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 - NOV'2024
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. Expand $\left(1 + \frac{2x}{3}\right)^{\frac{3}{2}}$ upto 4 terms.
2. Show that $\frac{1}{n+1} + \frac{1}{2(n+1)^2} + \frac{1}{3(n+1)^3} + ... = \frac{1}{n} - \frac{1}{2n^2} + \frac{1}{3n^3} - ...$
3. Show that $A = \begin{pmatrix} \frac{1}{3} & \frac{2}{3} & \frac{2}{3} \\ \frac{2}{3} & \frac{1}{3} & -\frac{2}{3} \\ -\frac{2}{3} & \frac{1}{3} & -\frac{1}{3} \end{pmatrix}$ is orthogonal.
4. Calculate A^4 when $A = \begin{pmatrix} -1 & 3 \\ -1 & 4 \end{pmatrix}$.
5. Express cos8θ in terms of sinθ.
6. Expand $sin^4\theta\ cos^2\theta$ in a series of cosines of multiples of θ.
7. Find the Laplace transform of $f(t)$ if
$$f(t) = \begin{cases} e^{-t}, & 0 \leq t \leq 4 \\ 0, & 4 < t < \infty \end{cases}$$
8. Find the inverse Laplace transform of $\frac{s}{(s-a)^2 + b^2}$.

Section C

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

9. Sum the series to infinity $\frac{1^3}{2!} + \frac{2^3}{3!} + \frac{3^3}{4!} + ...$
10. Find the characteristic equation of the matrix $\begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & -2 \end{pmatrix}$ and hence obtain its inverse.

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11. Express $\frac{sin6\theta}{sin\theta}$ in terms of $cos\theta$.

12. Find the Laplace transform of $e^{-t}(3sinh2t - cosh2t)$.

13. Evaluate $L^{-1}\left(\frac{5s+3}{(s-1)(s^2+2s+5)}\right)$.

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