Exam Code: 0006
Sub. Code: 0543

2071

B.A./B.Sc. (General) Sixth Semester

Mathematics

Paper – III: Numerical Analysis

Time allowed: 3 Hours | Max. Marks: 30

***NOTE:*** *Attempt five questions in all, selecting atleast two questions each Unit.*

x-x-x

## UNIT – I

I. a) Find a root of the equation $x^4 - x - 10 = 0$ by Secant method correct to three decimal places.

b) Develop a recurrence formula for finding $\sqrt{n}$, using Newton-Raphson's method and hence find $\sqrt{32}$ _______. (2x3)

II. a) Show that $e^x(u_0 + x\Delta u_0 + \frac{x^2}{2!}\Delta^2 u_0 + ..........)$

$$= u_0 + u_1 x + u_2 \frac{x^2}{2!} + ............)$$

b) Let y = $\sin x^0$ and

| x | 30° | 35° | 40° | 45° | 50° | 55° |
|---|---|---|---|---|---|---|
| y | 0.5 | 0.5736 | 0.6428 | 0.7071 | 0.7660 | 0.8192 |

(2x3)

III. a) Find $\frac{dy}{dx}$ at x = 1.25 for

| x | 1.00 | 1.05 | 1.10 | 1.15 | 1.20 | 1.25 | 1.30 |
|---|---|---|---|---|---|---|---|
| y | 1.0000 | 1.0247 | 1.0488 | 1.0723 | 1.0954 | 1.1180 | 1.1401 |

b) Find the value of $f'(4)$ from the following table by using Bessel's formula.

| x | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| f(x) | 0 | 1 | 3 | 5 | 8 | 12 | 18 |

(2x3)

P.T.O.

IV. a) Evaluate $\int_0^1 \frac{1}{1+x^2}dx$ by Trapezoidal's rule, where the interval of integration is divided into six equal parts.

b) Apply Gauss-Legendre two point formula to evaluate the integral $\int_{-1}^{1} \frac{1}{1+x^2}dx$ (2x3)

## UNIT – II

V. Solve by LU decomposition method the system of equations:-

2x - 3y + 10z = 3; -x + 4y + 2z = 20; 5x + 2y + z = -12 (6)

VI. Transform the matrix A = $\begin{bmatrix} 2 & 1 & \sqrt{3} \\ 1 & 2 & \sqrt{3} \\ \sqrt{3} & \sqrt{3} & 3 \end{bmatrix}$ to the tri diagonal form using Given's method. Hence find eigen values of A. (6)

VII. Find the dominant eigen values of matrix A and the corresponding eigen vectors by power method A = $\begin{bmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{bmatrix}$ (6)

VIII. a) Find the Taylor's series method, the values of y at x = 0.1 and x = 0.2 to five places of decimals from $\frac{dy}{dx} = x^2y - 1; y(0) = 1$

b) Apply Runge-Kutta's method of second order to find approximate value of y at x = 0.2 for $\frac{dy}{dx} = x + y^2; y(0) = 1$ taking h = 0.1 (2x3)

*x-x-x*