Code No: R10206 **R10** SET - 1

I B. Tech II Semester Supplementary Examinations, April/May - 2017
MATHEMATICAL METHODS
(Com. to ME, ECE, CHEM, IT, ECC, BME, PCE, PT, MM)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Find rank of $A = \begin{bmatrix} 2 & 1 & 3 & 1 \\ 0 & 1 & 2 & -2 \\ 4 & 0 & 2 & 6 \end{bmatrix}$ (7M)

   b) Solve by Gauss elimination method. $10x + y + z = 12$; $2x + 10y + z = 13$; $x + y + 5z = 70$. (8M)

2. a) Find the Eigen values and Eigen vectors of $\begin{bmatrix} 5 & -2 & 0 \\ -2 & 6 & 2 \\ 0 & 2 & 7 \end{bmatrix}$. (10M)

   b) Prove that the Eigen values of a triangular matrix are diagonal elements of the matrix. (5M)

3. Determine the nature of the quadratic form. Identify the nature of the quadratic form $x_1^2 + 4x_2^2 + x_3^2 - 4x_1x_2 + 2x_1x_3 - 4x_2x_3$. (15M)

4. a) Compute the root of the equation $x^3 - x^2 - 1 = 0$ by the method of false position. (8M)

   b) Find a real root of the equation $e^x = x + 2$ in the interval [1,1.4] by using bisection method. (7M)

5. a) Use Gauss forward interpolation formula to estimate f(3.2), given f(25) = 0.2707, f(30) = 0.3027, f(35) = 0.3386, f(40) = 0.3794. (8M)

   b) From the following data find the value of y at x = 2 , using Lagrange's interpolation formula (7M)

x	1	3	4	6
y	4	40	85	259

6. a) Find $f'(x)$ *and* $f''(x)$ at the point $x = 1.5$ (8M)

x	1.5	2.0	2.5	3.0	3.5	4.0
f(x)	3.375	7.0	13.625	24	38.875	59

   b) Compute the value of $\int_0^1 \frac{dx}{1+x^2}$ using trapezoidal rule and simpson's 3/8th rule. (7M)

7. a) Solve $y' = 3x + \frac{y}{2}$, $y(0) = 1$ by Taylor series method and hence find y(.1) and y(.2) (7M)

   b) Apply R-K Fourth order method to find y(0.25) where $y' = 1 + xy$, $y(0) = 1$ (8M)

8. a) Fit a curve $y = ax^b$ to the following data (7M)

x	5	6	7	8	9	10
y	133	55	23	7	2	2

   b) Fit a straight line of the form y = a + bx to the following data (8M)

x	1	2	4	5	6	8	9
y	2	5	7	10	12	15	19
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