Roll.No. | 22UDSAT1001

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(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.Sc Cs with Ds - END SEMESTER EXAMINATIONS - NOVEMBER 2025
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. Find the value of x when y = 85 using Lagrange's formula for the table

x	2	5	8	14
y	94.8	87.9	81.3	68.7

2. Find the Eigenvalues and Eigen vectors for the matrix
$\begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$

3. If the roots of the equation $x^3 + px^2 + qx + r = 0$ are in arithmetic progression, show that $2p^3 - 9pq + 27r = 0$.

4. Derive $\sin 3\theta$ and $\cos 3\theta$ as polynomials in $\sin\theta$ and $\cos\theta$.

5. Find the extreme values of the function $f(x, y) = x^3 + y^3 - 3x - 12y + 20$

6. Express the following matrix as the sum of a symmetric and a skew symmetric matrix,
$\begin{pmatrix} -1 & 7 & 1 \\ 2 & 3 & 4 \\ 5 & 0 & 5 \end{pmatrix}$

7. Solve $x^5 - 5x^4 + 9x^3 - 9x^2 + 5x - 1 = 0$

8. If $\frac{\sin\theta}{\theta} = \frac{2165}{2166}$ show that θ is equal to $3°1'$ nearly.

Section C

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

9. Use Newton's difference formula find at x = 43 and x = 84 for the following data,

x	40	50	60	70	80	90
y	184	204	226	250	276	304

Contd...

10. Verify Cayley – Hamilton theorem also find A^{-1} when $A = \begin{pmatrix} -2 & -1 & 2 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$

11. Find the equation whose roots are less by 2, than the roots of the equation $x^5 - 3x^4 - 2x^3 + 15x^2 + 20x + 15 = 0$

12. Find the radius of curvature at the point $\left(\frac{3a}{2}, \frac{3a}{2}\right)$ of the curve $x^3 + y^3 = 3axy$.

13. Expand $\cos 6\theta$ and $\cos 5\theta$ in series of cosines of multiples of θ.

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