

## 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

1. a) Solve the equations  $10x + y + z = 12$ ,  
 $2x + 10y + z = 13$ , 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)


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

