NOVEMBER 2019 **50402/SBAMA**

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer any TEN questions.

1. Solve the equation $x^4 - 4x^2 + 8x + 35 = 0$ give that $2 + i\sqrt{3}$ is a root of it.

2. Form the equation with rational coefficients, whose roots are $1 + \sqrt{2}, 3$.

3. Solve the equation $x^3 - 12x^2 + 39x - 28 = 0$, whose roots are in arithmetical progression.

4. Define Eigen values and Eigen vectors.

5. State Cayley-Hamilton theorem.

6. Find the Eigen values of Matrix $\begin{bmatrix} 2 & 0 & 4 \\ 0 & 6 & 0 \\ 4 & 0 & 2 \end{bmatrix}$.

7. Expand $\sin^7 \theta$ in a series of sines of Multiples of θ.

8. Relations between hyperbolic functions of $\cosh^2 x = \sinh^2 x$.

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9. Evaluate $\int_0^1\int_0^2\int_0^3 (x+y+z)\,dx\,dy\,dz$.

10. Evaluate $\int_0^3\int_1^2 xy(x+y)\,dy\,dx$.

11. Define odd functions with example.

12. Define Fourier series.

PART B — (5 × 5 = 25 marks)

Answer any FIVE questions.

13. Solve the equation $x^4 - 8x^3 + 14x^2 - 8x - 15 = 0$ given that the sum of two roots is equal to the sum of the other two.

14. Find an approximate value of the positive root of the equation $x^3 - 2x - 5 = 0$.

15. Calculate A^4 when $A = \begin{bmatrix} -1 & 3 \\ -1 & 4 \end{bmatrix}$.

16. Find the Eigen values of Matrix is $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 8 & 1 & 1 \end{bmatrix}$.

17. Express $\cos 8\theta$ in terms of $\sin\theta$.

18. Evaluate $\iint (x^2+y^2)\,dx\,dy$ over the region for which x, y are each ≥ 0 and $x + y \leq 1$.

19. Express $f(x) = x(-\pi < x < \pi)$ as a Fourier series with period 2π.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

20. Solve the equation $6x^5 + 11x^4 - 33x^3 - 33x^2 + 11x + 6 = 0$.

21. Diagonalises the matrix $\begin{bmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{bmatrix}$.

22. Separate into real and imaginary parts $\tan^{-1}(x+iy)$.

23. Evaluate $\iiint xyz\,dx\,dy\,dx$ taken thought the positive octant of the sphere $x^2 + y^2 + z^2 = a^2$.

24. Express $f(x) = 1/2(\pi - x)$ as a Fourier series with period 2π, to be valid in the interval 0 to 2π.