Hall Ticket Number :										

R-15

Code: 5GC14

I B.Tech. I Semester Supplementary Examinations February 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) Find the Orthogonal trajectories of the family of parabolas $y^2 = 4ax$ 7M

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

OR

2. Find the Orthogonal trajectories of the family of curves $r^n = a^n \cos n\theta$ 14M

UNIT–II

3. Solve $(D^2 - 6D + 25)y = e^{2x} + \sin x + x$ 14M

OR

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

UNIT–III

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

   b) Verify Lagrange's Mean value theorem for $f(x) = e^x \; in [0,1]$ 7M

OR

6. a) Expand $\sin x$ in powers of $\left(x - \frac{\pi}{2}\right)$ 7M

   b) Expand e^x in powers $(x-1)$ upto four terms. 7M

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 $x^3 + y^3 = 3axy$ 14M

OR

10. Trace the curve $r^2 = a^2 \cos 2\theta$ 14M

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Hall Ticket Number :										

R-15

Code: 5GC15

I B.Tech. I Semester Supplementary Examinations February 2022

Mathematical Methods-I

(Common to CSE & 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. a) Give a brief note on the following.
i) Hermitian matrix. ii) Skew-Hermitian iii) Unitary matrix
iv) Orthogonal matrix 6M

b) Define the rank of the matrix. Find the rank of the matrix

A= $\begin{bmatrix} -2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$ by reducing it to normal form. 8M

OR

2. a) Find the values of a and b for which the equations x+ ay+ z=3, x+2y+2z=b, x+5y+3z=9 will have i) no solution ii) Unique solution iii) Infinite no of solutions. 6M

b) Find whether the following equations are consistent, it so solve them $x_1 + 2x_2 + 3x_3 = 16,\ x_1 + x_2 - 3x_3 = -9,$ $x_1 - 2x_2 + 2x_3 = 8$. 8M

UNIT–II

3. a) Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ 8M

b) Show that if $a_1, a_2, a_3, \ldots\ldots a_n$ latent roots of a matrix A are, then A^3 has the latent roots $a^3_1, a^3_2, a^3_3, \ldots\ldots a^3_n$ and $k^{a_1}, k^{a_2}, k^{a_3}, \ldots\ldots k^{a_n}$ are latent roots of kA. 6M

OR

4. a) Define a model matrix, Diagonalize the Matrix

A= $\begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$ 14M

UNIT–III

5. a) Define Hermitian, skew-Hermitian, Unitary Matrices and give example for each 7M

   b) Identify the Nature, Index and Signature of the Quadratic form $x_1^2 + 4x_2^2 + x_3^2 - 4x_1x_2 + 2x_1x_3 - 4x_2x_3$ 7M

OR

6. a) Reduce the quadratic form $3x_1^2 + 3x_2^2 + 3x_3^2 + 2x_1x_2 + 2x_1x_3 - 2x_2x_3$ in to a sum of squares. Also find the rank, index, signature and nature of the quadratic form. 10M

   b) Find the eigen values of the matrix $\begin{bmatrix} 4 & 1-3i \\ 1+3i & 27 \end{bmatrix}$ 4M

UNIT–IV

7. a) Find the real root of the equation $x\log_{10} x = 1.2$ by Regular-false method correct to four decimal places. 7M

   b) Find the real root of $f(x) = x^3 - 19$ correct upto three decimal places using Newton-Raphson method. 7M

OR

8. a) Using the bisection method, Find The Negative Root Of The Equation $x^2 - 4x - 9 = 0$ 7M

   b) Using the Newton-Raphson's method, evaluate to two decimal places the root of the transcendental equation $f(x) = e^x - 3x = 0$. Using between 0 and 1. 7M

UNIT–V

9. a) Consider the following data for g(x)=(sin x)/x^2

x	0.1	0.2	0.3	0.4	0.5
g(x)	9.9833	4.9696	3.2836	2.4339	1.9177

Calculate g(0.25) accurately using Newton's forward method of interpolation. 7M

   b) Using Lagrange's interpolation formula, find y(10) from the following table

X	5	6	9	11
Y	12	13	14	16

7M

OR

10. a) Compute $f'(4)$ from the following table:

x	1	2	4	8	10
f(x)	0	1	5	21	27

8M

   b) Evaluate $\int_0^2 e^{-x^2} dx$ using Simpon's rule. Taking h=0.25. 6M

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Hall Ticket Number :										

R-15

Code: 5G111

I B.Tech. I Semester Supplementary Examinations February 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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Marks

UNIT–I

1. a) What is a flow chart? How it is different from an Algorithm 7M
   b) Illustrate different phases of Software Development Life Cycle (SDLC) with a neat diagram. 7M

OR

2. a) What is Programming Language? What is the generation of programming Language? Describe it briefly. 7M
   b) Give short notes on computer environments. 7M

UNIT–II

3. a) What is a variable? What are the rules for declaring variables? Give examples of valid and invalid variables 7M
   b) Describe Structure of C program with an example. 7M

OR

4. a) Explain about the basic data types in C language with examples 7M
   b) Explain with examples, any two types of operators in c programming language. 7M

UNIT–III

5. a) Explain for loop and nested for loop in c programming language. 7M
   b) Write a program to print sum of odd numbers between 1 and 100 using for loops. 7M

OR

6. a) Explain with examples, if…else and nested if….else statements. 7M
   b) Write a program to find the largest among three numbers. 7M

UNIT–IV

7. a) How single dimensional arrays and multidimensional arrays are declared and initialized? Explain with suitable examples. 7M
   b) How to declare and initialization of strings? Explain them with examples. 7M

OR

8. a) Explain any five string handling functions with suitable examples, 7M
   b) Write a C program for addition of two matrices. 7M

UNIT–V

9. a) Discuss in details about local variables and global variables with respect to their scope and extent. 7M
   b) Explain about the actual arguments and formal argument in functions. What is the difference between these arguments? 7M

OR

10. a) What are the different ways of passing parameters to the function? Explain. 7M
    b) Write a c program to find the factorial of a number using recursive function. 7M

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Hall Ticket Number :										

R-15

Code: 5GC12

I B.Tech. I Semester Supplementary Examinations February 2022

Engineering Chemistry

(Common to CE, ME & CSE)

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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Marks

UNIT–I

1. a) Explain the process of a phosphate, carbonate and sodium aluminate conditioning of boiler feed water 7M
   b) Give detailed procedure for the determination of dissolved oxygen in water. 7M

OR

2. a) With the help of neat diagram, describe the reverse osmosis method for the desalination of brackish water. 7M
   b) What is hardness of water? How do you classify and express hardness? 7M

UNIT–II

3. a) Write a note on the mechanism of hydrogen evolution type of wet corrosion. 7M
   b) Explain rusting of iron with the help of electrochemical theory of corrosion 7M

OR

4. a) On what factors does the conductance of a solution depend? How would you proceed to determine the conductivity of a solution? 7M
   b) Explain passivity of metals. How it affects rate of corrosion 7M

UNIT–III

5. a) What is vulcanization of rubber? Explain why natural rubber needs vulcanization. How is it carried out? 7M
   b) Write a note on the classification of polymers with examples 7M

OR

6. a) Write the characteristics of co-polymerization 7M
   b) Write a note on polydispersive index 7M

UNIT–IV

7. a) Write short note on octane number and cetane number. 7M
   b) Compare the liquid fuels with gaseous fuels. 7M

OR

8. a) With a neat diagram describe the Orsat's gas analysis method. What are the special precautions to be taken in the measurement? 7M
   b) Describe the determination of calorific value of a solid fuel using bomb calorimeter. 7M

UNIT–V

9. a) Describe the analysis of cement 7M
   b) Write a note on the classification of refractories with examples. 7M

OR

10. a) Define refractory? Discuss the criteria of good refractory materials 7M
    b) Explain the hardening and setting of cement using the chemical equations 7M

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