Course : Numerical Methods   **Date : 06/03/21**

Course Code : COS 205   **Time : 3 hrs**

Answer any 5 out of 7 :   (5 X 15 = 75)

1. Find a real root of the equation $x^3 - x - 11 = 0$ by using bisection method.

2. Find the real root lying between **1** and **2** of the equation $x^3 - 3x + 1 = 0$ upto

3 places of decimals by using Regula – falsi Method.

3. Find the inverse of the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}$ using Gauss Elimination Method.

4. The following data gives the melting point of an alloy of zinc and lead. θ is the

temperature and x is the percentage of lead,

x	40	50	60	70	80	90
θ	184	204	226	250	276	304

(i) By using Newton's forward interpolation formula, find $\theta = 48$

(ii) By using Newton's Backward interpolation formula, find $\theta = 84$.

5. Using the following table,

 (a) Apply Gauss forward interpolation formula, to get $f\,(3.75)$

x	2.5	3.0	3.5	4.0	4.5	5.0
$f(x)$	24.145	22.043	20.225	18.644	17.262	16.047

(b)   Apply Gauss backward interpolation formula to find $y\,(25)$ for the following data ,

x	20	24	28	32
y	2854	3162	3544	3992

6. Evaluate $\int_0^1 \frac{dx}{1+x}$ using (i) Trapezoidal rule (ii) Simpson's $1/3$ rd rule

(iii) Simpson's $3/8$ rule (iv) Weddle's rule (v) Find the error in each method by

comparing with the actual integration upto 4 places of decimals.

Take $h = \frac{1}{6}$ for all cases.

7. Using Runge – Kutta method of fourth order find $y\,(\,0.1\,)$; $y(0.2)\,and\,y(0.3)$,

Given that $\frac{dy}{dx} = 1 + xy$; $y\,(0) = 2$.