[Total No. of (i) Printed Pages 4 (ii) Questions 8]

Sub Code : 0543 (1048) **Exam Code :** 0006

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

Subject : Mathematics

Paper : Paper-III Numerical Analysis

Time : 3 Hours ***Maximum Marks : 30***

Note: (i) Attempt **five** questions in all, selecting at least **two** questions from each section.

(ii) Use of scientific nonprogrammable calculator is allowed.

SECTION - A

1. (a) Solve $\cos x - xe^x = 0$ by Bisection method, performing five iterations. 3

(b) Use Newton-Raphsan's method to find a root of the equation $x^2 - 8 = 0$ upto 3 decimal places. 3

2. Derive Newton's Backward Difference Formula for f(x) defined by (n + 1) points (x_i, y_i), $0 \le i \le n$ being continuous and differentiable (n + 1) times such that $x_i = x_{i-1} + h$. 6

P.T.O.

3. (a) Compute f'(x) and f''(x) at x = 16, given

x :	15	17	19	21	23	25
f(x) :	3.873	4.123	4.359	4.583	4.796	5.0

(b) Apply Lagrange's formula inversely to obtain the root of the equation f(x) = 0, given :

f(30) = - 30, f(34) = -13, f(38) = 3, f(42) = 18 3

4. (a) Use four point Gauss Quadrature formula to evaluate $\int_{0.2}^{2.6} e^{-x}\,dx$. 4

(b) Use Chebyshev's quadrature formula to evaluate $\int_{5}^{12} \frac{dx}{x}$ for n = 4 2

SECTION - B

5. (a) Solve the system of linear equations by Gauss Elimination method : 3

$$10x - 7y + 3z + 5u = 6$$
$$-6x + 8y - z - 4z = 5$$
$$3x + y + 4z + 11u = 2$$
$$5x - 9y - 2z + 4u = 7$$

(b) Transform the matrix $A = \begin{bmatrix} 1 & \frac{1}{2} & \frac{1}{3} \\ \frac{1}{2} & \frac{1}{3} & \frac{1}{4} \\ \frac{1}{3} & \frac{1}{4} & \frac{1}{5} \end{bmatrix}$ to the tridiagonal form by Given's method. 3

6. Find the dominant eigen value of matrix A and the corresponding eigen vectors by Power Method where : 6

$$A = \begin{bmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{bmatrix}$$

7. (a) Given $\frac{dy}{dx} = \frac{y - x}{y + x}$ with initial condition $y(0) = 1$. Find $y(0.1)$ by Euler's method. 3

(b) Evaluate $y(0.2)$ from the differential equation $\frac{dy}{dx} = x^2 + y$, $y(0) = -1$ using Runge – Kutta's method of 2nd order. 3

3. Using LU decomposition method solve the following system of equations : 6

$$2x + 3y + z = 9$$

$$x + 2y + 3z = 6$$

$$3x + y + 2z = 8$$