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.(DS) END SEMESTER EXAMINATIONS NOVEMBER -2023
SEMESTER - I

22UDSAT1001 - 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 the series $\frac{1}{1!} + \frac{1+3}{2!} + \frac{1+3+3^2}{3!} + ...\infty$.
2. Show that the matrix $\frac{1}{3}\begin{bmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{bmatrix}$ is orthogonal.
3. Verify Cayley-Hamilton theorem for the matrix $\begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$.
4. Solve the equation $6x^4$ - $13x^3$ - $35x^2$ - $x + 3 = 0$ given that 2-$\sqrt{3}$ is a root.
5. Solve x^4 - $10x^3 + 26x^2$ - $10x + 1 = 0$.
6. Prove that $\frac{\sin 6\theta}{\sin \theta}$ =32 $\cos^5\theta$ - 32 $\cos^3\theta$ + 6 $\cos\theta$.
7. If $y = \sin(m \sin^{-1} x)$ show that (1-x^2) y_2 - $xy_1 + m^2 y$.
8. Find the n^{th} derivative of $\sin 2x \cos 3x$.

Section C

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

9. Find the value of y at x=21 from the following data using Newton's forward formula:

x	20	23	26	29
y	0.3420	0.3907	0.4384	0.4848

10. Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$.
11. Solve $8x^5$ - $22x^4$ - $55x^3 + 55x^2 + 22x$ - 8 = 0.
12. Expand $\sin^5\theta \cos^2\theta$ as the sum of sin of multiple of θ.
13. Find the maximum and minimum values of $f(x, y) = x^4 + y^4$ - $4xy + 1$

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