MAY 2022 **U/ID 32503/URM1A**

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer any TEN questions.

1. Write the formula for finding an approximate root of $f(x) = 0$ by Newton-Raphson's method.

2. Briefly discuss iteration method.

3. Briefly discuss Gauss – Seidel method.

4. Discuss Crout's method.

5. Prove that $\Delta[cf(x)] = c\Delta[f(x)]$.

6. Evaluate $\Delta[e^{ax+b}]$.

7. Prove that $E = 1 + \Delta$.

8. Write Gauss backward formula.

9. State Bessel's formula.

10. Write the Newton's forward formula.

11. State Lagrange's inverse interpolation formula.

12. Find the third divided difference with arguments 2,4, 9, 10 of the function $f(x) = x^3 - 2x$.

PART B — ($5 \times 5 = 25$ marks)

Answer any FIVE questions.

13. Find the real root of $3x - \cos x = 1$ by using Newton – Raphson's method.

14. Solve the following system of equations by Gauss elimination method

$$x_1 + x_2 + x_3 = 6$$
$$3x_1 + 3x_2 + 4x_3 = 20$$
$$2x_1 + x_2 + 3x_3 = 13.$$

15. Prove that $e^x = \left(\frac{\Delta^2}{E}\right) e^x . \frac{Ee^x}{\Delta^2 e^x}$.

16. Obtain the function whose first difference is $x^3 + 3x^2 + 5x + 12$.

17. The population of a country in decennial census were as under. Estimate the population for the year 1925 by using Newton's backward formula.

Year x	1891	1901	1911	1921	1931
Population y	46000	66000	81000	93000	101000

18. Find $f(x)$ from the following table.

x	0	1	2	3
$f(x)$	1	0	1	10

19. Use Newton's divided difference formula, find the value of $f(6)$ from.

x	1	2	7	8
$f(x)$	1	5	5	4

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

20. Find the positive root of $x - \cos x = 0$ by bisection method.

21. Apply Gauss – Jordan method to solve

$x + 2y + z = 3$

$2x + 3y + 3z = 10$

$3x - y + 2z = 13.$

22. Express $x^4 + 3x^3 - 5x^2 + 6x - 7$ in factorial polynomial and get their successive forward differences by taking $h = 1$.

23. Use Stirling's formula to find y_{35}, given that $y_{20} = 512$, $y_{30} = 439$, $y_{40} = 346$, $y_{50} = 243$.

24. Use Lagrange's interpolation formula to find y_{10} from the following table.

x	5	6	9	11
y_x	12	13	14	16