

Code No: R10107

**R10**

**SET - 1**

**I B. Tech I Semester Supplementary Examinations, May - 2017**

**MATHEMATICAL METHODS**

(Com. to CE, EEE, CSE, Bio-T E, EIE, AE, AME)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions  
All Questions carry **Equal** Marks

1. a) Test the consistency of the system  $x + y + z = 6$ ,  $x - y + 2z = 5$ ,  $3x + y + z = -8$ , hence solve. (7M)
- b) Solve the system of equations by Gauss –Seidel method (8M)  
 $8x - 3y + 2z = 20$ ;  $4x + 11y - z = 33$ ;  $6x + 3y + 12z = 36$ .
2. a) Determine the characteristic roots and the corresponding characteristic vectors of (7M)  
the matrix  $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$
- b) Verify Cayley-Hamilton theorem for  $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ -4 & 4 & 3 \end{bmatrix}$  and hence find  $A^{-1}$  &  $A^4$  (8M)
3. Reduce the quadratic form  $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$  in to canonical form (15M)  
by orthogonal reduction hence find rank, index and signature.
4. a) Find the Real root of the equation  $x = e^{-x}$  using False position method. (7M)
- b) Find the Real root of the equation  $x^2 - \log_e x = 12$  using Newton Raphson method. (8M)
5. a) Find  $f(1.75)$  if  $f(1.7) = 5.474$ ,  $f(1.8) = 6.050$ ,  $f(1.9) = 6.686$ ,  $f(2) = 7.389$ . (7M)
- b) Using Lagrange's formula calculate  $f(3)$  from the following table. (8M)

|      |   |    |    |   |   |    |
|------|---|----|----|---|---|----|
| x    | 0 | 1  | 2  | 4 | 5 | 6  |
| f(x) | 1 | 14 | 15 | 5 | 6 | 19 |

6. a) Find  $y(0.1)$  by Picard's method given that  $\frac{dy}{dx} = \frac{y-x}{y+x}$ ,  $y(0) = 1$  (7M)
- b) By Runge kutta method of fourth order find  $y(0.1)$ ,  $y(0.2)$  given that (8M)  
 $\frac{dy}{dx} = 3x + y^2$ ,  $y(0) = 1$

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7. a) For the following table find  $y'(2.2)$ ,  $y''(2.2)$  (7M)

|   |        |        |        |        |        |        |        |
|---|--------|--------|--------|--------|--------|--------|--------|
| x | 1.0    | 1.2    | 1.4    | 1.6    | 1.8    | 2.0    | 2.2    |
| y | 2.7183 | 3.3201 | 4.0552 | 4.9530 | 6.0496 | 7.3891 | 9.0250 |

- b) Evaluate  $\int_4^{5.2} \log x dx$  using (i) Trapezoidal rule (ii) Simpson's 1/3 rule. (8M)

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

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

- b) Fit a curve  $y = a + bx$  degree curve to the following data: (7M)

|   |   |     |     |     |     |
|---|---|-----|-----|-----|-----|
| x | 0 | 1   | 2   | 3   | 4   |
| y | 1 | 1.8 | 1.3 | 2.5 | 6.3 |

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