

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.Computer Science - END SEMESTER EXAMINATIONS - APRIL 2025  
SEMESTER - I

**20UCSAT1001 - Allied Mathematics - I**

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

**Section B**

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

1. Sum to infinity of the series  $5 + \frac{2.6}{\underline{1}} + \frac{3.7}{\underline{2}} + \frac{4.8}{\underline{3}} + \dots + \infty$

2. show that the matrix  $\frac{1}{3} \begin{pmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{pmatrix}$  is orthogonal.

3. Expand  $\cos 6\theta$  interms of  $\sin \theta$ .

4. Find the value of (i)  $L[t^3 + 4e^{-5t} + \sin 2t]$  (ii)  $L[e^{3t} \cos 3t]$ .

5. Find the inverse Laplace transform of  $\frac{s+1}{(s-1)(s-2)(s-3)}$ .

6. Show that  $\frac{1}{1.2.3} + \frac{1}{3.4.5} + \frac{1}{5.6.7} + \dots \infty = \log 2 - \frac{1}{2}$ .

7. Verify cayley Hamilton theorem of the matrix  $\begin{pmatrix} 1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{pmatrix}$ .

8. State and prove linearity property of Laplace transform.

**Section C**

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

9. Sum to infinity of the series  $\frac{2.4}{3.6} + \frac{2.4.6}{3.6.9} + \frac{2.4.6.8}{3.6.9.12} \dots + \infty$

10. Find the eigen values and eigen vectors of the matrix  $\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$ .

11. Expand  $\sin^8 \theta$  in terms of  $\cos \theta$ .

12. Find the value of (i)  $L[t^5 - 4t^3 + 3]$  (ii)  $L[\sin 3t \cos 2t]$  (iii)  $L[t \sin 2t]$ .

13. Find the inverse Laplace transform of

i)  $\frac{s}{s^2 + 2s + 2}$

ii)  $\frac{s}{s^2 + 5s + 6}$ .

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