

I B. Tech I Semester Supplementary Examinations, May/June - 2019
MATHEMATICAL METHODS

(Com. to CE,CSE,EEE,EIE,AE,BT & AME)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions
 All Questions carry **Equal** Marks

1. a) Find the Rank of the matrix $\begin{bmatrix} 1 & 2 & -3 \\ 2 & 1 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ using Echelon form. (7M)

b) Solve the equations $5x + y + z + w = 4$, $x + 7y + z + w = 12$, $x + y + 6z + w = -5$, $x + y + z + 4w = -6$. by Gauss-seidal method. (8M)

2. a) Verify and find A^4 using Cayley- Hamilton theorem for $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ -4 & 4 & 3 \end{bmatrix}$ (7M)

b) Find the Eigen values and Eigen vectors of the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ (8M)

3. a) Reduce the quadratic form $x^2 + y^2 + 2z^2 - 2xy + 4xz + 4yz$ to the canonical form. (8M)

b) Find the rank, index, signature and nature of the quadratic form. (7M)
 $2x^2 + 2y^2 + 2z^2 - 2yz + 2zx - 2xy$

4. a) Find the positive root of $x^3 - 6x - 4 = 0$ using Newton Raphson Method. (7M)

b) Find the positive root of $x \sin x + \cos x = 1$ using Bisection Method. (8M)

5. a) Find $f(0.5)$ using Newton's forward formula for the following table. (8M)

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

b) Use Lagrange's formula to calculate $f(4)$ from the following table. (7M)

X	0	2	3	6	7	9
Y	1	14	15	5	6	19

6. a) Find the $f^{-1}(1.1)$ from the following table. (7M)

X	1	1.1	1.2	1.3	1.4
Y	43.1	47.7	52.1	56.4	60.8

- b) Evaluate $\int_0^4 \frac{dx}{1+x^2}$ using (i) Trapezoidal rule (ii) Simpson's 1/3rd Rule. (8M)

7. a) Fit the straight line for the following data. (7M)

X	0	5	10	15
Y	10	15	20	25

- b) Fit the parabola for the following data. (8M)

X	0	4	8	12	16	20
Y	6	12	18	24	30	36

8. a) Find $y(0.1), y(0.2)$ If $\frac{dy}{dx} = xy + 1, y(0) = 1$ using Taylor's series method. (7M)

- b) Find $y(1.2)$ by modified Euler's method for $h = 0.2, \frac{dy}{dx} = \log(x + y), y(1) = 0$ (8M)