

29/5/2023 (new)

(i) Printed Pages : 3 Roll No.

(ii) Questions : 8

Sub. Code :

0	5	4	3
---	---	---	---

Exam. Code :

0	0	0	6
---	---	---	---

B.A./B.Sc. (General) 6th Semester
(2053)

MATHEMATICS

Paper—III : Numerical Analysis

Time Allowed : Three Hours]

[Maximum Marks : 30

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

UNIT—I

- Find a real root of $x^3 - x - 4 = 0$ using bisection method correct to three places of decimal.
 - Find an iterative formula for finding cube root of a positive integer n using Newton-Raphson's method. Use it to find cube root of 128. 2×3
- Prove that $\nabla\Delta = \Delta - \nabla$.
 - Find the cubic Lagrange's interpolating polynomial from the following data : 2×3

x	0	1	2	5
f(x)	2	3	12	147

3. Find x for which y is minimum :

x	0.60	0.65	0.70	0.75
y	0.6221	0.6155	0.6138	0.6170

Also find minimum value of y .

6

4. Calculate an approximate value of $\int_0^{\pi/2} \sin x \, dx$ using :

(i) Trapezoidal rule

(ii) Simpson's 1/3 rule taking 11 ordinates.

6

UNIT—II

5. Apply Cholesky's method to solve the equations :

$$9x + 6y + 12z = 17.4; \quad 6x + 13y + 11z = 23.8;$$

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

6

6. Transform the matrix $A = \begin{bmatrix} 2 & 1 & \sqrt{3} \\ 1 & 2 & \sqrt{3} \\ \sqrt{3} & \sqrt{3} & 3 \end{bmatrix}$ to the tridiagonal

form using Given's method. Hence find eigen values of A .

6

7. Determine the largest eigen value and the corresponding eigen vector of the matrix

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

6

8. (a) Find an approximate value of y when $x = 0.1$ using Taylor's series method from

$$\frac{dy}{dx} = x - y^2 \text{ and } y(0) = 1.$$

- (b) Apply Runge-Kutta's method of fourth order to find approximate value of y at $x = 0.2$ for

$$\frac{dy}{dx} = x + y^2, \quad y(0) = 1 \text{ taking } h = 0.1 \quad 2 \times 3$$