Hall Ticket Number :										

R-15

Code: 5GC14

I B.Tech. I Semester Supplementary Examinations December 2022

Engineering Mathematics-I

(Common to all Branches)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. a) A bacterial culture, growing exponentially, increases from 100 to 400 grams in 10 hours. How much was present after 3 hours 7M

   b) Find the Orthogonal trajectories of the family of parabolas $y^2 = 4ax$ 7M

OR

2. Find the Orthogonal trajectories of the family of curves $r = a(1+\cos^{-})$ 14M

UNIT–II

3. Using the method of variation of parameters, solve $(D^2 + a^2)y = \sec ax$ 14M

OR

4. Solve $(D^2 + 4)y = \sin x$ 14M

UNIT–III

5. a) Expand $\sin x$, by using Maclaurin's theorem. 7M

   b) Verify Rolle's Theorem for $f(x) = e^x(\sin x - \cos x) in\left(\frac{®}{4}, \frac{5®}{4}\right)$ 7M

OR

6. If $f(x) = \sin^{-1} x, 0 < a < b < 1,$ use Mean value theorem to prove that

$$\frac{b-a}{\sqrt{(1-a^2)}} < \sin^{-1} b - \sin^{-1} a < \frac{b-a}{\sqrt{(1-b^2)}}$$ 14M

UNIT–IV

7. If $u = \sin^{-1}\left(\frac{x^2+y^2}{x+y}\right),$ then prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \tan u$ 14M

OR

8. Given $x + y + z = a,$ find the maximum value of $x^m y^n z^p$ 14M

UNIT–V

9. Trace the curve $x = a(^{-} + \sin^{-})$, $y = a(1+\cos^{-})$ 14M

OR

10. Trace the curve $r = a(1-\cos^{-})$ 14M

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R-15

Code: 5GC15

I B.Tech. I Semester Supplementary Examinations December 2022

Mathematical Methods

(Common to CSE and IT)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. Reduce the matrix to normal form and hence find its rank

$$\begin{bmatrix} 1 & 2 & -1 & 4 \\ 2 & 4 & 3 & 4 \\ 1 & 2 & 3 & 4 \\ -1 & -2 & 6 & -7 \end{bmatrix}$$

OR

2. a) Test for consistency and solve
$5x+3y+7z=4,\ 3x+26y+2z=9,\ 7x+2y+10z=5$

b) Solve $x+3y-2z=0,\ 2x-y+4z=0,\ x-11y+14z=0.$

UNIT–II

3. Find the Eigen roots and Eigen vectors of the matrix

$$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$

OR

4. Diagonalise the matrix

$$A=\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}.$$

UNIT–III

5. Reduce the Quadratic form $8x^2+7y^2+3z^2-12xy-8yz+4zx$ to the normal form by orthogonal transformation.

OR

6. Reduce the quadratic form $7x^2+6y^2+5z^2-4xy-4yz$ to the canonical form.

UNIT–IV

7. a) Find the real root of the equation $x^3-2x-5=0$ by regula-falsi method correct to three decimals.

b) Using Newton's -Raphson method, find the real root of $x^3-3x+1=0$ correct to 3 decimals.

OR

8. a) Find the real root of the equation $e^x=4\sin x$ by using bisection method correct to four decimals.

b) Evaluate $\sqrt[3]{24}$ by Newton's iteration method correct to four decimals.

UNIT–V

9. From the following table, estimate the number of students who obtained marks between 40 and 45.

Marks	30-40	40-50	50-60	60-70	70-80
No.of students	31	42	51	35	31

OR

10. A curve is passing through the points (0,18) (1,10) (3,-18) and (6,90).Find the slope of the curve at $x=2$.

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Hall Ticket Number :										

R-15

Code: 5G111

I B.Tech. I Semester Supplementary Examinations December 2022

Problem Solving Techniques and Introduction to C Programming

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. a) Differentiate between computer hardware and software 7M
   b) Write an algorithm to find product of two integers using repetitive addition 7M

OR

2. a) Explain in detail about the software development method. 7M
   b) List and explain various symbols used in flowcharts with figures 7M

UNIT–II

3. a) Discuss about operator precedence in expression evaluation with a suitable example. 7M
   b) Give the format for conditional operator. When is it used? 7M

OR

4. a) Explain different data types supported by C language with their memory requirements. 7M
   b) Describe the structure of a C program with example 7M

UNIT–III

5. a) Write a C Program to check weather given number is Amstrong number or not 7M
   b) Explain the significance of ‘break’ and ‘continue’ statement with a sample program. 7M

OR

6. a) Write ‘C’ program to print the Fibonacci sequence. 7M
   b) In what way a do – while loop differs from while loop. Explain. 7M

UNIT–IV

7. a) Write a program to print an array in reverse order 7M
   b) Write a C Program to delete ‘n’ characters in a given string 7M

OR

8. a) What is an Array? How to declare and initialize a one dimensional array? 4M
   b) Explain different string manipulation functions with example 10M

UNIT–V

9. a) What is the scope of variables of type extern, auto, register and static? Explain with example. 10M
   b) What is meant by user defined function? Explain with an example C program 4M

OR

10. a) What is a function? What are its advantages? Explain various parameter passing techniques. 10M
    b) Write a function that checks whether a given year is leap year or not. 4M

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