DECEMBER 2023 **U/ID 32503/URM1A**

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer any TEN questions

1. In Newton Raphson method if the curve $f(x)$ is constant then ————————

2. The Bisection method is also known as ————————

3. The reduced form of the matrix in Gauss elimination method is also known as ————————

4. Which of the following of linear equation has strictly diagonally dominant co-efficient matrix.

   (a) $3x - y = -4$

   $2x + 5y = 2$

   (b) $2x + y = 1$

   $x - 7y = 4$

   (c) $3x + 5y = 2$

   $x + y = -3$

   (d) $4x = 2y - 2 - 1$

   $x + z = -4$

   $3x - 5y + z = 3$.

5. The mean operator $\mu f(x) =$ ————————

6. If $U_x = \frac{1}{(x+3)(x+4)}$, then $\sum_1^n U_x =$ ————————

7. Using Lagrange's interpolation, find the polynomials through (0,0) (1,1) and (2, 2).

8. Write the formula for strilling interpolation formula.

9. Write down the relation between ∇ and E.

10. Write the Lagrange inverse interpolation formula.

11. The divided difference of a function multiplied by a constant is the product of the constant and the divided difference of the function.

12. Write the formula for Newton's forward interpolation formula.

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

13. Find a real root of the equation $x^3 + x^2 - 1 = 0$ by iteration method.

14. Solve by Gauss -Seidel method.

$x - 2y = -3$

$2x + 25y = 15$

15. Prove that $e^x = \left(\frac{\Delta^2}{E}\right) e^x \frac{Ee^x}{\Delta^2 e^x}$ the interval of differencing being h.

16. Find $\sum_1^n U_x$ where

$$U_x = \frac{x+3}{x(x+1)\,(x+2)}$$

17. Use Stirling's formula find Y_{35}. Given $Y_{20} = 512$, $Y_{30} = 439$, $Y_{40} = 346$, $Y_{50} = 243$, where Y_x represents the number of persons at age x years in a life table.

18. Using the following table find f (15)

x	5	7	11	13	17
f(x)	150	392	1452	2366	5202

19. Solve for x_1, x_2 and x_3 by Crout's method.

$2x_1 + 3x_2 + 2x_3 = 2$

$10x_1 + 3x_2 + 4x_3 = 16$

$3x_1 + 6x_2 + x_3 = -6$

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions

20. Find the smallest positive root of the equation $xe^{-2x} = \frac{1}{2}\sin x$ correct to 3 decimal places using Newton Raphson method.

21. Solve the following equation using Gauss - Jordan method.

$$2x_1 + 2x_2 - x_3 + x_4 = 4$$
$$4x_1 + 3x_2 - x_3 + 2x_4 = 6$$
$$8x_1 + 5x_2 - 3x_3 + 4x_4 = 12$$
$$3x_1 + 3x_2 - 2x_3 + 2x_4 = 6$$

22. Use the method of finite differences to find the sum to n terms of the series whose x^{th} term is

(a) $(x+3)\,(x+4)\,(x+5)$

(b) $x(x+2)\,(x+4)$

(c) $(3x-2)\,(3x+4)\,(3x+4)$

23. Interpolate by means of Gauss's backward formula the population for the year 1936, given the following table.

Year	1901	1911	1921	1931	1941	1951
Population	12	15	20	27	39	52

24. If $f(0) = f(1) = 0, f(2) = -12, f(4) = 0,\ f(5) = 600$ and $f(7) = 7308,$ find a polynomial that satisfies this data using Netwon's divided difference interpolation formula. Hence find $f(6)$