MAY 2023 **U/ID 32503/URM1A**

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer any TEN questions

1. Newton Raphson method is also known as ————————

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

3. Solve the eqn using Gauss Jordan method $5x + 4y = 15;\ 3x + 7y = 12$ ————————

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

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

6. Find the sum of 'n' terms of the series whose x^{th} term is $(x+3)(x+4)(x+5)$.

7. Write the formula for Bessal's Interpolation.

8. Find the cubic function from following table.

x	0	1	3	4
f(x)	1	4	40	85

9. If 3rd difference are constant prove that $Y_{x+½} = \frac{1}{2}(y_x + y_{n+1}) - \frac{1}{16}\ (\Delta^2\ y_{x-1} + \Delta^2\ y_x)$

10. The dividend difference of sum of two functions is the algebraic sum of their divided differences.

11. The nth divided differences of polynomial of the nth degree are ——————

12. Write the formula for Newton's backward interpolation formula?

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions

13. Find the real root of the equation

$1 - x + \frac{x^2}{(2!)^2} - \frac{x^3}{(3!)^3} + \frac{x^4}{(4!)^2} - ..... = 0$ using iteration method.

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

$2x_1 + 3x_2 + 2x_3 = 2$
$10x_1 + 3x_2 + 4x_3 = 16$
$3x_1 + 6x_2 + x_3 = -6$

15. Using Gauss-Jordan method, solve the following equation.

$5x + 4y = 15$

$3x + 7y = 12$

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

17. Apply Newton's backward formula to find a polynomial of degree 3 which includes the following x, y pairs.

x	3	4	5	6
y	6	24	60	120

18. Using Lagrange's interpolation formula, find the eqn of the cubic curve that passes through the points $(-1,-8), (0,3), (2,1)$ and $(3,2)$.

19. 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.

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. Using Gauss – Elimination method. Solve the system.

$$3.15x - 1.96y + 3.85z = 12.95$$
$$2.13x + 5.12y - 2.89z = -8.61$$
$$5.92x + 3.05y + 2.15z = 6.88$$

22. Find the general term and the sum to n terms of the series 1,2,4,8,17,40,104,.....

23. Use Gauss's forward formula to find the values of y when $x = 3.75$ given the following table.

x	2.5	3.0	3.5	4.0	4.5	5.0
y_x	24.145	22.043	20.225	18.644	17.262	16.047

24. Using lagrange's interpolation formula. Find the value of x. corresponding to $y = 13.5$ from following table.

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

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