Roll.No. | 22UAIAT1001

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 Cs with AI - END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - I
22UAIAT1001 - Allied Mathematics - I

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

Section B

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

1. Show that $\frac{1}{3!} + \frac{2}{5!} + \frac{3}{7!} + \frac{4}{9!} + ... = \frac{1}{2e}$.
2. Apply Newton's Backward Difference Formula to find a polynomial of degree 3, using the following table.

x	3	4	5	6
y	6	24	60	120

3. Express $\begin{pmatrix} 2 & 4 & 8 \\ 6 & 2 & 8 \\ 2 & 2 & 2 \end{pmatrix}$ as the sum of a symmetric matrix and a skew symmetric matrix.
4. Obtain the characteristics equation of $A = \begin{pmatrix} 1 & 2 \\ 4 & 3 \end{pmatrix}$ and use it to calculate A^{-1}
5. Diminish the roots of the equation $x^4 - 4x^3 - 7x^2 + 22x + 24 = 0$ by 1 and hence solve the equation.
6. Show that $\cos 8\theta = 128\cos^8\theta - 256\cos^6\theta + 160\cos^4\theta - 32\cos^2\theta + 1$.
7. If $\tan(x/2) = \tan h(x/2)$, show that $\cos x \cos hx = 1$.
8. If $x = r\sin\theta\cos\phi, y = r\sin\theta\sin\phi, z = r\cos\theta$, then find the Jacobian of x,y,z with respect to r, θ, φ

Section C

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

9. Sum to infinity, the series $\frac{7}{9} + \frac{7.9}{9.12} + \frac{7.9.11}{9.12.15} + ...$
10. Find the Eigen Values and Eigen Vectors of $\begin{pmatrix} 7 & 0 & -2 \\ 0 & 5 & -2 \\ -2 & -2 & 6 \end{pmatrix}$

Contd....

11. Solve the following equation, given that its roots are in Geometric Progression:
$3x^4 - 40x^3 + 130x^2 - 120x + 27 = 0$.

12. Show that the following results:
(i) $\lim_{x\to 0} \dfrac{\sin 2x - 2\sin x}{x^3} = -1$
(ii) $\lim_{x\to \frac{\pi}{2}} = \dfrac{3}{2}$.

13. Find the radius of curvature at any point on the curve
$x = e^t \cos t, y = e^t \sin t$

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