Roll No. .....

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GSM/D-24 1067

COMPUTER ORIENTED NUMERICAL METHODS

BCA-236

Time : Three Hours] [Maximum Marks : 80

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

(Compulsory Question)

1. (a) Determine absolute error, relative error and percentage error in a calculation 24.13 is the actual value and 25.09 is the measured value. 3

   (b) What is difference between floating point number and decimal ? 3

   (c) Estimate the initial approximate root x_0 of equation $f(x) = x^2 - 4x - 2 = 0$ using iterative method ? 3

   (d) What are III-conditioned equations system ? Give a 2×2 system of equations as a example ? 3

P.T.O.

(e) Find relation between Δ(Del) and E(shift) operators for interpolations ? 2

(f) What are three common pitfalls in numerical diffentiation ? 2

Unit I

2. (a) Use bisection method for equation $x^3 - 5x - 4$ for three iterations. 8

(b) Use false position method to find the positive root of $x^3 - 4x - 9 = 0$. Compute upto 4 iterations. 8

3. (a) Use Newton-Raphson iteration method to find a root of the equation $x^3 - x - 1 = 0$ near $x = 1.5$ (use upto 4 iterations). 8

(b) Use Bairstow's method to find a root of polynomial $f(x) = x^4 + x^3 + 2x^2 + x + 1 = 0$. 8

Unit II

4. (a) Use Gauss Elimination method to solve :

$$X + 3Y + 8Z = 4$$

$$X + 4Y + 3Z = -2$$

$$X + 3Y + 4Z = 1.$$

8

(b) Solve the following system of equations using Gauss-Seidel iterative method :

$$2x - y = 1$$

$$-x + 2y = 4$$

using successive method starting with (0, 0) as Initial values. **8**

5. (a) Use modified Euler's method to solve :

$dy/dx = x + y^2$; $y(0) = 1$

Taking $h = 0.05$ in the range $0 \leq x \leq 0.10$. **8**

(b) Use Runge-Kutta Method to solve differential equation :

$dy/dx = x + y$; $y(0) = 1$

in the range $0 \leq x \leq 0.2$ taking $h = 0.1$. **8**

Unit III

6. (a) Given the table :

X :	5	10	15	20
Y :	0.08716	0.17365	0.25882	0.34202

Find $y(6)$ using Newton's forward interpolation formula. **8**

(b) Use Newton's Backward interpolation formula to find y when $x = 23.4$ from the following table :

x :	19	20	21	22	23	24	25
y :	91.00	100.25	110.0	120.25	131.0	142.55	154.0

8

7. (a) Use Newton's divided difference formula for unequal interval to find an interpolating polynomial for the data :

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

8

(b) Using Lagrange's interpolation formula, find y for $x = 2$ for the data :

x :	0.0	0.1	0.3
y :	– 0.5	0.0	0.2

8

Unit IV

8. (a) Find $y'(x_0)$ and $y''(x_0)$ at $x = 2.2$ given the following table :

X :	1.4	1.6	1.8	2.0	2.2
Y :	4.0552	4.9530	6.0496	7.3891	9.0250

8

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ to five decimal places by Trapezoidal rule where the interval (0, 1) is subdivided into 6 equal parts. 8

9. (a) Use Simpson's 1/3rd rule to evaluate $\int_0^1 x^4\,dx$, considering 6 strips. 8

(b) Use Gaussian quadrature formula of second order to evaluate $\int_1^2 \frac{dx}{x}$. 8