Anna Hazare
   b) Medha Patkar
   c) Sundarlal Bahuguna
   d) J. P. Narayan

8) Which of the following is the example of informal sector ?
   a) Street vendor
   b) Waste picker
   c) Rag picker
   d) All the above

9) _____ is a natural and continues process.
   a) Change
   b) Poverty
   c) Modernization
   d) All the above

10) Process of socialization starts _____
   a) After birth of child
   b) Before child's birth
   c) After getting maturity
   d) In youth age

_____

SLR-TJ – 601

Seat No.	

T.E. (Part – I) (All Branches) (CGPA) Examination, 2017
SOCIOLOGY
Introduction to Sociology (Self Learning) (HSS)

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 Noon

Instructions *: I) Attempt* ***any 4*** *from the following questions.*
II) Figures to the ***right*** *indicate* ***full*** *marks.*

2. Define sociology and explain the characteristics of culture. **10**

3. Define industrialization and explain its key features in Indian context. **10**

4. Elucidate the vital trends of urbanization in India. **10**

5. Define social movements and elucidate the objectives of "India against corruption movement". **10**

6. Do you think that modern technology leads to environment crisis ? Discuss. **10**

7. Discuss the changing pattern of family system in urban society. **10**

Set P

SLR-TJ – 601

Seat No.	

Set Q

T.E. (Part – I) (All Branches) (CGPA) Examination, 2017
SOCIOLOGY
Introduction to Sociology (Self Learning) (HSS)

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 Noon

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

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **10**

1) _____ is a natural and continues process.
   a) Change b) Poverty
   c) Modernization d) All the above

2) Process of socialization starts _____
   a) After birth of child b) Before child's birth
   c) After getting maturity d) In youth age

3) Who has been initiated the Narmada Bachao Andolan (Movement) ?
   a) Anna Hazare b) Medha Patkar
   c) Sundarlal Bahuguna d) J. P. Narayan

4) Which of the following is the example of informal sector ?
   a) Street vendor b) Waste picker
   c) Rag picker d) All the above

5) The term sociology was for the first time coined by
   a) Auguste Comte b) Ginsberg
   c) Aristotle d) Socrates

P.T.O.

6) Sociology as a subject deals with _____
   a) Man and society
   b) Human associations
   c) Social relations among individuals
   d) Rights and duties of the citizens

7) Which of the following is not a characteristic of primary group ?
   a) Formality b) Closeness
   c) Familiarity d) Integrity

8) The nature of urbanization is _____
   a) Pioneering b) Static
   c) Dynamic d) Homogeneous

9) Social change is responsible for _____
   a) Social progress b) Social evolution
   c) Social disorganisation d) All the above

10) An unskilled worker becomes semiskilled and later on skilled. What type of mobility is this ?
   a) Intra generational occupational mobility
   b) Inter generational occupational mobility
   c) Vertical social mobility
   d) Horizontal social mobility

_____

SLR-TJ – 601

Seat No.	

T.E. (Part – I) (All Branches) (CGPA) Examination, 2017
SOCIOLOGY
Introduction to Sociology (Self Learning) (HSS)

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 Noon

Instructions *: I) Attempt* ***any 4*** *from the following questions.*
II) Figures to the ***right*** *indicate* ***full*** *marks.*

2. Define sociology and explain the characteristics of culture. **10**

3. Define industrialization and explain its key features in Indian context. **10**

4. Elucidate the vital trends of urbanization in India. **10**

5. Define social movements and elucidate the objectives of "India against corruption movement". **10**

6. Do you think that modern technology leads to environment crisis ? Discuss. **10**

7. Discuss the changing pattern of family system in urban society. **10**

Set Q

Set Q

SLR-TJ – 601

Seat No.	

Set R

T.E. (Part – I) (All Branches) (CGPA) Examination, 2017
SOCIOLOGY
Introduction to Sociology (Self Learning) (HSS)

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 Noon

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

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **10**

1) Social change is responsible for _____
   a) Social progress b) Social evolution
   c) Social disorganisation d) All the above

2) An unskilled worker becomes semiskilled and later on skilled. What type of mobility is this ?
   a) Intra generational occupational mobility
   b) Inter generational occupational mobility
   c) Vertical social mobility
   d) Horizontal social mobility

3) _____ is a natural and continues process.
   a) Change b) Poverty
   c) Modernization d) All the above

4) Process of socialization starts _____
   a) After birth of child b) Before child's birth
   c) After getting maturity d) In youth age

5) Which of the following is not a characteristic of primary group ?
   a) Formality b) Closeness
   c) Familiarity d) Integrity

P.T.O.

6) The nature of urbanization is _____
   a) Pioneering b) Static
   c) Dynamic d) Homogeneous

7) The term sociology was for the first time coined by
   a) Auguste Comte b) Ginsberg
   c) Aristotle d) Socrates

8) Sociology as a subject deals with _____
   a) Man and society
   b) Human associations
   c) Social relations among individuals
   d) Rights and duties of the citizens

9) Who has been initiated the Narmada Bachao Andolan (Movement) ?
   a) Anna Hazare b) Medha Patkar
   c) Sundarlal Bahuguna d) J. P. Narayan

10) Which of the following is the example of informal sector ?
   a) Street vendor b) Waste picker
   c) Rag picker d) All the above

_____

SLR-TJ – 601

Seat No.	

T.E. (Part – I) (All Branches) (CGPA) Examination, 2017
SOCIOLOGY
Introduction to Sociology (Self Learning) (HSS)

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 Noon

Instructions *: I) Attempt* ***any 4*** *from the following questions.*
II) Figures to the ***right*** *indicate* ***full*** *marks.*

2. Define sociology and explain the characteristics of culture. **10**

3. Define industrialization and explain its key features in Indian context. **10**

4. Elucidate the vital trends of urbanization in India. **10**

5. Define social movements and elucidate the objectives of "India against corruption movement". **10**

6. Do you think that modern technology leads to environment crisis ? Discuss. **10**

7. Discuss the changing pattern of family system in urban society. **10**

Set R

SLR-TJ – 601

Seat No.	

Set S

T.E. (Part – I) (All Branches) (CGPA) Examination, 2017
SOCIOLOGY
Introduction to Sociology (Self Learning) (HSS)

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 Noon

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

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **10**

1) Which of the following is not a characteristic of primary group ?
   a) Formality b) Closeness
   c) Familiarity d) Integrity

2) The nature of urbanization is _____
   a) Pioneering b) Static
   c) Dynamic d) Homogeneous

3) Social change is responsible for _____
   a) Social progress b) Social evolution
   c) Social disorganisation d) All the above

4) An unskilled worker becomes semiskilled and later on skilled. What type of mobility is this ?
   a) Intra generational occupational mobility
   b) Inter generational occupational mobility
   c) Vertical social mobility
   d) Horizontal social mobility

5) Who has been initiated the Narmada Bachao Andolan (Movement) ?
   a) Anna Hazare b) Medha Patkar
   c) Sundarlal Bahuguna d) J. P. Narayan

P.T.O.

6) Which of the following is the example of informal sector ?
   a) Street vendor
   b) Waste picker
   c) Rag picker
   d) All the above

7) _____ is a natural and continues process.
   a) Change
   b) Poverty
   c) Modernization
   d) All the above

8) Process of socialization starts _____
   a) After birth of child
   b) Before child's birth
   c) After getting maturity
   d) In youth age

9) The term sociology was for the first time coined by
   a) Auguste Comte
   b) Ginsberg
   c) Aristotle
   d) Socrates

10) Sociology as a subject deals with _____
   a) Man and society
   b) Human associations
   c) Social relations among individuals
   d) Rights and duties of the citizens

_____

SLR-TJ – 601

Seat No.	

T.E. (Part – I) (All Branches) (CGPA) Examination, 2017
SOCIOLOGY
Introduction to Sociology (Self Learning) (HSS)

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 Noon

Instructions *: I) Attempt* ***any 4*** *from the following questions.*
II) Figures to the ***right*** *indicate* ***full*** *marks.*

2. Define sociology and explain the characteristics of culture. **10**

3. Define industrialization and explain its key features in Indian context. **10**

4. Elucidate the vital trends of urbanization in India. **10**

5. Define social movements and elucidate the objectives of "India against corruption movement". **10**

6. Do you think that modern technology leads to environment crisis ? Discuss. **10**

7. Discuss the changing pattern of family system in urban society. **10**

Set S

SLR-TJ – 602

Seat No.	

Set P

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
SELF LEARNING – HSS – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

Note : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Figures to ***right*** *indicate* ***full*** *marks.*
4) Make suitable assumptions, if required and state them ***clearly****.*

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) HR means
A) Head Resource B) Honorary Responsibility
C) Human Resource D) All of the above

2) CSR means
A) Corporate Social Responsibility B) Cooperation Society Responsibility
C) Class Social Representative D) None of the above

3) _____ is not the part of internal communication.
A) Mailers
B) Electronic mails
C) Advertise and market honoring values
D) Internal news letter

4) In SWOT, T represents
A) Temperature B) Threats
C) Table D) Teacher

5) FMEA is a tool of
A) Financial analysis B) Risk analysis
C) Equity analysis D) None of the above

P.T.O.

6) Rights theory is related to
   A) Motivation B) Ethics
   C) Leadership D) Team building

7) Maslow has demonstrated the hierarchy of
   A) Beliefs B) Team
   C) Needs D) None of the above

8) The bargain by a Trade Union for improving the economic and other interest is called as
   A) Strike B) Authority Responsibility
   C) Collective bargaining D) None of the above

9) Gilligan theory is related to
   A) Moral development B) Human values
   C) Motivation D) Team working

10) A specific exclusive right, describing rights given to creator for their literature and artistic work is called as
   A) Patent B) Trademark
   C) Copy right D) None of the above

———————

SLR-TJ – 602

Seat No.	

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
SELF LEARNING – HSS – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

***Note** : Solve **any 4** questions.*

2. Explain variety of moral issues. **10**

3. Differentiate between Kohlberg's and Gilligan's theory. **10**

4. Explain types of inquiries in detail. **10**

5. Explain the method of Failure Mode and Effect Analysis (FMEA). **10**

6. What are human values ? Explain their types. **10**

———————

Set P

Set P

SLR-TJ – 602

Seat No.	

Set Q

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
SELF LEARNING – HSS – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

Note : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Figures to ***right*** *indicate* ***full*** *marks.*
4) Make suitable assumptions, if required and state them ***clearly****.*

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) Gilligan theory is related to
A) Moral development B) Human values
C) Motivation D) Team working

2) A specific exclusive right, describing rights given to creator for their literature and artistic work is called as
A) Patent B) Trademark
C) Copy right D) None of the above

3) Maslow has demonstrated the hierarchy of
A) Beliefs B) Team
C) Needs D) None of the above

4) The bargain by a Trade Union for improving the economic and other interest is called as
A) Strike B) Authority Responsibility
C) Collective bargaining D) None of the above

5) HR means
A) Head Resource B) Honorary Responsibility
C) Human Resource D) All of the above

P.T.O.

6) CSR means
   A) Corporate Social Responsibility B) Cooperation Society Responsibility
   C) Class Social Representative D) None of the above

7) _____ is not the part of internal communication.
   A) Mailers
   B) Electronic mails
   C) Advertise and market honoring values
   D) Internal news letter

8) In SWOT, T represents
   A) Temperature B) Threats
   C) Table D) Teacher

9) FMEA is a tool of
   A) Financial analysis B) Risk analysis
   C) Equity analysis D) None of the above

10) Rights theory is related to
   A) Motivation B) Ethics
   C) Leadership D) Team building

_____

SLR-TJ – 602

Seat No.	

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
SELF LEARNING – HSS – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

***Note** : Solve **any 4** questions.*

2. Explain variety of moral issues. **10**

3. Differentiate between Kohlberg's and Gilligan's theory. **10**

4. Explain types of inquiries in detail. **10**

5. Explain the method of Failure Mode and Effect Analysis (FMEA). **10**

6. What are human values ? Explain their types. **10**

———————

Set Q

Set Q

SLR-TJ – 602

Seat No.	

Set R

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
SELF LEARNING – HSS – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

Note : *1) Q. No. **1** is **compulsory**. It should be solved in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, if required and state them **clearly**.*

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) FMEA is a tool of
A) Financial analysis B) Risk analysis
C) Equity analysis D) None of the above

2) Rights theory is related to
A) Motivation B) Ethics
C) Leadership D) Team building

3) Gilligan theory is related to
A) Moral development B) Human values
C) Motivation D) Team working

4) A specific exclusive right, describing rights given to creator for their literature and artistic work is called as
A) Patent B) Trademark
C) Copy right D) None of the above

5) _____ is not the part of internal communication.
A) Mailers
B) Electronic mails
C) Advertise and market honoring values
D) Internal news letter

P.T.O.

6) In SWOT, T represents
   A) Temperature B) Threats
   C) Table D) Teacher

7) HR means
   A) Head Resource B) Honorary Responsibility
   C) Human Resource D) All of the above

8) CSR means
   A) Corporate Social Responsibility B) Cooperation Society Responsibility
   C) Class Social Representative D) None of the above

9) Maslow has demonstrated the hierarchy of
   A) Beliefs B) Team
   C) Needs D) None of the above

10) The bargain by a Trade Union for improving the economic and other interest is called as
   A) Strike B) Authority Responsibility
   C) Collective bargaining D) None of the above

———————

SLR-TJ – 602

Seat No.	

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
SELF LEARNING – HSS – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

***Note** : Solve **any 4** questions.*

2. Explain variety of moral issues. **10**

3. Differentiate between Kohlberg's and Gilligan's theory. **10**

4. Explain types of inquiries in detail. **10**

5. Explain the method of Failure Mode and Effect Analysis (FMEA). **10**

6. What are human values ? Explain their types. **10**

———————

Set R

Set R

SLR-TJ – 602

Seat No.	

Set S

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
SELF LEARNING – HSS – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

Note : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Figures to ***right*** *indicate* ***full*** *marks.*
4) Make suitable assumptions, if required and state them ***clearly****.*

MCQ/Objective Type Questions

Marks : 10

1. Choose the correct answer : **(10×1=10)**

1) _____ is not the part of internal communication.
A) Mailers
B) Electronic mails
C) Advertise and market honoring values
D) Internal news letter

2) In SWOT, T represents
A) Temperature B) Threats
C) Table D) Teacher

3) FMEA is a tool of
A) Financial analysis B) Risk analysis
C) Equity analysis D) None of the above

4) Rights theory is related to
A) Motivation B) Ethics
C) Leadership D) Team building

5) Maslow has demonstrated the hierarchy of
A) Beliefs B) Team
C) Needs D) None of the above

P.T.O.

6) The bargain by a Trade Union for improving the economic and other interest is called as
   A) Strike
   B) Authority Responsibility
   C) Collective bargaining
   D) None of the above

7) Gilligan theory is related to
   A) Moral development
   B) Human values
   C) Motivation
   D) Team working

8) A specific exclusive right, describing rights given to creator for their literature and artistic work is called as
   A) Patent
   B) Trademark
   C) Copy right
   D) None of the above

9) HR means
   A) Head Resource
   B) Honorary Responsibility
   C) Human Resource
   D) All of the above

10) CSR means
   A) Corporate Social Responsibility
   B) Cooperation Society Responsibility
   C) Class Social Representative
   D) None of the above

———————

SLR-TJ – 602

Seat No.	

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
SELF LEARNING – HSS – PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

***Note** : Solve **any 4** questions.*

2. Explain variety of moral issues. **10**

3. Differentiate between Kohlberg's and Gilligan's theory. **10**

4. Explain types of inquiries in detail. **10**

5. Explain the method of Failure Mode and Effect Analysis (FMEA). **10**

6. What are human values ? Explain their types. **10**

———————

Set S

Set S

SLR-TJ – 603

Seat No.	

Set P

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
ECONOMICS
(Self Learning – H.S.S.)

Day and Date : Wednesday, 13-12-2017 Toal Marks : 50
Time : 10.00 a.m. to 12.00 noon

***Instructions** : 1) Attempt **any four** questions out of Q. **2** to **7**.*
*2) Figtures at **right** indicates marks.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 15 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 15 Minutes Marks : 10

1. Choose the correct alternatives : **10**

1) Macro study is
   a) Study of individual
   b) Study of aggregate
   c) Both above
   d) None of above

2) Utility analysis is
   a) Subjective and changes
   b) Objective and des no change
   c) Can be measured numerically
   d) Not measurable at all by any means

3) Demand is always influenced, as per law of demand, by
   a) Price of commodity under reference
   b) Price of substitute commodity
   c) By both above
   d) By none above

4) If the price of petrol continuously increase, it will create
   a) Positive impact on demand of scooter
   b) Negative impact on demand of scooter
   c) Shall not create any impact
   d) All above alternatives are irrelevant

P.T.O.

5) International tarde is a trade between
   a) Two different firms in the same country
   b) Two different industries in the same country
   c) Two different firms in different countries
   d) Two different regions in the same country

6) Balance of trade and balance of payment are
   a) Same concepts
   b) Different in matter of quantity of trade
   c) Balance of payment is wider than balance of trade
   d) Balance of trade is wider than balance of payment

7) Monetary policy is
   a) Formulated and implemented by RBI
   b) Formulated by RBI but implemented by Finance Dept.
   c) Formulated by Finance Dept and implemented by RBI
   d) Neither formulated nor implemented by RBI

8) RBI was establised under
   a) Banking Regulation Act, 1949 b) RBI Act, 1935
   c) RBI Act, 1934 d) Govt. of India Act, 1935

9) Consumption is majorly influenced by
   a) Income b) Pricing c) Taxation d) Advertisement

10) Inflation refers to
   a) Continuous rise in prices
   b) Continuous fall in prices
   c) No change in the prices
   d) Price has no relation with inflation

———————

SLR-TJ – 603

Seat No.	

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
ECONOMICS
(Self Learning – H.S.S.)

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

***Instructions** : 1) Attempt **any four** questions out of Q. **2** to **7**.*
*2) Figures to the **right** indicate marks.*

2. Define Economics. Explain the importance of economics theories for business firms. **10**

3. "Law of demand shall come into effect only on remaining other things constant" – Discuss. **10**

4. Examine critically the laws of return to scale. **10**

5. What do you understand by National Income ? How it is measured in any country ? **10**

6. What is Central Banking ? In what respect it is different from commercial banking ? **10**

7. What do you understand by international trade ? Why countries go for international trade ? **10**

Set P

SLR-TJ – 603

Seat No.	

Set Q

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
ECONOMICS
(Self Learning – H.S.S.)

Day and Date : Wednesday, 13-12-2017 Toal Marks : 50
Time : 10.00 a.m. to 12.00 noon

***Instructions** : 1) Attempt **any four** questions out of Q. **2** to **7**.*
*2) Figtures at **right** indicates marks.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 15 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 15 Minutes Marks : 10

1. Choose the correct alternatives : **10**

1) Consumption is majorly influenced by
   a) Income b) Pricing c) Taxation d) Advertisement

2) Inflation refers to
   a) Continuous rise in prices
   b) Continuous fall in prices
   c) No change in the prices
   d) Price has no relation with inflation

3) Monetary policy is
   a) Formulated and implemented by RBI
   b) Formulated by RBI but implemented by Finance Dept.
   c) Formulated by Finance Dept and implemented by RBI
   d) Neither formulated nor implemented by RBI

4) RBI was establised under
   a) Banking Regulation Act, 1949 b) RBI Act, 1935
   c) RBI Act, 1934 d) Govt. of India Act, 1935

5) Macro study is
   a) Study of individual b) Study of aggregate
   c) Both above d) None of above

P.T.O.

6) Utility analysis is
   a) Subjective and changes
   b) Objective and des no change
   c) Can be measured numerically
   d) Not measurable at all by any means

7) Demand is always influenced, as per law of demand, by
   a) Price of commodity under reference
   b) Price of substitute commodity
   c) By both above
   d) By none above

8) If the price of petrol continuously increase, it will create
   a) Positive impact on demand of scooter
   b) Negative impact on demand of scooter
   c) Shall not create any impact
   d) All above alternatives are irrelevant

9) International tarde is a trade between
   a) Two different firms in the same country
   b) Two different industries in the same country
   c) Two different firms in different countries
   d) Two different regions in the same country

10) Balance of trade and balance of payment are
   a) Same concepts
   b) Different in matter of quantity of trade
   c) Balance of payment is wider than balance of trade
   d) Balance of trade is wider than balance of payment

_____

SLR-TJ – 603

Seat No.	

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
ECONOMICS
(Self Learning – H.S.S.)

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

***Instructions** : 1) Attempt **any four** questions out of Q. **2** to **7**.*
*2) Figures to the **right** indicate marks.*

2. Define Economics. Explain the importance of economics theories for business firms. **10**

3. "Law of demand shall come into effect only on remaining other things constant" – Discuss. **10**

4. Examine critically the laws of return to scale. **10**

5. What do you understand by National Income ? How it is measured in any country ? **10**

6. What is Central Banking ? In what respect it is different from commercial banking ? **10**

7. What do you understand by international trade ? Why countries go for international trade ? **10**

Set Q

SLR-TJ – 603

Seat No.	

Set R

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
ECONOMICS
(Self Learning – H.S.S.)

Day and Date : Wednesday, 13-12-2017 Toal Marks : 50
Time : 10.00 a.m. to 12.00 noon

Instructions *: 1) Attempt* ***any four*** *questions out of Q.* ***2*** *to* ***7****.*
2) Figtures at ***right*** *indicates marks.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 15 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 15 Minutes Marks : 10

1. Choose the correct alternatives : **10**

1) International tarde is a trade between
   a) Two different firms in the same country
   b) Two different industries in the same country
   c) Two different firms in different countries
   d) Two different regions in the same country

2) Balance of trade and balance of payment are
   a) Same concepts
   b) Different in matter of quantity of trade
   c) Balance of payment is wider than balance of trade
   d) Balance of trade is wider than balance of payment

3) Consumption is majorly influenced by
   a) Income b) Pricing c) Taxation d) Advertisement

4) Inflation refers to
   a) Continuous rise in prices
   b) Continuous fall in prices
   c) No change in the prices
   d) Price has no relation with inflation

P.T.O.

5) Demand is always influenced, as per law of demand, by
   a) Price of commodity under reference
   b) Price of substitute commodity
   c) By both above
   d) By none above

6) If the price of petrol continuously increase, it will create
   a) Positive impact on demand of scooter
   b) Negative impact on demand of scooter
   c) Shall not create any impact
   d) All above alternatives are irrelevant

7) Macro study is
   a) Study of individual
   b) Study of aggregate
   c) Both above
   d) None of above

8) Utility analysis is
   a) Subjective and changes
   b) Objective and des no change
   c) Can be measured numerically
   d) Not measurable at all by any means

9) Monetary policy is
   a) Formulated and implemented by RBI
   b) Formulated by RBI but implemented by Finance Dept.
   c) Formulated by Finance Dept and implemented by RBI
   d) Neither formulated nor implemented by RBI

10) RBI was establised under
   a) Banking Regulation Act, 1949
   b) RBI Act, 1935
   c) RBI Act, 1934
   d) Govt. of India Act, 1935

———————

SLR-TJ – 603

Seat No.	

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
ECONOMICS
(Self Learning – H.S.S.)

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

***Instructions** : 1) Attempt **any four** questions out of Q. **2** to **7**.*
*2) Figures to the **right** indicate marks.*

2. Define Economics. Explain the importance of economics theories for business firms. **10**

3. "Law of demand shall come into effect only on remaining other things constant" – Discuss. **10**

4. Examine critically the laws of return to scale. **10**

5. What do you understand by National Income ? How it is measured in any country ? **10**

6. What is Central Banking ? In what respect it is different from commercial banking ? **10**

7. What do you understand by international trade ? Why countries go for international trade ? **10**

Set R

SLR-TJ – 603

Seat No.	

Set S

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
ECONOMICS
(Self Learning – H.S.S.)

Day and Date : Wednesday, 13-12-2017 Toal Marks : 50
Time : 10.00 a.m. to 12.00 noon

Instructions *: 1) Attempt* ***any four*** *questions out of Q.* ***2*** *to* ***7****.*
2) Figtures at ***right*** *indicates marks.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 15 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 15 Minutes Marks : 10

1. Choose the correct alternatives : **10**

1) Demand is always influenced, as per law of demand, by
   a) Price of commodity under reference
   b) Price of substitute commodity
   c) By both above
   d) By none above

2) If the price of petrol continuously increase, it will create
   a) Positive impact on demand of scooter
   b) Negative impact on demand of scooter
   c) Shall not create any impact
   d) All above alternatives are irrelevant

3) International tarde is a trade between
   a) Two different firms in the same country
   b) Two different industries in the same country
   c) Two different firms in different countries
   d) Two different regions in the same country

P.T.O.

4) Balance of trade and balance of payment are
   a) Same concepts
   b) Different in matter of quantity of trade
   c) Balance of payment is wider than balance of trade
   d) Balance of trade is wider than balance of payment

5) Monetary policy is
   a) Formulated and implemented by RBI
   b) Formulated by RBI but implemented by Finance Dept.
   c) Formulated by Finance Dept and implemented by RBI
   d) Neither formulated nor implemented by RBI

6) RBI was establised under
   a) Banking Regulation Act, 1949 b) RBI Act, 1935
   c) RBI Act, 1934 d) Govt. of India Act, 1935

7) Consumption is majorly influenced by
   a) Income b) Pricing c) Taxation d) Advertisement

8) Inflation refers to
   a) Continuous rise in prices
   b) Continuous fall in prices
   c) No change in the prices
   d) Price has no relation with inflation

9) Macro study is
   a) Study of individual b) Study of aggregate
   c) Both above d) None of above

10) Utility analysis is
   a) Subjective and changes
   b) Objective and des no change
   c) Can be measured numerically
   d) Not measurable at all by any means

———————

SLR-TJ – 603

Seat No.	

T.E. (All Branches) (Part – I(CGPA) Examination, 2017
ECONOMICS
(Self Learning – H.S.S.)

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

***Instructions** : 1) Attempt **any four** questions out of Q. **2** to **7**.*
*2) Figures to the **right** indicate marks.*

2. Define Economics. Explain the importance of economics theories for business firms. **10**

3. "Law of demand shall come into effect only on remaining other things constant" – Discuss. **10**

4. Examine critically the laws of return to scale. **10**

5. What do you understand by National Income ? How it is measured in any country ? **10**

6. What is Central Banking ? In what respect it is different from commercial banking ? **10**

7. What do you understand by international trade ? Why countries go for international trade ? **10**

Set S

SLR-TJ – 604

Seat No.	

Set **P**

T.E. (Part – I) (All Branches) (CGPA) Examination, 2017
Self Learning (HSS)
STRESS AND COPING

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50

Time : 10.00 a.m. to 12.00 noon

***Note** : i) Q. No. **1** is **compulsory**.*
*ii) Solve **any 4** from Q.No. **2** to Q. No. **7**.*

1. A) Choose amongst the right alternative. **5**

1) Technological change, economic conditions are _____ causes of stress.

a) Political b) Environmental c) Occupational d) Cultural

2) Stress which is healthy for organisation or for the individual is known as

a) Eustress b) Distress c) Resistance d) None of these

3) High BP, Heart diseases are _____ symptoms of stress.

a) Behavioral b) Psychological c) Physiological d) None of these

4) _____ is a feeling of role occupant that there are too many expectations from his/her role.

a) Role stagnation b) Role erosion c) Role overload d) Role isolation

5) _____ deals with prioritizing and scheduling the activities to cope up with multiple job demands.

a) Physical exercise b) Relaxation

c) Wellness programs d) Time management

B) Match the pairs : **5**

Set "A"	**Set "B"**
1) Individual coping	1) Technological change
2) Organisational causes	2) Relatives
3) Environmental causes	3) Physical exercise
4) Social support	4) Confusion
5) Role ambiguity	5) Procedure and structure

P.T.O.

2. Explain the individual ways to stress management. **10**
3. Elaborate on the common sources of stress. **10**
4. The consequences of stress can be harmful. Explain this statement. **10**
5. Highlight the role of social support in minimising the effects of stress. **10**
6. Define stress and state the current and historical status of stress. **10**
7. Explain the nature of stress response. **10**

———————

SLR-TJ – 605

Seat No.	

Set **P**

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

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

MCQ/Objective Type Questions

Marks : 10

1. Choose correct answers : **10**

1) What is the term of a patent ?
   a) 35 years b) 25 years
   c) 20 years d) 15 years

2) What is copyright meant for ?
   a) Film work b) Books
   c) Essay d) All the above

3) A person develops a new process for making cheese from milk having low Fats and Cholesterol. He wishes to protect it. Which form of IPR would be suitable ?
   a) Patent b) Copyright
   c) Trademarks d) Industrial Design

4) The legislation covering Intellectual Property Right in India for Information Technology is
   a) Information Technology Act, 2003
   b) Information Technology Act, 2000
   c) Information Technology Act, 2008
   d) None of the above

P.T.O.

5) The first Patent Law was enacted in India in the year
   a) 1856 b) 1880
   c) 1905 d) 1850

6) No patent shall be granted in respect of an invention relating to
   a) Atomic energy b) Bio energy
   c) Solar energy d) Wind energy

7) Which of the following is not specifically protected by intellectual property legislation ?
   a) Industrial designs b) Trademarks
   c) Copyrights d) Trade secrets

8) All of the following are examples of intellectual property protections EXCEPT
   a) Copyrights b) Patents
   c) Contracts d) Trademarks

9) Intellectual Property Rights are result of
   a) Mental work b) Physical work
   c) Technical work d) Communication

10) To apply for a patent, an inventor must
   a) File an application at a patent office which must comply with formal and technical requirements
   b) Draft the full specification of the patent they seek, which cannot be later amended
   c) Demonstrate that their invention works
   d) None of above

SLR-TJ – 605

Seat No.	

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

N.B. *: 1) Attempt **all** questions.*
*2) Figures to the **right** indicate **full** marks.*

2. What are the essential requirements for granting patent ? Explain in detail. **10**

3. Elaborate the Indian Patent Act, 1970. **10**

OR

3. Explain role of confidentiality and information security in technology development. **10**

4. Write short notes on **any four** : **20**
   1) Copyrights
   2) Trade secrets
   3) Biotechnology and intellectual property
   4) Publication and examination of patent applications
   5) Protection of traditional knowledge
   6) Copyright issues in creative works.

Set P

SLR-TJ – 605

Seat No.	

Set Q

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

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

MCQ/Objective Type Questions

Marks : 10

1. Choose correct answers : **10**

1) Intellectual Property Rights are result of
   a) Mental work b) Physical work
   c) Technical work d) Communication

2) To apply for a patent, an inventor must
   a) File an application at a patent office which must comply with formal and technical requirements
   b) Draft the full specification of the patent they seek, which cannot be later amended
   c) Demonstrate that their invention works
   d) None of above

3) Which of the following is not specifically protected by intellectual property legislation ?
   a) Industrial designs b) Trademarks
   c) Copyrights d) Trade secrets

4) All of the following are examples of intellectual property protections EXCEPT
   a) Copyrights b) Patents
   c) Contracts d) Trademarks

P.T.O.

5) What is the term of a patent ?
   a) 35 years b) 25 years
   c) 20 years d) 15 years

6) What is copyright meant for ?
   a) Film work b) Books
   c) Essay d) All the above

7) A person develops a new process for making cheese from milk having low Fats and Cholesterol. He wishes to protect it. Which form of IPR would be suitable ?
   a) Patent b) Copyright
   c) Trademarks d) Industrial Design

8) The legislation covering Intellectual Property Right in India for Information Technology is
   a) Information Technology Act, 2003
   b) Information Technology Act, 2000
   c) Information Technology Act, 2008
   d) None of the above

9) The first Patent Law was enacted in India in the year
   a) 1856 b) 1880
   c) 1905 d) 1850

10) No patent shall be granted in respect of an invention relating to
   a) Atomic energy b) Bio energy
   c) Solar energy d) Wind energy

———————

SLR-TJ – 605

Seat No.	

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

N.B. *: 1) Attempt **all** questions.*
*2) Figures to the **right** indicate **full** marks.*

2. What are the essential requirements for granting patent ? Explain in detail. **10**

3. Elaborate the Indian Patent Act, 1970. **10**

OR

3. Explain role of confidentiality and information security in technology development. **10**

4. Write short notes on **any four** : **20**
   1) Copyrights
   2) Trade secrets
   3) Biotechnology and intellectual property
   4) Publication and examination of patent applications
   5) Protection of traditional knowledge
   6) Copyright issues in creative works.

Set Q

SLR-TJ – 605

Seat No.	

Set R

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

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

MCQ/Objective Type Questions

Marks : 10

1. Choose correct answers : **10**

1) The first Patent Law was enacted in India in the year
   a) 1856 b) 1880
   c) 1905 d) 1850

2) No patent shall be granted in respect of an invention relating to
   a) Atomic energy b) Bio energy
   c) Solar energy d) Wind energy

3) Intellectual Property Rights are result of
   a) Mental work b) Physical work
   c) Technical work d) Communication

4) To apply for a patent, an inventor must
   a) File an application at a patent office which must comply with formal and technical requirements
   b) Draft the full specification of the patent they seek, which cannot be later amended
   c) Demonstrate that their invention works
   d) None of above

P.T.O.

5) A person develops a new process for making cheese from milk having low Fats and Cholesterol. He wishes to protect it. Which form of IPR would be suitable ?
   a) Patent
   b) Copyright
   c) Trademarks
   d) Industrial Design

6) The legislation covering Intellectual Property Right in India for Information Technology is
   a) Information Technology Act, 2003
   b) Information Technology Act, 2000
   c) Information Technology Act, 2008
   d) None of the above

7) What is the term of a patent ?
   a) 35 years
   b) 25 years
   c) 20 years
   d) 15 years

8) What is copyright meant for ?
   a) Film work
   b) Books
   c) Essay
   d) All the above

9) Which of the following is not specifically protected by intellectual property legislation ?
   a) Industrial designs
   b) Trademarks
   c) Copyrights
   d) Trade secrets

10) All of the following are examples of intellectual property protections EXCEPT
   a) Copyrights
   b) Patents
   c) Contracts
   d) Trademarks

SLR-TJ – 605

Seat No.	

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

N.B. *: 1) Attempt **all** questions.*
*2) Figures to the **right** indicate **full** marks.*

2. What are the essential requirements for granting patent ? Explain in detail. **10**

3. Elaborate the Indian Patent Act, 1970. **10**

OR

3. Explain role of confidentiality and information security in technology development. **10**

4. Write short notes on **any four** : **20**
   1) Copyrights
   2) Trade secrets
   3) Biotechnology and intellectual property
   4) Publication and examination of patent applications
   5) Protection of traditional knowledge
   6) Copyright issues in creative works.

Set R

SLR-TJ – 605

Seat No.	

Set S

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date : Wednesday, 13-12-2017 Max. Marks : 50
Time : 10.00 a.m. to 12.00 noon

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

MCQ/Objective Type Questions

Marks : 10

1. Choose correct answers : **10**

1) A person develops a new process for making cheese from milk having low Fats and Cholesterol. He wishes to protect it. Which form of IPR would be suitable ?
   a) Patent b) Copyright
   c) Trademarks d) Industrial Design

2) The legislation covering Intellectual Property Right in India for Information Technology is
   a) Information Technology Act, 2003
   b) Information Technology Act, 2000
   c) Information Technology Act, 2008
   d) None of the above

3) The first Patent Law was enacted in India in the year
   a) 1856 b) 1880
   c) 1905 d) 1850

4) No patent shall be granted in respect of an invention relating to
   a) Atomic energy b) Bio energy
   c) Solar energy d) Wind energy

P.T.O.

5) Which of the following is not specifically protected by intellectual property legislation ?
   a) Industrial designs
   b) Trademarks
   c) Copyrights
   d) Trade secrets

6) All of the following are examples of intellectual property protections EXCEPT
   a) Copyrights
   b) Patents
   c) Contracts
   d) Trademarks

7) Intellectual Property Rights are result of
   a) Mental work
   b) Physical work
   c) Technical work
   d) Communication

8) To apply for a patent, an inventor must
   a) File an application at a patent office which must comply with formal and technical requirements
   b) Draft the full specification of the patent they seek, which cannot be later amended
   c) Demonstrate that their invention works
   d) None of above

9) What is the term of a patent ?
   a) 35 years
   b) 25 years
   c) 20 years
   d) 15 years

10) What is copyright meant for ?
   a) Film work
   b) Books
   c) Essay
   d) All the above

SLR-TJ – 605

Seat No.	

T.E. (All Branches) (Part – I) (CGPA) Examination, 2017
INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date : Wednesday, 13-12-2017 Marks : 40
Time : 10.00 a.m. to 12.00 noon

N.B. *: 1) Attempt **all** questions.*
*2) Figures to the **right** indicate **full** marks.*

2. What are the essential requirements for granting patent ? Explain in detail. **10**

3. Elaborate the Indian Patent Act, 1970. **10**

OR

3. Explain role of confidentiality and information security in technology development. **10**

4. Write short notes on **any four** : **20**
   1) Copyrights
   2) Trade secrets
   3) Biotechnology and intellectual property
   4) Publication and examination of patent applications
   5) Protection of traditional knowledge
   6) Copyright issues in creative works.

Set S