

Code No: R10107

**R10**
**SET - 1**
**I B. Tech I Semester Supplementary Examinations, Nov/Dec - 2017**
**MATHEMATICAL METHODS**

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

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions  
 All Questions carry **Equal** Marks  
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- $10x + y + z = 12,$
1. a) Solve the equations  $2x + 10y + z = 13$ , by Gauss – Jordan method. (7M)  
 $x + y + 5z = 7$
- b) Discuss for what values of  $\lambda, \mu$  the simultaneous equations  $x + y + z = 6$ , (8M)  
 $x + 2y + 3z = 10, x + 2y + \lambda z = \mu$  have  
 i) no solution      ii) a unique solution      iii) An infinite number of solutions
2. a) Find Eigen values and Eigen vectors of the matrix  $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$  (7M)
- b) Verify Cayley-Hamilton theorem for the matrix  $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$ . Hence find  $A^4$  (8M)
3. Reduce the quadratic form  $x^2 + y^2 + 2z^2 - 2xy + 4xz + 4yz$  to the canonical form by (15M)  
 orthogonal reduction hence find rank, index and signature of the quadratic form.
4. a) Find the Real root of  $x = x^4 - 10$  using False position method. (7M)
- b) Find the Real root of  $x = e^{-x}$  using Newton Raphson method. (8M)
5. a) Find the Missing terms in the following data. (7M)

|   |    |    |    |    |      |
|---|----|----|----|----|------|
| x | 45 | 50 | 55 | 60 | 65   |
| y | 3  | -- | 2  | -- | -2.4 |

- b) Find  $y(25)$ , Given that  $y_{20}=24, y_{24}=32, y_{28}=35, y_{32}=40$  using Gauss forward difference formula. (8M)
6. a) Find  $y^1, y^{11}$  at  $x = 95$

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

(7M)

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

7. a) Solve  $\frac{dy}{dx} = xy$  using R-K 4<sup>th</sup> order for  $x=0.2$  given  $y(0)=1$ , taking  $h=0.2$ . (7M)

b) Evaluate  $y(0.1)$ ,  $y(0.2)$  by Taylor's series method for  $\frac{dy}{dx} = \frac{x+y}{y-x}$ ,  $y(0)=1$ . (8M)

8. a) Fit a straight line  $y = ax + b$  to the following by the method of least squares. (8M)

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

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

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