

Subject Code: R16CC1102

I B.Tech I Semester Supple Examinations, September-2023

ENGINEERING MATHEMATICS

(Common to CE, EEE, ME, ECE & CSE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

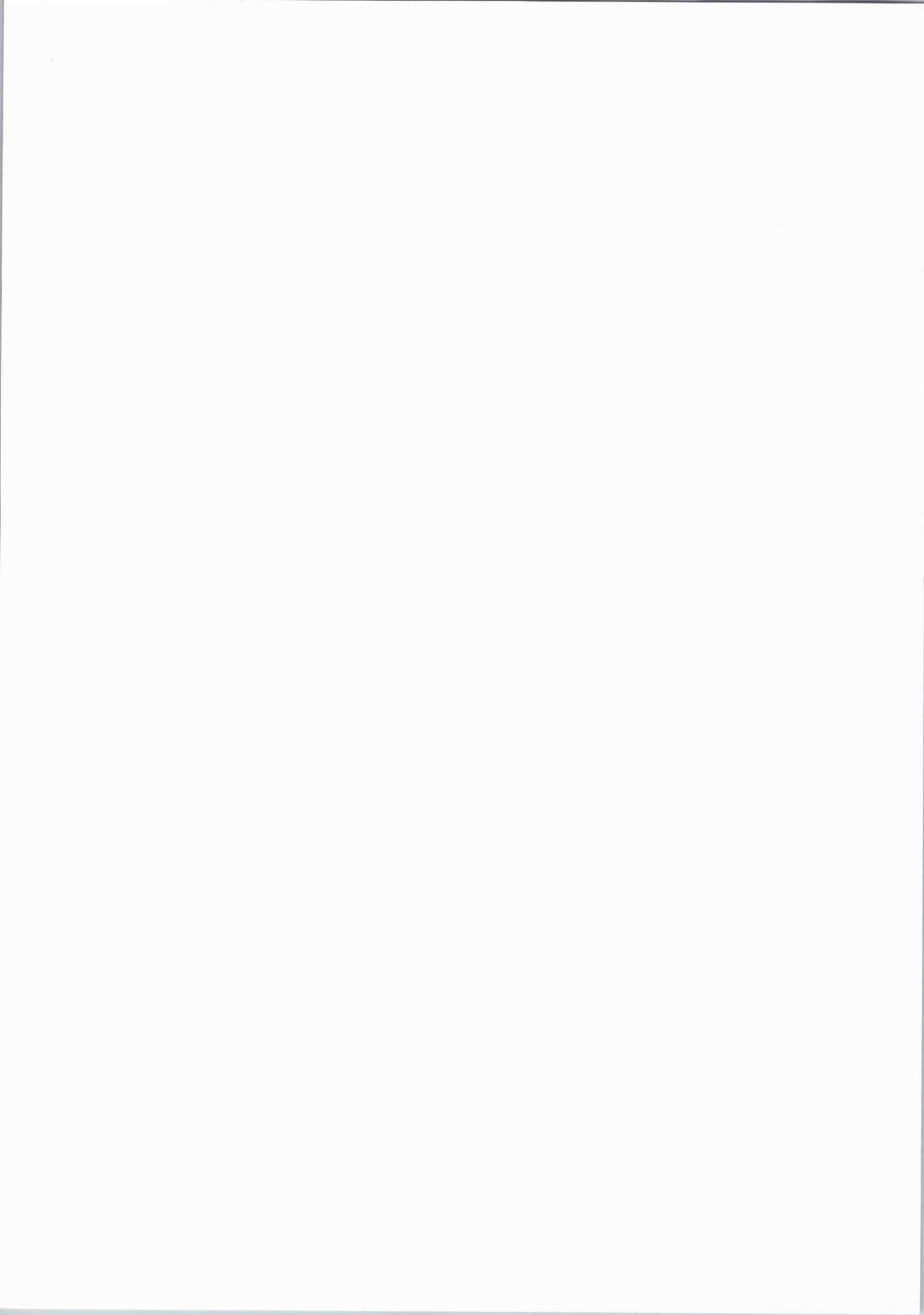
1. (a) Define orthogonal Trajectory of the family of curves.
- (b) What is the Particular integral of $(D^2 + 2)y = 4$.
- (c) State Cauchy's mean value theorem.
- (d) Write Taylor's series expansion of two variables.
- (e) Write working rule to solve the Lagrange's linear equation.
- (f) Write one dimensional heat equation.

[2+2+2+2+2+2]

PART-B

4X 12 = 48

2. (a) Solve $(x^4 + y^4)dx - (xy^3)dy = 0$.
- (b) If the temperature of air is $25^{\circ}C$ and the temperature of body drops from $100^{\circ}C$ to $80^{\circ}C$ in 10 min. What will be the temp after 20 min and when will be the temperature $40^{\circ}C$.
3. (a) Solve $(D - 2)(D + 1)^2 y = e^{2x} + e^x$.
- (b) A condenser of capacity 'c' discharged through an inductance 'L' & resistance (R) in series & charge q satisfying the equation $\frac{d^2q}{dt^2} + R \frac{dq}{dt} + \frac{q}{c} = 0$. Given that $L = 0.25$ henry;
 $R = 250 \Omega$ $c = 2 \times 10^{-6}$ Farads. further, given that when $t = 0, q = 0.002$ colombs & $i = \frac{dq}{dt} = 0$ obtain the value of q in terms of t.
4. (a) Verify Rolle's theorem for the function $f(x) = \log \left| \frac{x^2 + ab}{x(a+b)} \right|$ in the interval $[a, b]$.
- (b) Expand $e^{\sin x}$ by Maclaurin's series up to the term containing x^4 .
5. (a) If $x + y + z = u, y + z = uv, z = uvw$ then find $J \left(\frac{x, y, z}{u, v, w} \right)$.
- (b) Find Maxima and minima of function $x^4 + y^4 + 4xy - 2x^2 - 2y^2$.
6. (a) Solve $\tan x p + \tan y q = \tan z$.
- (b) Form a PDE by eliminating arbitrary constants a' & b' from the equation $z = ax + by + a^2 + b^2$.
7. (a) Solve by the method of separation of variables $\frac{\partial u}{\partial x} = 4 \frac{\partial u}{\partial y}$, given that $u(0, y) = 8e^{-3y}$.
- (b) Solve $(D^2 - 2DD' + D'^2)z = e^{x+y}$.





Subject Code: R16CC1103

I B.Tech I Semester Supple Examinations, September-2023

MATHEMATICAL METHODS

(Common to CE, EEE, ME & ECE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

- (a) When you say that a system of non-homogeneous linear equations obeys the principle of diagonal dominance?
- (b) Use the Cayley-Hamilton theorem, to find the inverse of $\begin{bmatrix} 2 & 3 \\ 3 & 3 \end{bmatrix}$.
- (c) Evaluate $\int_1^2 \int_0^x \frac{dy dx}{x^2+y^2}$.
- (d) Give the geometrical interpretation of an approximating real root of the equation by the Newton-Raphson method.
- (e) Prove that $(1+\Delta)(1-\nabla)=1$.
- (f) Write Simpson's 3/8th rule to find the value of the definite integral.

[2+2+2+2+2+2]

PART-B

4X 12 = 48

- For what values of a and b do the equations $x+2y+3z=6$, $x+3y+5z=9$, $2x+5y+az=b$ have (i) no solution (ii) a unique solution (iii) an infinite number of solutions.
- Find the rank, index, and signature of the following quadratic form by reducing it into canonical form using orthogonal transformation

$$2x^2+2y^2+3z^2+2xy-4yz-4zx.$$

- (a) Evaluate $\iint_R (x+y)^2 dx dy$, where R is the parallelogram in xy -plane with vertices $(1, 0)$, $(3, 1)$, $(2, 2)$, $(0, 1)$, using the transformation $u=x+y$ and $v=x-2y$
(b) Evaluate $\int_0^\infty \int_0^x x e^{-\left(\frac{x^2}{y}\right)} dy dx$.

- (a) Find the real root of the equation $2x - \log_{10} x = 7$ correct to four decimal places, using the fixed point iteration method with initial guess $x_0=3.8$.
(b) Use the Newton-Raphson method to obtain a real root of $x \sin x = 1$ correct to four decimal places.

6. (a) The following are the data from the steam table:

Temperature °C	140	150	160	170	180
Pressure kgf/cm^2	3.685	4.854	6.302	8.076	10.225

Using Newton's formula, find the pressure of steam for a temperature of 142 °C.

(b) Apply Lagrange's formula to find $f(x)$ from the following data:

x	0	1	4	5
$f(x)$	4	3	24	39

7. (a) Using the Runge-Kutta method of order four, compute $y(0.2)$ correct to four decimal places in steps of $h=0.1$, given that $\frac{dy}{dx} = x + y^2$, $y(0)=1$.

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using (i) Simpson's 1/3 rd rule taking $h=1/4$ (ii) Simpson's 3/8 th rule taking $h=1/6$.



Subject Code: R16CC1104

I B.Tech I Semester Supple Examinations, September-2023

PROGRAMMING WITH C

(Common to CE, EEE & ME)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

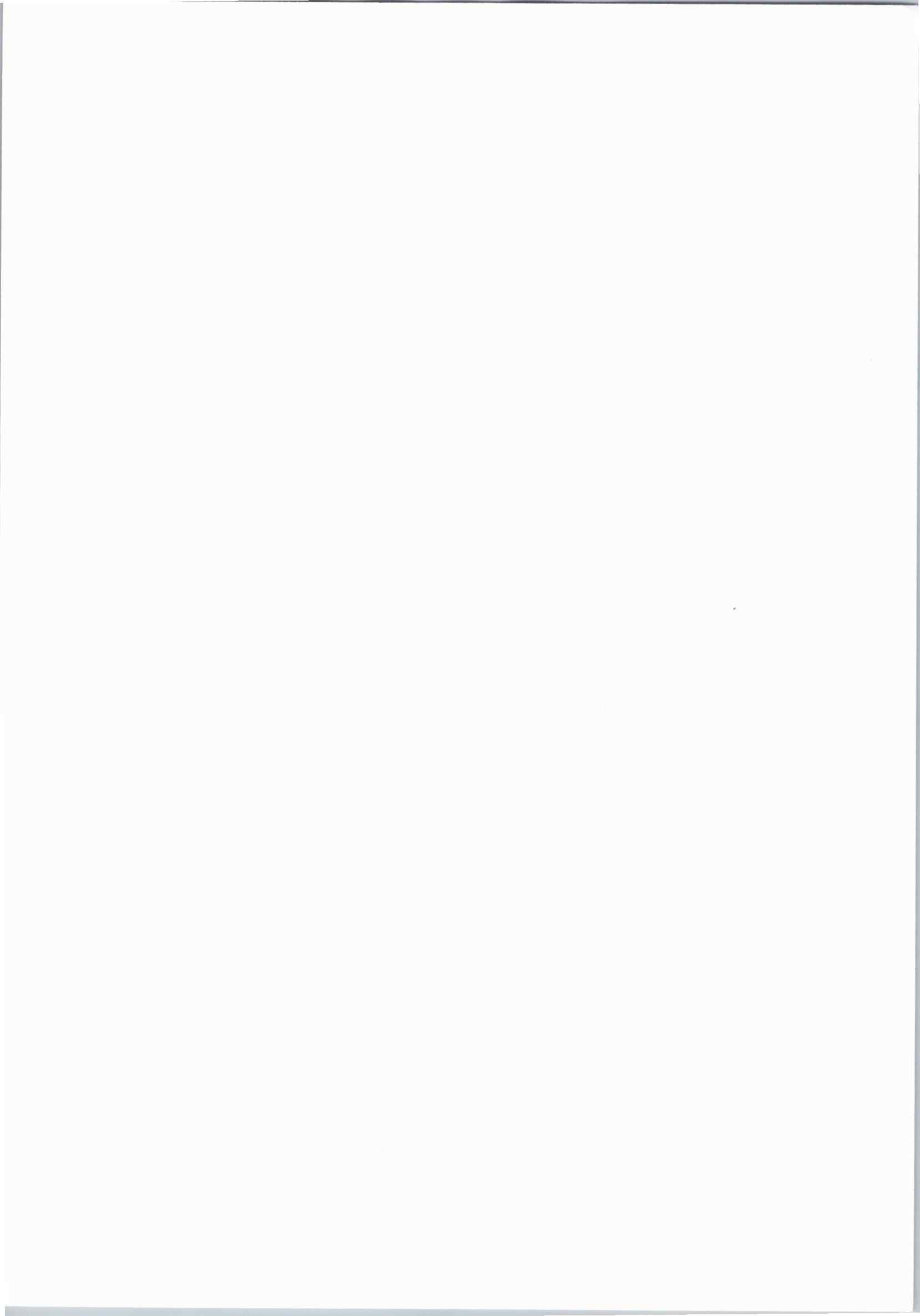
1. (a) What is a header file in C? List any two header files.
- (b) Differentiate between break and continue.
- (c) What is meant by call-by value and call-by reference?
- (d) Define pointer. How to declare and initialize it.
- (e) Differentiate between union and structure.
- (f) Write about Random file handling functions?

[2+2+2+2+2+2]

PART-B

4X 12 = 48

2. (a) Describe different Relational, Logical, Bitwise and Arithmetic operators available in C Programming Language
- (b) What is flowchart? Explain different symbols used for flowchart. [6+6]
3. (a) List and explain unconditional statements in C with examples
- (b) Write a C program to sort the given array elements in Ascending order. [6+6]
4. (a) What is recursion? What are the advantages and Disadvantages of recursion?
- (b) Write a C program to find the factorial of a given number using recursion. [6+6]
5. (a) Explain the array of pointers with example.
- (b) What is dynamic memory allocation? Write and explain the different dynamic memory allocation functions in C. [6+6]
6. (a) Write a C program to create structure with employee details and display the same.
- (b) Define union. Explain the general syntax of union with example. [8+4]
7. (a) Explain the file handling functions: a. fseek() b. ftell() c. rewind() d. feof()
- (b) Write a C program to count no.of characters, spaces, lines, words of a file. [8+4]





Subject Code: R16CC1105

I B.Tech I Semester Supple Examinations, September-2023

ENGINEERING CHEMISTRY

(Common to CE, EEE & ME)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

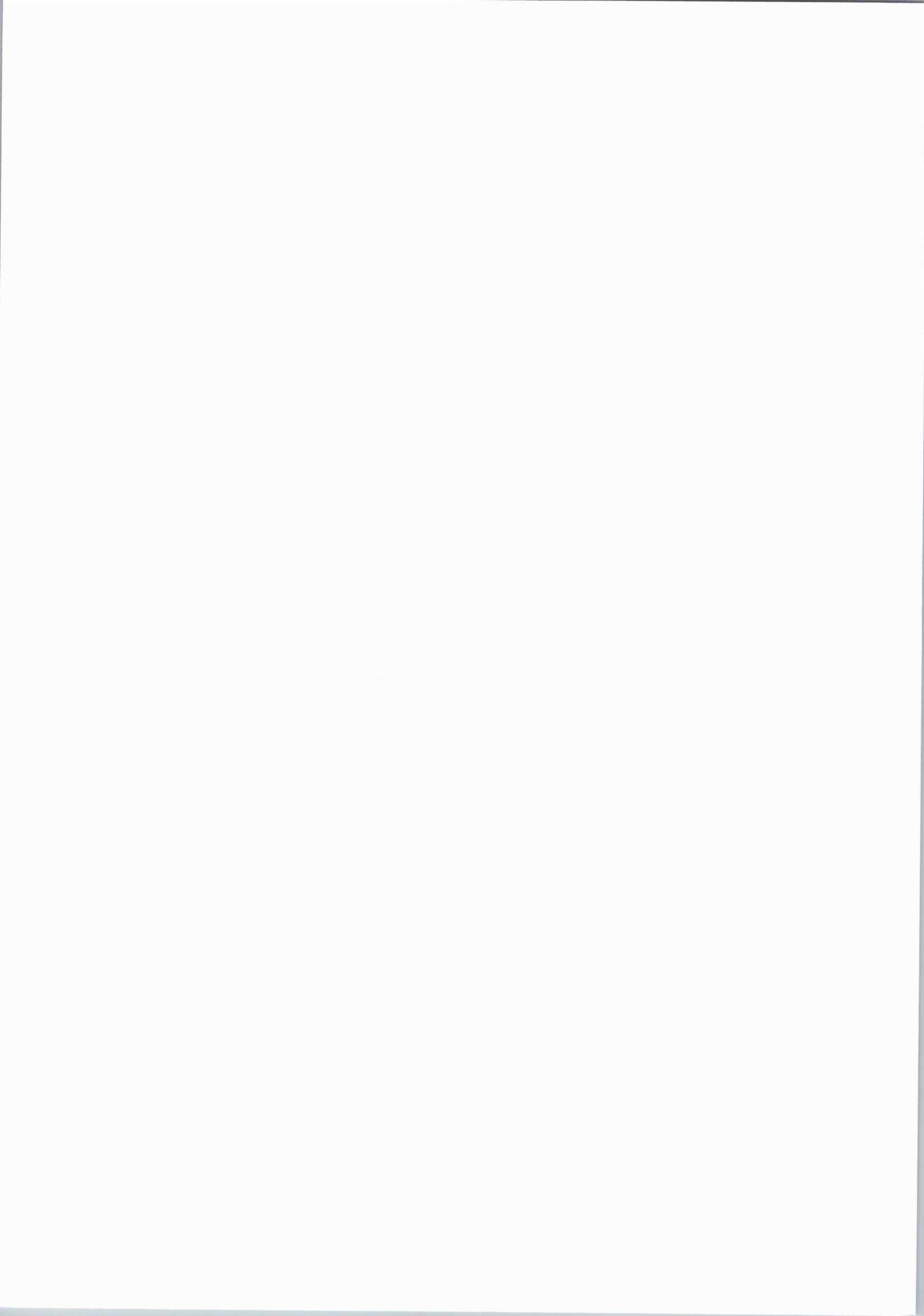
1. (a) Why is priming formed in boilers?
- (b) What are elastomers? Give examples.
- (c) How are fullerenes prepared?
- (d) Define corrosion. Give example.
- (e) What is meant by knocking in internal combustion engines?
- (f) State Lambert's Beer Law.

[2+2+2+2+2+2]

PART-B

4X 12 = 48

2. (a) Explain phosphate and calgon conditioning method for softening of water.
- (b) Discuss estimation of hardness by complexometric method.
3. (a) Explain various additives added during compounding of plastics.
- (b) Discuss briefly conducting polymers.
4. (a) Write the principles of green chemistry.
- (b) Explain process involved in manufacture of Portland cement.
5. (a) Explain (i) calomel electrode (ii) Nickel-cadmium battery
- (b) Discuss dry theory of corrosion.
6. (a) Discuss how of hydrogen, carbon and sulphur can be determined in a coal sample.
- (b) Explain Fisher's Tropch method for manufacture of synthetic petrol.
7. (a) Discuss applications of photochemistry.
- (b) Explain Jablonski diagram.





Subject Code: R16CC1107

I B.Tech I Semester Supple Examinations, September-2023

ENGINEERING GRAPHICS

(Common to ECE & CSE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B
All questions carry equal marks of 12.

PART-A

1. (a) Define engineering drawing. Why drawing is called universal language of engineers?
(b) What do you mean by H.T & V.T of a line?
(c) What is difference between prism and pyramid?
(d) What are the types of planes?
(e) What do you understand by regular solids?
(f) Differentiates between Isometrics Projection and Isometric View.

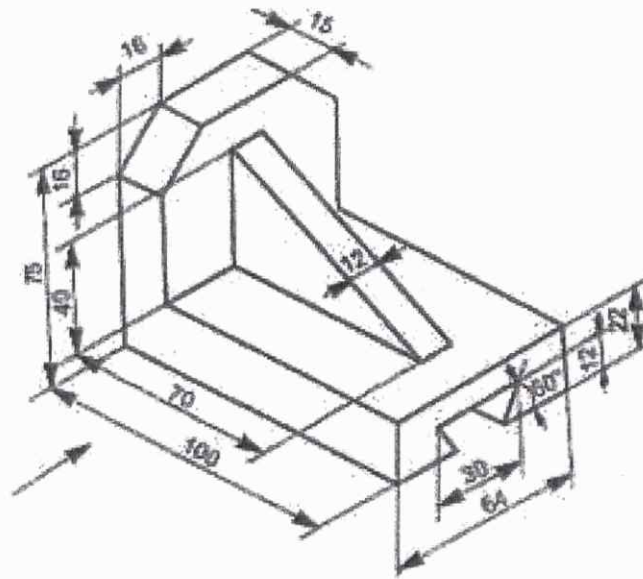
[2+2+2+2+2+2]

PART-B

4X 12 = 48

2. Two fixed points C and D are 80 mm apart. Draw the locus of point p moving (in the same plane as that of C and D) in such a way that the sum of its distance from C and D is always same and equal to 100 mm. Name the curve.
3. (a) A point R is situated in a plane inclined 40° to the VP and passing through the intersection of the HP and VP. Draw the projections of R if the distance of R is 50 mm in front of the VP.
(b) A straight-line CD of 50 mm length is parallel to the HP and inclined at 30 degrees to the VP. Its end C, which is nearer to the VP is 10 mm from the VP and 25 mm from the HP. Draw the projections of the line CD in all possible positions.
4. The midpoint of a line AB is 35mm above HP and 45mm in front of VP. The top view and front view of the line measures 80mm and 70mm respectively. The end A is 10mm in front of VP and the end B is nearer to HP. Draw the projections and find its true length and true inclinations.
5. A square lamina is placed such that one of the corners is touching the VP and the diagonal through this is perpendicular to the VP and measures 60mm. The other diagonal appears to be 40 mm in the view from above. Draw the projections and find the inclination of the plane to the ground.
6. A cylinder of base diameter 50mm and axis height 65mm is resting on HP on a point on the circumference of the base with its axis inclined at 50° to HP and parallel to VP. Draw its projections.

7. Draw the three orthographic views for the following fig.





Subject Code: R16CC1108

I B.Tech I Semester Supple Examinations, September-2023

ENGINEERING PHYSICS

(Common to ECE & CSE)

Time: 3 hours

Max Marks: 60

Question Paper Consists of **Part-A** and **Part-B**.

Answering the question in **Part-A** is Compulsory & Four Questions should be answered from Part-B

All questions carry equal marks of 12.

PART-A

1. (a) Differentiate diffraction and interference.
- (b) Explain the principle of light propagation through optical fibers.
- (c) Differentiate primitive and non-primitive unit cell.
- (d) What is the principle of magnetostriction effect?
- (e) Discuss about dual nature of matter.
- (f) Draw the energy band diagram for intrinsic, n-type and p-type semiconductors indicating the positions of Fermi energy levels.

[2+2+2+2+2+2]

PART-B

4X 12 = 48

2. (a) What is the principle of double refraction. Discuss the construction and working of Nichol's prism. (6M)
- (b) Explain the Fraunhofer diffraction due to single slit. Obtain the condition for maximum intensity of diffraction pattern. (6M)
3. (a) Discuss the construction and working of He-Ne laser using a neat sketch of energy level diagram. (6M)
- (b) Derive the expression for numerical aperture of an optical fiber. Discuss its importance. (6M)
4. (a) What is atomic packing factor (APF)? Derive the APF for SC, BCC and FCC. Prove that the FCC crystal systems are densely packed than SC and BCC. (8M)
- (b) State and explain Bragg's law. (4M)
5. (a) What is reverberation time? Explain Sabine formula of reverberation time. (6M)
- (b) Explain the construction and working of piezoelectric generator. Mention its advantages and drawbacks. (6M)
6. (a) Assuming Schrodinger time independent wave equation, solve the problem of a particle enclosed in a potential well of infinite height. Derive the probability density function of the particle for the ground state, first and second excited states. (8M)
- (b) Discuss the importance of Fermi energy in semiconductors. (4M)
7. (a) Assuming a particle moving in a one-dimensional potential well, Discuss the boundary conditions and origin of formation of band structure using Kronig-Penney model. (8M)
- (b) Derive the relation between Hall voltage and Hall coefficient with a neat experimental setup. (4M)

