MAY 2024 **U/ID 32503/URM1A**

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer any TEN questions.

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

2. In iteration method the sequence of approximations converges if ————————

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

4. The Gauss Seidel method is applicable to strictly diagonally dominant or symmetric ———————— definite matrix.

5. The central difference operator is defined as ————————.

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

7. Write the formula for Striling interpolation formula.

8. If 3rd differences are constant prove that

$$y_{x\ +1/2} = 1/2\left(y_n + y_{n+1}\right) - \frac{1}{16}\left(\Delta^2 y_{x-1} + \Delta^2 y_x\right).$$

9. Write the Relation between ∇ and E.

10. The nth divided difference of a polynomial of the nth degree are ————————

11. Write the Lagrange inverse interpolation formula.

12. Write the Newton's backward interpolation formula.

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

13. Solve by iteration method $2x - \log_{10} x = 7$.

14. Solve by Crout's method, the following system of equation.

$a + 3c + d = 2$

$4a - b + c - 2d = 1$

$a + 3b + 5d = -1$

$3a - b + 2c + d = 3.$

15. Use the method of separation of symbols for prove the following identity :

$u_0 + x_{c_1}\Delta u_1 + x_{c_2}\Delta^2 u_2 + \ldots + \Delta^x u_x =$

$u_x + x_{c_1}\Delta^2 u_{x-1} + \ x_{c_2}\Delta^4 u_{x-2} + \ldots\ldots + \Delta^x u_0$.

16. Using Newton's forward formula, find $\sin(0.1604)$ from the following table.

x :	0.160	0.161	0.162
$\sin x$:	0.1593182066	0.1603053541	0.161293412

17. Using Lagrange's interpolation formula, find the value of 'x' corresponding to $y = 13.5$ from the following table.

x :	93.0	96.2	100.0	104.2	108.7
y :	11.38	12.80	14.70	17.07	19.91

18. Solve by the Gauss-Seidel method.

$x - 2y = -3$

$2x + 25y = 15$

19. Evaluate $\sum_{1}^{n} 4^x \left\{ \frac{x^2}{(x+1)(x+2)} \right\}$.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

20. Find the root of $\cos x = xe^x$ by Newton-Raphson method by taking $x_0 = 0.5$.

21. Solve the given system of equations using Gauss-elimination method.

$x_1 + x_2 + x_3 + x_4 = 2$

$x_1 + x_2 + 3x_3 - 2x_4 = -6$

$2x_1 + 3x_2 - x_3 + 2x_4 = 7$

$x_1 + 2x_2 + x_3 - x_4 = -2$

22. Sum to n terms the series whose x^{th} term is $\frac{x.2^x}{(x+2)!}$.

23. Apply Bessel's formula to obtain $1/25$. Given $Y_{20} = 2854$, $Y_{24} = 3162$, $Y_{28} = 3544$, $Y_{32} = 3992$.

24. Using Lagrange's interpolation formula find $f(x)$ from the following table :

x :	1	2	3	4	7
$y = f(x)$	2	4	8	16	128