APRIL 2017 **50402/SBAMA**

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer any TEN questions.

1. If $\alpha, \beta, \gamma, \delta$ are the roots of the equation $x^4 + 2x^3 - 25x^2 - 26x + 120 = 0$, find the value of $(\alpha + \beta + \gamma + \delta)$.

2. What is known as eigen values of a matrix?

3. State Cayley-Hamilton's theorem.

4. Define : cosine hyperbolic functions.

5. If $\frac{\tan\theta}{\theta} = \frac{2524}{2523}$, find θ approximately.

6. Write the De'moivre's theorem.

7. Define : Beta function.

8. What is the relation between gamma and Beta functions?

9. What is $\Gamma\left(\frac{1}{2}\right)$?

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10. Write the Fourier series for the function $f(x)$, where $0 < x < 2\pi$.

11. Determine whether the function $f(x) = x\cos x$ is odd or not.

12. Define : Even function.

SECTION B — (5 × 5 = 25 marks)

Answer any FIVE questions.

13. Find the equation whose roots are the roots of the equation $x^4 + x^3 - 3x^2 + 2x - 4 = 0$ diminished by 2.

14. Determine the approximate value of the positive root of the equation $x^3 - 2x - 5 = 0$ using Newton's method.

15. Find the eigen values of the matrix $\begin{bmatrix} 2 & 0 & 4 \\ 0 & 6 & 0 \\ 4 & 0 & 2 \end{bmatrix}$.

16. Show that $\dfrac{\sin 5\theta}{\sin\theta} = 5 - 20\sin^2\theta + 16\sin^4\theta$.

17. Evaluate $\int_0^{\pi/2}\int_0^{\pi/2} \sin(x+y)\,dx\,dy$.

18. Prove that $\dfrac{\beta(m+1, n)}{\beta(m,n)} = \dfrac{m}{m+n}$.

19. Obtain a sine series for unity in $0 < x < \pi$.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

20. Find the real root of the equation $x^3 + 6x - 2 = 0$ by Horner's method.

21. Determine the characteristic equation the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and hence obtain A^{-1}.

22. If $\sin(\theta + i\phi) = \tan\alpha + i\sec\alpha$, prove that $\cos 2\theta \cosh 2\phi = 3$.

23. Evaluate $\int_2^4\int_0^x\int_0^{\sqrt{x+y}} z\,dz\,dy\,dx$.

24. Find a Fourier series expression for e^x in $-\pi < x < \pi$.