

Code No: R10107

R10
SET - 1
I B. Tech I Semester Supplementary Examinations, May - 2018
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
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1. a) Solve the equations  $3x + y + 2z = 3$ ,  
 $2x - 3y - z = -3$  by Gauss – Elimination method. (8M)  
 $x + 2y + z = 4$

- b) Find the rank of the matrix  $\begin{bmatrix} 2 & -2 & 0 & 6 \\ 4 & 2 & 0 & 2 \\ 1 & -1 & 0 & 3 \\ 1 & -2 & 1 & 2 \end{bmatrix}$  by reducing to canonical form. (7M)

2. a) Find the Eigen value and the Eigen vectors of  $A = \begin{bmatrix} 3 & -2 & 2 \\ 6 & -4 & 6 \\ 2 & -1 & 3 \end{bmatrix}$  (7M)

- b) Verify cayley -Hamilton theorem for the matrix  $A = \begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 2 & -1 & 1 \end{bmatrix}$  Hence find  $A^{-1}$  (8M)

3. Reduce the quadratic form  $8x^2 + 7y^2 + 3z^2 - 12xy - 8yz + 4xz$  to the canonical form by orthogonal reduction. Hence find rank , index and signature of the quadratic form. (15M)

4. a) Find the Real root of  $x = x^4 - 10$  using bisection method. (7M)

- b) Find the Real root of  $x = e^{-x}$  using Iteration method. (8M)

5. a) Using Gauss backward difference formula find  $y(8)$  from the following table. (7M)

|   |   |    |    |    |    |    |
|---|---|----|----|----|----|----|
| X | 0 | 5  | 10 | 15 | 20 | 25 |
| Y | 7 | 11 | 14 | 18 | 24 | 32 |

- b) Find the parabola passing through the points (0,1) ,(1,3) and (3,55) using Lagrange's interpolation formula. (8M)

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6. a) Find  $y^I$ ,  $y^{II}$  at  $x = 80$ . (7M)

|   |      |      |      |      |      |
|---|------|------|------|------|------|
| x | 80   | 85   | 90   | 95   | 100  |
| y | 5026 | 5674 | 6362 | 7088 | 7854 |

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

7. a) Find  $y(0.1), y(0.2), y(0.3), y(0.4)$  using Euler's formula if  $\frac{dy}{dx} = 2e^x + y, y(0) = 2$  (7M)

- b) Find  $y(0.1)$  &  $y(0.2)$  using RK 4<sup>th</sup> order formula given that  $y^I = x^2 - y$  and  $y(0) = 1$  (8M)

8. a) Fit a straight line  $y = ab^x$  to the following by the method of least squares (7M)

|   |   |   |    |    |    |
|---|---|---|----|----|----|
| x | 0 | 1 | 2  | 3  | 4  |
| y | 1 | 5 | 10 | 22 | 38 |

- b) Fit the line  $y = a + bx$  for the following data. (8M)

|   |    |    |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|----|----|
| X | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  |
| Y | 12 | 11 | 13 | 15 | 14 | 17 | 16 | 19 | 18 |