



Subject Code: R16CC1102

I B.Tech I Semester Supple Examinations, May-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) Solve $e^x \left(\frac{dy}{dx} + 1 \right) = e^x$.

(b) Solve $(D^2 + 1)^3 y = 0$.

(c) Verify Rolle's theorem for $f(x) = x^2$, where $2 \leq x \leq 3$.

(d) If $z = u^2 + v^2$ and $u = at^2$, $v = 2at$, find the value of $\frac{dz}{dt}$.

(e) Write the order and degree of the partial differential equation $\left(\frac{\partial z}{\partial x} \right)^3 + \frac{\partial^2 z}{\partial y^2} = \sec(x + y)$

(f) Solve $\frac{\partial^2 z}{\partial x^2} + 5 \frac{\partial^2 z}{\partial x \partial y} + 6 \frac{\partial^2 z}{\partial y^2} = 0$

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

PART-B

4X 12 = 48

2. (a) Solve the equation $2x \frac{dy}{dx} = 10x^3 y^4 + y$

(b) The number N of bacteria in a culture grew at a rate proportional to N . The value of N was initially 100 and increased to 332 in one hour, what would be the value of N after $1\frac{1}{2}$ hours?

3. (a) Solve $x^2 \frac{d^2 y}{dx^2} - 3x \frac{dy}{dx} + 4y = (1+x)^2$.

(b) Find the solution of $\frac{d^2 y}{dx^2} + 4y = x \sin x$.

4. (a) Prove that $\frac{b-a}{b} < \log \left(\frac{b}{a} \right) < \frac{b-a}{a}$, for $0 < a < b$. Hence show that $\frac{1}{4} < \log \frac{4}{3} < \frac{1}{3}$.

(b) A rectangular metal sheet of length 6 metres width 2 metre is given. Four equal squares are removed from the corners. The sides of this sheet are now turned up to form an open rectangular box. Find approximately, the height of the box in centimetres, such that the volume of the box is maximum.

5. (a) If $x^x y^y z^z = c$, show that at $x = y = z$, $\frac{\partial^2 z}{\partial x \partial y} = - (x \log ex)^{-1}$.

(b) If $xyz = 8$, find the values of x, y for which $u = \frac{5xyz}{x + 2y + 4z}$ is a maximum.

6. (a) Form the partial differential equation by eliminating arbitrary functions from $f(x^2 + y^2, z - xy) = 0$

(b) Solve $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$.

7. The ends A and B of a rod 20 cm long have the temperature at 30°C and 80°C until steady-state prevails. The temperature of the ends are changed to 40°C and 60°C respectively. Find the temperature distribution in the rod at time t .



Subject Code: R16CC1103

I B.Tech I Semester Supple Examinations, May-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

1. (a) If $A+B = \begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix}$ and $A-B = \begin{bmatrix} 3 & 1 \\ 1 & 4 \end{bmatrix}$ calculate the product AB .

(b) Find the index and signature of the quadratic form $x_1^2 + 2x_2^2 - 3x_3^2$

(c) Sketch the region of integration for $\int_0^1 \int_0^x f(x, y) dy dx$.

(d) Derive a formula to find the value of \sqrt{N} , by the Newton-Raphson method.

(e) State Fundamental theorem of finite differences and hence evaluate

$$\Delta^{10} \left[(1-x)(1-2x^2)(1-3x^3)(1-4x^4) \right], \text{ considering interval of difference as 1.}$$

(f) State Trapezoidal rule and Simpson's $3/8^{\text{th}}$ rule.

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

PART-B

4X 12 = 48

2. (a) Find non-singular matrices P and Q such that PAQ is in the normal form of A for the matrix

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

(b) Apply Gauss elimination method to solve the equations

$$x + 4y - z = -5$$

$$x + y - 6z = -12$$

$$3x - y - z = 4$$

3. (a) Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$.

(b) Write the characteristic equation of matrix $A = \begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$ and verify Cayley-Hamilton

Theorem.

4. (a) Find the area bounded by the parabola $y^2 = 4 - x$; and $y^2 = 4 - 4x$ as a double integral and evaluate it.

(b) Evaluate $\int_1^{e^{(\log y)^e}} \int_1^y \int_1^z (\log z) dz dx dy$.

5. (a) By Newton's method, find the real root of the equation $3x = \cos x + 1$

(b) Find the negative root of the equation $x^3 - x^2 + 1 = 0$, correct to three places of decimals, using bisection method.

6. (a) In the following table, the values of y are consecutive terms of a series of which 12.5 is the 5th term. Find the first and tenth terms of the series

X	3	4	5	6	7	8	9
Y	2.7	6.4	12.5	21.6	34.3	51.2	72.9

(b) Given the values

x:	5	7	11	13	17
f(x):	150	392	1452	2366	5202

Evaluate $f(6)$, using Newton's divided difference formula.

7. (a) Apply Runge-Kutta method of fourth order to find an approximate value of y when $x = 0.2$ given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$.

(b) Using Euler's modified method compute the value of y at $x = 0.1$ and at $x = 0.2$ given that $\frac{dy}{dx} = x + y^2$, $y(0) = 1$



Subject Code: R16CC1104

I B.Tech I Semester Supple Examinations, May-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 are basic data types in C Language?
- (b) Distinguish between while and do-while loops.
- (c) What are storage classes in C language?
- (d) What are Command Line Arguments?
- (e) Explain about unions.
- (f) What are Binary Files?

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

PART-B

4X 12 = 48

2. (a) Explain arithmetic and relational operators with examples in C language.
(b) Write C statements for the following Expressions.
(i) $y = ax^2 + bx + c$
(ii) $y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
3. (a) Explain syntax of Nested-if statement with example.
(b) Write a C program to find Addition of 2 Matrices.
4. (a) Write about function declaration, function definition and function call.
(b) Write a C program to find the factorial of given number using Recursive function.
5. (a) Explain dynamic memory function malloc(), calloc() and free().
(b) Write a C function to swap two given numbers using pointers.
6. (a) What is Structure data type? Explain with example.
(b) Explain valid pointer operations.
7. (a) Explain about text files with example.
(b) Discuss various file I/O Operations.



Subject Code: R16CC1105

I B.Tech I Semester Supple Examinations, May-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) Explain carbonate conditioning for water softening.
- (b) Write any two important applications of Bakelite.
- (c) Define thermotropic liquid crystals with suitable examples.
- (d) Mention two important applications of H₂-O₂ fuel cell.
- (e) Define calorific value of a fuel. Mention the relationship between HCV and LCV.
- (f) State Lambert-Beer's law.

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

PART-B

4 X 12 = 48

2. (a) 50 mL of standard hard water containing 1 mg of pure CaCO₃ per ml consumed 20 mL of EDTA solution. 50 mL of a water sample consumed 25 mL of the same EDTA solution. Calculate the total hardness of water sample in ppm. [4M]
- (b) Discuss Ion-Exchange method for water softening with a neat diagram and chemical reactions. [5M]
- (c) State the differences between scale and sludge. [3M]
3. (a) State the differences between addition polymerization and condensation polymerization reaction. [4M]
- (b) Write preparation, properties and uses of styrene rubber. [5M]
- (c) State the differences between low density polyethylene and high density polyethylene. [3M]
4. (a) Write preparation, properties and applications of fullerenes. [6M]
- (b) Write applications of green chemistry. [3M]
- (c) Write a short note on photovoltaic cell. [3M]
5. (a) Explain the charging and discharging process in lead-acid storage cell with chemical reactions involved in it. [5M]
- (b) Explain sacrificial anodic protection. [4M]
- (c) State the characteristics of a good paint. [3M]
6. (a) What are the advantages of catalytic cracking over thermal cracking? [2M]
- (b) Calculate the weight and volume of air required for combustion of 3 kg of carbon. [4M]
- (c) Write a short note on Fischer-Tropsch method for synthesis of petrol. [3M]
- (d) Distinguish between proximate and ultimate analysis of coal. [3M]

7. (a) A solution of thickness 5 cm transmits 30% incident light. Calculate the concentration of the solution if molar extinction coefficient of the solution is $5000 \text{ dm}^3\text{mol}^{-1}\text{cm}^{-1}$. [4M]
- (b) Write a short note on photo-excitation of organic molecules. [4M]
- (c) Draw a neat diagram of Jablonski diagram. [4M]

*****All The Best*****

Subject Code: R16CC1107

I B.Tech I Semester Supple Examinations, May-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

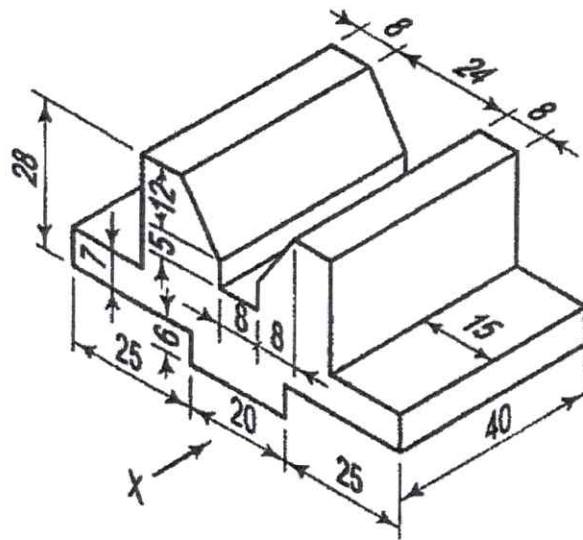
1. (a) Construct a regular hexagon of side 40 mm by general method.
(b) Draw the projections of a point 15 mm above the H.P. and 50 mm behind the V.P.
(c) Draw the projections of a 75 mm long straight line Parallel to and 40 mm in front of the V.P. and in the H.P.
(d) An equilateral triangle of 50 mm side has its V.T. parallel to and 25 mm above xy. It has no H. T. Draw its projections when one of its sides is inclined at 45° to the V.P.
(e) Draw the projections of a cone with base 40mm diameter, axis 50 mm long, lying on its base on H.P.
(f) Draw the isometric view of a circle of 40mm diameter with its surface parallel to V.P.
[2+2+2+2+2+2]

PART-B

4X 12 = 48

2. (a) Construct a parabola whose focus is 50 mm away from directrix.
(b) Construct a scale of 1 : 4 to show centimetres and long enough to measure upto 5 decimetres.
3. (a) A point P is 20 mm below H.P. and lies in the third quadrant. Its shortest distance from xy is 40 mm. Draw its projections.
(b) The front view of a line, inclined at 30° to the V.P is 65 mm long. Draw the projections of the line, when it is parallel to and 40 mm above the H.P., its one end being 30 mm in front of the V.P.
4. A line AB, 65 mm long has its end A 20 mm above the H.P. and 25 mm in front of the V.P. The end B is 40 mm above the H.P. and 65 mm in front of the V.P. Draw the projections of AB and show its inclinations with the H.P. and the V.P.
5. Draw the projections of a regular hexagon of 25 mm side, having one of its sides in the H.P. and inclined at 60° to the V.P., and its surface making an angle of 45° with the H.P.
6. A pentagonal pyramid, base 25 mm side and axis 50 mm long has one of its triangular faces in the V.P. and the edge of the base contained by that face makes an angle of 30° with the H.P. Draw its projections.

7. Draw the front view, top view and side view of the following figure:





Subject Code: R16CC1108

I B.Tech I Semester Supple Examinations, May-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) Define half wave plate.
- (b) What do you understand about fractional refractive index change in optical fibre?
- (c) Define primitive lattice.
- (d) Write any four properties of ultrasonics.
- (e) What are the drawbacks of quantum free electron theory?
- (f) What is an intrinsic semiconductor?

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

PART-B

2. (a) Explain the phenomenon of interference of light due to thin film and find the conditions for maxima and minima. [8]
- (b) A parallel beam of light of wavelength 5890\AA is incident on a glass plate of refractive index 1.5 such that the angle of refraction into the plate is 60° . Calculate the smallest thickness of the plate, which will make it appear dark by reflection. [4]
3. (a) With necessary theory and energy level diagram, explain the construction and working of a He-Ne gas laser. [8]
- (b) Derive an expression for acceptance angle in terms of refractive indices of the core and the cladding. [4]
4. (a) Find the coordination number, nearest neighbour distance, atomic radius and packing fractions of SC lattices. [8]
- (b) What are Miller indices? Draw the plane for the cubic unit cell: (101) [4]
5. (a) Explain the construction and production of ultrasonics using Piezo electric method. [8]
- (b) What are the basic requirements of acoustically good hall? [4]
6. (a) Define Fermi energy. What is the relation of Fermi energy with the concentration of electrons in the metals? [6]
- (b) Derive Schrodinger time independent wave equation. [6]
7. (a) Distinguish between metals, semiconductors and insulators on the basis of their energy band structure. [6]
- (b) State and explain Hall effect. [6]
