SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc. END SEMESTER EXAMINATIONS NOVEMBER-2022
SEMESTER - I
20UCSAT1001 - Allied Mathematics - I

Total Duration : 2 Hrs 30 Mins. Total Marks : 60

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Sum the series 1 - $\frac{3}{4} + \frac{35}{48}$ - $\frac{357}{4812} + ...$
2. Show that the matrix $\frac{1}{3}\begin{pmatrix} 2 & 2 & 1 \\ -2 & 1 & 2 \\ 1 & -2 & 2 \end{pmatrix}$ is orthogonal
3. Show that -$2^5 \sin^6\theta = \cos 6\theta$ - $6\cos 4\theta + 15\cos 2\theta$ - 10
4. Find L$\left[e^{-t}\cos^2 t\right]$
5. Find the L$^{-1}\left(\log\left[\frac{s+1}{s-1}\right]\right)$
6. Find the eigen value and corresponding eigen vector of the following matrix $\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$
7. Express $\frac{\sin 7\theta}{\sin\theta}$ as a polynomial in $\cos\theta$ and $\sin\theta$
8. Find L $\left(t\sin 3t\cos 2t\right)$

Section B

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Show that $1 + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + \frac{1+3+3^2+3^3}{4!} + ... = \frac{e(e^2-1)}{2}$
10. State the Cayley - Hamilton theorem and verify it for the matrix $\begin{pmatrix} 1 & -1 & 2 \\ -2 & 1 & 3 \\ 3 & 2 & -3 \end{pmatrix}$

Contd...

11. Express $\cos 6\theta$ as a polynomial in
(1) $\cos\theta$ and (2) $\sin\theta$

12. Find L$\left[\dfrac{\sin^2 t}{t}\right]$ and L$\Big[$ t $\cos^3 t\Big]$

13. Find $L^{-1}\left(\dfrac{s^2}{(s^2+a^2)(s^2+b^2)}\right)$

*****