B.Sc.DEGREE EXAMINATION,APRIL 2020
I Year I Semester
Allied Mathematics-I

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

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

Answer any **TEN** questions

1. Find the coefficient of x^n in the expansion of e^{b+ax}.
2. Write the expansion for $\log(1+x)$.
3. Define symmetric matrix with an example.
4. State Cayley Hamilton theorem.
5. Write the expansion of $\sin n\theta$.
6. Show that $\lim_{x\to 0} \frac{\sin 2x \ -2\sin x}{x^3} = -1$.
7. Find Laplace transform $[\ sinat\ ]$.
8. Find Laplace transform $[\ \left[e^{-2t}sin2t\right]$.
9. Find Laplace transform $1^{-1}[\ \frac{5}{(s-3)^5}\ ]$
10. Find Laplace transform $^{-1}[\ \frac{s}{(s-5)^2+4}\ ]$
11. Define unitary matrix.
12. State initial value theorem Laplace transform.

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

Answer any **FIVE** questions

13. Find the sum to infinity of the series $1 + \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.\ 12} + \ldots\infty$.
14. Find the eigen value of the matrix $\begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$.
15. Prove that $\frac{sin7\theta}{sin\theta} = -1 + 24\ cos^2\theta - 80\ cos^4\theta + 64\ cos^6\theta$.
16. State and prove change of scale property of Laplace Transform.
17. Show that $L^{-1}\left[\log\left(\frac{s}{(s^2+4)^2}\right)\ \right] = \frac{1}{t}\left(4cos2t - 1\right)$.

18. Prove that the matrix $\frac{1}{3}\begin{bmatrix} 1 & -2 & 2 \\ -2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ is orthogonal.

19. If $\sin\theta_{\overline{\theta=\frac{5045}{5046}}}$, prove that the angle θ is $1^\circ\ 58'$ nearly

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

Answer any **THREE** questions

20. Find the sum to infinity of the series. $1 + \frac{1+3}{2\ !} + \frac{1+3+3^2}{3\ !} + \frac{1+3+3^2+3^3}{4\ !} + \ldots\infty$.

21. Verify Cayley-Hamilton theorem for the matrix $\begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$.

22. Prove that $2^8\ sin^9\theta = sin9\theta - 9sin7\theta + 36sin5\theta - 84sin3\theta + 126sin\theta$.

23. Find the Laplace Transform of (i) $t^2 cosat$ (ii) $\frac{e^{at}-\cos bt}{t}$.

24. Find the inverse Laplace Transform of $\dfrac{4s^2 - 3s + 5}{(s+1)(s-1)(s-2)}$

B.Sc.DEGREE EXAMINATION,APRIL 2020
I Year I Semester
Allied Mathematics-I

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

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

Answer any **TEN** questions

1. Find the coefficient of x^n in the expansion of e^{b+ax}.
2. Write the expansion for $\log(1+x)$.
3. Define symmetric matrix with an example.
4. State Cayley Hamilton theorem.
5. Write the expansion of $\sin n\theta$.
6. Show that $\lim_{x\to 0} \frac{\sin 2x \ -2\sin x}{x^3} = -1$.
7. Find Laplace transform $[\ sinat\ ]$.
8. Find Laplace transform $[\ \left[e^{-2t}sin2t\right]$.
9. Find Laplace transform $1^{-1}[\ \frac{5}{(s-3)^5}\ ]$
10. Find Laplace transform $^{-1}[\ \frac{s}{(s-5)^2+4}\ ]$
11. Define unitary matrix.
12. State initial value theorem Laplace transform.

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

Answer any **FIVE** questions

13. Find the sum to infinity of the series $1 + \frac{3}{4} + \frac{3.5}{4.8} + \frac{3.5.7}{4.8.\ 12} + \ldots\infty$.
14. Find the eigen value of the matrix $\begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$.
15. Prove that $\frac{sin7\theta}{sin\theta} = -1 + 24\ cos^2\theta - 80\ cos^4\theta + 64\ cos^6\theta$.
16. State and prove change of scale property of Laplace Transform.
17. Show that $L^{-1}\left[\log\left(\frac{s}{(s^2+4)^2}\right)\ \right] = \frac{1}{t}\left(4cos2t - 1\right)$.

18. Prove that the matrix $\frac{1}{3}\begin{bmatrix} 1 & -2 & 2 \\ -2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ is orthogonal.

19. If $\sin\theta_{\overline{\theta=\frac{5045}{5046}}}$, prove that the angle θ is $1^\circ\ 58'$ nearly

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

Answer any **THREE** questions

20. Find the sum to infinity of the series. $1 + \frac{1+3}{2\ !} + \frac{1+3+3^2}{3\ !} + \frac{1+3+3^2+3^3}{4\ !} + \ldots\infty$.

21. Verify Cayley-Hamilton theorem for the matrix $\begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$.

22. Prove that $2^8\ sin^9\theta = sin9\theta - 9sin7\theta + 36sin5\theta - 84sin3\theta + 126sin\theta$.

23. Find the Laplace Transform of (i) $t^2 cosat$ (ii) $\frac{e^{at}-\cos bt}{t}$.

24. Find the inverse Laplace Transform of $\dfrac{4s^2 - 3s + 5}{(s+1)(s-1)(s-2)}$