I B. Tech II Semester Supplementary Examinations, March -2022

MATHEMATICS-II
(Com. to All Branches)

Time: 3 hours   Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks
~~~~~~

UNIT-I

1. a) Define the rank of the matrix and find the rank of the matrix using Echelon form   (7M)

$$\begin{bmatrix} 2 & 1 & 3 & 5 \\ 4 & 2 & 1 & 3 \\ 8 & 4 & 7 & 13 \\ 8 & 4 & -3 & -1 \end{bmatrix}$$

   b) Solve the equations $x + y + z - w = 2,\ 7x + y + 3z + w = 12,\ 8x - y + z - 3w = 5,\ 10x + 5y - 3z + 2w = 20$ by Gauss-Elimination method   (7M)

Or

2. a) Solve the equations $x + y - 2z + 3w = 0, x - 2y + z - w = 0, 4x + y - 5z + 8w = 0, 5x - 7y + 2z - w = 0.$ (7M)

   b) Prove that for any real symmetric matrix Eigen vectors corresponding to two distinct eigen values are orthogonal.   (7M)

UNIT-II

3. a) Verify Cayley -Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 2 & -1 & 1 \end{bmatrix}$ also find A^{-1} (7M)

   b) Find the nature, rank, index and signature of the quadratic from by reduce in to canonical form $x^2 + 3y^2 + 3z^2 - 2yz$ (7M)

Or

4 a) Diagonalize the matrix A where $= \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$?   (7M)
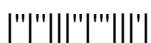
   b) Reduce the quadratic form $3x^2 + 2y^2 + 3z^2 - 2xy - 2yz$ into a sum of squares by orthogonal transformation.   (7M)

UNIT-III

5. a) Find the real root of the equation x^3-5x-7=0 using False-position method   (7M)

   b) Find the real root of the equation xtanx+1=0 using Newton Raphson method   (7M)

Or

6. a) Find the real root of the equation x^3-8x- 4 = 0   using bisection method   (7M)

   b) Solve the following system of equations using Gauss-Jacobi method   (7M)
$$20x + y - 2z = 17, 3x + 20y - z = -18, 2x - 3y + 20z = 25.$$

|"|"|||"|"'|||'|

UNIT-IV

7. a) Find f(5.5) using Newton's Back ward formula for the following table   (7M)

X	0	1	2	3	4	5	6
Y	0	1	16	81	256	625	1296

b) Find $\Delta^3[(1 - ax)(1 - bx^2)]$ (7M)

Or

8. a) Find f(3.5) using Gauss forward formula for the following table   (7M)

X	0	1	2	3	4	5	6
Y	1	3	14	22	35	48	56

b) Find the polynomial for the following data using Newton divided difference formula.   (7M)

x	0	2	3	6
y	648	704	729	792

UNIT-V

9. a) Find y(0.1) using RK method of fourth order If $\frac{dy}{dx} = 2e^x + y$, y(0) = 1   (7M)

b) By modified Euler's formula find y(0.2) given that $\frac{dy}{dx} = 2x + y^2, y(0) = 1$ (7M)

Or

10 a) Evaluate $\int_0^\pi sinx \, dx$ using Simpson's 1/3rd and Trapezoidal Rule   (7M)

b) By Picard's method find y(0.1) given that $\frac{dy}{dx} = 2x + y, y(0) = 1$ (7M)

|"|"|||"|"'|||'|