COMPUTER ORIENTED NUMERICAL METHODS

(COMPULSORY QUESTION)

1. Short answer Type questions :

   (a) Define Absolute error and Relative error with example ?　　2

   (b) Locate the error and correct it in the following table, given the functional relation $y = x^3$:

x	1	2	3	4	5	6	7	8
$f(x)$	1	8	27	64	120	216	343	512

   　　3

   (c) Prove that relation between Δ (Del) and E (Shift operator) are

   $$\Delta^2 = E^3 - 3E^2 + 3E - 1$$
   　　3

   (d) For integral $\int_0^2 \left(2 - x^2\right) dx$, explain Gaussian Quadrature equation. 3

   (e) Compute the determinant of the matrix using pivoting :

   $$\begin{bmatrix} 1 & 4 & -2 & 3 \\ 2 & 2 & 0 & 4 \\ 3 & 0 & -1 & 2 \\ 1 & 2 & 2 & -3 \end{bmatrix}$$
   　　3

UNIT-1

2. (a) Explain floating point representation and normalised floating point representation of real numbers.　　8

   (b) Use Regula Falsi method to obtain a real root upto three iterations for equation $x^3 + 7x^2 + 9 = 0$.　　8

3. (a) Calculate the root of the equation $x^3 - 5x + 3 = 0$ starting with ini-

        tial value $x_0 = 1.0$ with accuracy 0.0001.   8

  (b) Using Bairtow's method to find the Complex roots of

        $f(x) = x^4 + x^3 + 2x^2 + x + 1 = 0$

UNIT-II

4. (a) Using Gauss Elimination method, solve

        $x + 3y + 8z = 4$

        $x + 4y + 3z = -2$

        $x + 3y + 4z = 1.$ 8

  (b) What are Ill conditioned equations ? How ill conditions are measured ? Explain with an example.   8

5. (a) Use Taylor's seris expansion, find the appropriate polynomial and also range upto 4 decimal places of differential equation :

$$\frac{dy}{dx} = 0.1\,(x^3 + y^2); y(0) = 1$$

  (b) Use Euler's method, solve

$$\frac{dy}{dx} = \frac{x - y}{x + y}; y(0) = 1 \text{ in the range}$$

      $0 \le x \le 0.1$ taking h = 0.02.   8

UNIT-III

6. (a) Given the following table, Find y(78)

x:	80	85	90	95	100
y:	5026	5674	6362	7088	7854

  (b) Using Langrang's formula, evaluate Y(0.9) for the data :

x:	0	1	2	4
y:	5	14	41	98

7. (a) Find y, when x = 25 using Newton Gregory backward formula for

x:	16	18	20	22	24	26
y:	39	85	115	151	264	388

  (b) Using Langrange's formula, evalue Y(0.9) for the data :

x:	0	1	2	4
y:	5	14	41	98

UNIT-IV

8. Solve the integrla $\int_0^1 \frac{dx}{1+x^2}$ using

   (a) Trapezoide rule

   (b) Simpson's $\frac{1}{3}$ rd rule

   by considering 16 strips?

9. (a) Derive first and second order derivatives based on numerical differentiatio. 8

   (b) Given the following table:

x:	0	1	2	3	4
(f)x:	6.9897	7.4036	7.77815	8.1281	8.4510

   Find Y'(2) and Y''(2) using Newton Gregory backward formula.