

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM
I B. Tech I Semester Supplementary Examinations June-2025

MATHEMATICS-II

(Only for EEE)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. [7M]
- a) Find the rank of the matrix $\begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$ by reducing it to normal form.
- b) Solve the system of equations $3x + y - z = 3; 2x - 8y + z = -5; x - 2y + 9z = 8$ by using Gauss Elimination method. [7M]

(OR)

2. a) Prove that Eigen values of A^{-1} are the reciprocals of the Eigen values of A. [7M]
- b) Find the Eigen values and the corresponding vectors of the matrix $= \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$. [7M]

UNIT-II

3. a) Using Cayley-Hamilton theorem, find A^5 , If $A = \begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$. [7M]
- b) Show that the matrix $A = \begin{bmatrix} 2 & 3 & 4 \\ 0 & 2 & -1 \\ 0 & 0 & 1 \end{bmatrix}$ cannot be diagonalized. [7M]

(OR)

4. a) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & 1 & 2 \\ 5 & 3 & 3 \\ -1 & 0 & -2 \end{bmatrix}$. [7M]
- b) Reduce the quadratic form $7x^2 + 6y^2 + 5z^2 - 4xy - 4yz$ to the canonical form. [7M]

UNIT-III

5. a) Find a real root of the equation $x \log_{10} x = 1.2$ which lies between 2 and 3 by bisection method. [7M]
- b) Use Gauss-Seidal iteration method to solve the system. [7M]
- $10x + y + z = 12; 2x + 10y = z = 13; 2x + 2y + 10z = 14.$

(OR)

6. a) Find a real root of $x^4 - x - 10 = 0$ by using Newton-Raphson method. [7M]
- b) Use Gauss-Jacobi iteration method to solve the system. [7M]
- $x + 10y + z = 6; 10x + y + z = 6; x + y + 10z = 6.$

UNIT-IV

7. a) Apply Newton's forward interpolation formula to find $y(9)$ to the following data: [7M]

x	2	5	8	11
y	94.8	87.9	81.3	75.1

- b) Find the interpolation polynomial for the following: [7M]

x	0	1	2	5
F(x)	2	3	12	147

(OR)

8. a) Find $\sin 52^\circ$ using Newton's Backward Interpolation Formula, [7M]
given that $\sin 45^\circ = 0.7071$, $\sin 50^\circ = 0.7660$, $\sin 55^\circ = 0.8192$ and $\sin 60^\circ = 0.8660$
- b) Find the value of $f(2)$ using Lagrange's interpolation formula for the following data. [7M]

x	0	1	3	4
f(x)	5	6	50	105

UNIT-V

9. a) Find $\int_0^1 \frac{1}{1+x} dx$ with $h=0.25$ by using Trapezoidal rule. [7M]
- b) Solve $\frac{dy}{dx} = 3x^2 + 1$, $y(1) = 2$ taking step size $h=0.5$ using Euler's Method. [7M]

(OR)

10. a) Find $\int_0^1 \frac{1}{1+x^2} dx$ using Simpson's 3/8 rule, $h=1/6$. [7M]
- b) Find the value of y when $x=0.1$ by using Picard's Method, [7M]
given that $\frac{dy}{dx} = 1+xy$ and $y(0)=1$
