

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 $3/8^{\text{th}}$ 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 |