

Note: (i) All questions are compulsory.

(ii) Figures to the right indicate marks.

1. A) Attempt any **ONE** question from the following. (08)
- Define the terms i) Error ii) Absolute error iii) Relative error iv) Percentage Errors.

ii) Derive Secant method. Find roots of  $X^4 - X - 10 = 0$  correct to 2 decimal places.

- B) Attempt any **TWO** questions from the following. (12)

i) Given  $f(x) = X^3 - 2X - 5 = 0$  find root lies between 2 and 3 using Newton-Raphson method.

ii) Solve by Fixed Point method  $X^3 + X^2 - 100 = 0$ .

iii) Find the absolute error and relative error and also determine the number of significant digits in the approximations of the True value of  $x = 2.71828182$  and Approximate value of  $x = 2.7182$

2. A) Attempt any **ONE** question from the following. (08)
- Derive Simpson's 3/8th rule. Write difference between Trapezoidal, Simpson's 1/3<sup>rd</sup> rule.

ii) Derive Newton's Forward difference formula.

- B) Attempt any **TWO** questions from the following. (12)

i) Using Lagrange's interpolation formula find  $f(15)$

X	0	1	4	6	10
Y	5	8	10	15	16

ii) Fit a second degree equation for the given data

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

iii) Evaluate integral using Trapezoidal rule  $\int_4^{5.2} \log x \, dx$  for  $n=6$ .

3. A) Attempt any **ONE** question from the following. (08)

i) Derive Gauss - Seidel iteration method.

ii) Derive LU decomposition method. Hence solve system of equations  $x_1 + x_2 + x_3 = 1$ ,  
 $3x_1 + x_2 - 3x_3 = 5$ ,  $x_1 - 2x_2 - 5x_3 = 10$ .

- B) Attempt any **TWO** questions from the following. (12)

i) Solve  $A = \begin{bmatrix} 2 & 1 & 2 \\ 1 & 4 & 2 \\ 3 & 2 & 3 \end{bmatrix}$  by using Rutishauser method.

ii) Solve by Jacobi's iteration method  $20x + y - 2y = 17$ ,  $3x + 20y - z = -18$ ,  
 $2x - 3y + 20z = 25$ .

iii) Use Gauss - Seidel method to solve  $6x + y + z = 20$ ,  $x + 4y - z = 6$ ,  $x - y + 5z = 7$ .

4. Attempt any **THREE** question from the following.

(15)

- i) Use method of Regula Falsi to find the real root between 1 and 2 of the equation  $X^3 - X - 4 = 0$  ( Perform only 3 iterations).
- ii) Using Secant method solve  $X^3 - 5X + 1 = 0$ , roots lies between 0 and 1.
- iii) Evaluate the integral using Simpson's 1/3 Rule  $\int_0^1 y^2 dx$  where  $n = 4$ .
- iv) Find the root of equation  $x - \cos x - 1 = 0$ , correct to 3 decimal places, using Newton-Raphson method the root lies between and 2.
- v) Solve using Rutishauser method  $\begin{pmatrix} 3 & 1 \\ 1 & 1 \end{pmatrix}$
- vi) Solve using Jacobi's iteration method  $15x - 2y + z = 18, \quad 2x + 20y - 7z = 19, \quad 3x - 6y + 25z = 22.$

XXXXXXXXXXXXXXXXXXXX

munotes.in