(i) **Printed Pages: 3** **Roll No. .....**

(ii) **Questions : 8** **Sub. Code : 17543**

Exam. Code : 0006

B.A./B.Sc. (General) 6th Semester

(2055)

MATHEMATICS

Paper–III : Numerical Analysis

Time Allowed : Three Hours] **[Maximum Marks : 30**

Note :— Attempt **FIVE** questions in all, selecting at least **TWO** questions from each unit.

UNIT–I

1. (a) Perform two iterations of Birge-Victa method to find the smallest positive root of equation $2x^3 - 5x + 1 = 0$, with initial approximation $P_0 = 0.5$. Also write the deflated polynomial.

   (b) Find a real root of the equation $x^3 - x - 1 = 0$ by using the bisection method correct to three decimal places. 3,3

2. (a) Given $f(0) = 3$, $f(1) = 12$, $f(2) = 81$, $f(3) = 200$, $f(4) = 100$, $f(5) = 8$ find $\Delta^5 f(0.)$ 2

(b) Given a table :

x	0.61	0.62	0.63	0.64	0.65	0.66	0.67
y	1.8404	1.8589	1.8776	1.9152	1.9155	1.9347	1.9542

Evaluate y(0.638) by Stirling's formula. 4

3. (a) If $y(1) = -3$, $y(3) = 9$, $y(4) = 30$, $y(6) = 132$ find the Lagrangian polynomial that takes the same values as y at the given points.

(b) Find $\frac{d}{dx}f(x)$ at 7.50 by using the following data :

x	7.47	7.48	7.49	7.50	7.51	7.52	7.53
f(x)	0.193	0.195	0.198	0.201	0.203	0.206	0.208

3,3

4. (a) Compute $\int_0^1 \frac{x}{x^3+10}dx$ with 9 ordinates by Simpson's 1/3 rule.

(b) Calculate, an approximate value of $\int_{-3}^{3} x^4 dx$ by taking 7 ordinates by Trapezoidal rule. 3,3

UNIT–II

5. Solve the following systems of equations by Gauss-Jordan elimination method :

$2x_1 + 6x_2 - x_3 = -14$, $5x_1 - x_2 + 2x_3 = 29$, $-3x_1 - 4x_2 + x_3 = 4$. 6

6. Apply Cholesky's Method to solve the equations :

$9x + 6y + 12z = 17.4$, $6x + 13y + 11z = 23.6$,

$12x + 11y + 26z = 30.8$ 6

7. Reduce the matrix $A = \begin{bmatrix} 1 & 2 & -1 \\ 2 & 1 & 2 \\ -1 & 2 & 1 \end{bmatrix}$ to the tridiagonal form by Householder's Method. 6

8. Apply Runge-Kutta fourth order Method to solve $\frac{dy}{dx} = xy$ with $y(1) = 5$ for $x = 1.1$ given $h = 0.1$. 6