

Roll No.

Total Pages : 4

BCA/D-12

895

COMPUTER ORIENTED NUMERICAL METHODS

Paper : BCA-113

Time : Three Hours]

[Maximum Marks : 80

Note : Attempt five questions in all, selecting one question from each Section. Q. No. 1 is compulsory.

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

(b) Given the following table :

x :	0	1	2	3	4
f(x) :	6.9897	7.4036	7.7815	8.1281	8.4510

Find Y'(2) and Y''(2) using Newton Gregory backward formula. 8

(Compulsory Question)

1. Short answer type question :

(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

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

(d) For integral $\int_0^4 (2 - x^2) dx$; explain Gaussian Quadrature formula for integration. 2

(e) Explain 4th order Runga Kutta method for solving a differential equation. 3

- (f) Compute the determinant of the matrix using pivoting

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

UNIT-I

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 initial value $x_0 = 1.0$ with accuracy of 0.0001. 8
 (b) Using Bairtow's method to find the Complex roots of $f(x) = x^4 + x^3 + 2x^2 + x + 1 = 0$. 8

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 series expansion, find the appropriate polynomial and also range upto 4 decimal places for differential equation <http://www.kuonline.in>

$$\frac{dy}{dx} = 0.1(x^3 + y^2); y(0) = 1. \quad 8$$

- (b) Use Euler's method, solve

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

$$0 \leq x \leq 0.1 \text{ taking } h = 0.02. \quad 8$$

UNIT-III

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

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

8

- (b) Use Newton's divided difference formula to find interpolating polynomial for the data

x :	0.0	0.5	1.0	2.0
y :	0.00	0.57	1.46	5.05.

8

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.

8

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

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

8

UNIT-IV

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

(a) Trapezoide rule

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

by considering 16 strips ? 8,8