B.Sc. DEGREE EXAMINATION,NOVEMBER 2018
I Year I Semester
Allied Paper -I
ALLIED MATHEMATICS -I

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Give the expansion of $(1+x)^{-2}$.
2. Expand $\log\left(\frac{1+x}{1-x}\right)$ in powers of x.
3. Define Orthogonal matrix. Give an example.
4. State Cayley Hamilton theorem.
5. Expand sinθ in powers of θ.
6. Write cosnθ in terms of cos θ.
7. Find $L\left[e^{-at}\right]$.
8. Find the Laplace transform of $\sin^2 3t$.
9. Find the inverse Laplace transform of $1/s^6$.
10. State any two properties of inverse Laplace transforms.
11. Express $\begin{pmatrix} 6 & 8 & 5 \\ 4 & 2 & 3 \\ 9 & 7 & 1 \end{pmatrix}$ as the sum of a symmetric and a skew symmetric matrix.
12. Show that $\begin{pmatrix} 3 & 1+2i \\ 1-2i & 2 \end{pmatrix}$ is a Hamilton matrix.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Show that $\log_e (1+1/n)^n = 1 - \frac{1}{2(n+1)} - \frac{1}{2.3(n+1)^2} - \frac{1}{3.4(n+1)^3} - ...\infty$.
14. Find the characteristic roots and vectors of $A = \begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$.
15. If $\frac{\sin x}{x} = \frac{863}{864}$, find an approximate value of x.
16. Find the Laplace transform of $te^{2t}\cos 5t$.

17. Find $L^{-1}\left[\dfrac{s^2}{(s^2+4)(s^2+9)}\right]$.
18. Sum to infinity the series: $1+\dfrac{2^3x}{1!}+\dfrac{3^3x^2}{2!}+...\infty$.
19. Expand cos6θ in terms of sin θ.

Section C $(3\times 10=30)$ Marks

Answer any **THREE** questions

20. Sum to infinity the series: $\dfrac{1.3}{2.4.6.8}+\dfrac{1.3.5}{2.4.6.8.10}+\dfrac{1.3.5.7}{2.4.6.8.10.12}+...\infty$
21. Find the characteristic equation of the matrix: $A=\begin{pmatrix}2&-1&1\\-1&2&-1\\1&-1&2\end{pmatrix}$ and find the inverse.
22. Prove that $64(\cos^8\theta+\sin^8\theta)=\cos 8\theta+28\cos 4\theta+35$.
23. Find the Laplace transform of the function $\dfrac{e^{3t}-e^{-2t}}{t}$.
24. Find $L^{-1}\left[\dfrac{7s^3-2s^2-3s+6}{s^3(s-2)}\right]$.

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