B.Sc. DEGREE EXAMINATION,NOVEMBER 2019
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. Show that $\sqrt{8} = 1 + \frac{3}{4} + \frac{3.5}{2.4^2} + \ldots$
2. Write the expansion for $\log(1+x)$
3. If A $= \begin{pmatrix} cos\theta & sin\theta \\ -sin\theta & cos\theta \end{pmatrix}$, then show that A is orthogonal.
4. Define Unitary matrix.
5. State Cayley-Hamilton theorem.
6. Express cos 5θ interms of cos θ.
7. If x $= cos\theta + i\ sin\theta$, what is $\left(x - \frac{1}{x}\right)^n$?
8. Find $L(3e^{5t} + 5cost)$.
9. Find L [1].
10. Find $L^{-1}\left(\frac{1}{(s+1)^2}\right)$
11. Write any two properties of inverse Laplace transforms.
12. If $\lambda_1,\ \lambda_2,\ \ \lambda_3$ are the eigen values of A. Find λ_3 if $A = \begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$, $\lambda_1 = 3,\ \ \lambda_2 = 15.$

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

Answer any **FIVE** questions

13. Sum the series $\frac{1}{10} + \frac{1.4}{10.20} + \frac{1.4.7}{10.20.30} + \ldots.$
14. Sum the series $log_2 e -\ log_4 e\ + log_8 e - log_{16} e + \ldots.$
15. Find the eigen values of $\begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$.

16. Express $\dfrac{\sin 7\theta}{\sin\theta}$ as a polynomial in cosθ
17. Find L(cos 4t sin 2t)
18. Find $L(\dfrac{\sin t}{t})$
19. Find $L^{-1}\left(\dfrac{1}{s-3}+\dfrac{1}{s}+\dfrac{s}{s^2-4}\right)$

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

Answer any **THREE** questions

20. Show that $\dfrac{1}{1.2.3}+\dfrac{1}{3.4.5}+\dfrac{1}{5.6.7}+\cdots=\log 2-\dfrac{1}{2}$
21. Using Cayley-Hamilton theorem, find A^4 given that $A=\begin{pmatrix}2 & -2 & 1\\ 0 & 1 & 2\\ 1 & 0 & 1\end{pmatrix}$
22. Show that, if θ is very small, the expression $\dfrac{3\sin 2\theta}{2(2+\cos 2\theta)}$ differs from θ by $\dfrac{4\theta^5}{45}$ nearly.
23. Find L(cos ht .sin 2t)
24. Find $L^{-1}\left(\dfrac{s-3}{s^2+4s+13}\right)$

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