

I B. Tech I Semester Supplementary Examinations, January - 2020**MATHEMATICAL METHODS**

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

Time: 3 hours

Max. Marks: 75

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

1. a) Determine whether the following equations will have a non-trivial Solution if so (8M)
solve them $x+y-2z+3w=0$; $x-2y+z-w=0$; $4x+y-5z+8w=0$; $5x-7y+2z-w=0$.

- b) Define the rank of the matrix and find the rank of matrix by normal form (7M)

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

2. a) Verify Cayley Hamilton theorem for $A = \begin{bmatrix} 7 & 2 & -2 \\ -6 & -1 & 2 \\ 6 & 2 & 1 \end{bmatrix}$, hence compute A^4 and A^{-1} (8M)

- b) Find the Eigen values and Eigen vectors of $\begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$ (7M)

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

- b) Find Rank index and signature of quadratic form $10x^2 + 2y^2 + 5z^2 - 4xy - 10xz + 6yz$ (7M)

4. a) Find the real root of the equation $xe^x = 2$ using False position method. (8M)

- b) Find the real root of the equation $e^x = 3x$ using Newton Raphson method. (7M)

5. a) Compute $y(4)$ for the following data. (8M)

x	-2	-1	1	2
y	-7	2	0	11

- b) Find $y(1.2)$ using Newton's forward difference formula from the table. (7M)

X	1	1.4	1.8	2.2
Y	3.49	4.82	5.91	6.5

6. a) Evaluate $\int_0^1 e^{-x^2} dx$ using (i) Trapezoidal (ii) Simpson's 1/3rd rule. (8M)

b) Find first and second derivative at $x = 2.0$ from the following table. (7M)

x	1	1.2	1.4	1.6	1.8	2.0
y	0	0.128	0.544	1.296	2.432	4.0

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

b) By Taylor's method find $y(0.4)$ given that $\frac{dy}{dx} = 3x + y^2$, $y(0) = 1$ (7M)

8. a) Fit the second degree polynomial for the following data. (8M)

x	0	2	5	7
y	-1	5	12	20

b) Fit the curve $y = ae^{bx}$ for the following data. (7M)

x	1	5	7	9	12
y	10	15	12	15	21