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.Chemistry - END SEMESTER EXAMINATIONS - APRIL 2025
SEMESTER - I
20UCHAT1001 - 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 sum of infinity of the series $1 + \frac{3}{2!} + \frac{5}{3!} + \frac{7}{4!} + ...\infty$
2. Apply Cayley Hamilton's theorem, find the inverse of $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$.
3. Express $\frac{\cos 5\theta}{\cos \theta}$ in terms of $\sin \theta$.
4. Apply Newton's backward formula to find a polynomial of degree 3 which includes the following x, y pairs.

x	3	4	5	6
y	6	24	60	120

5. Separate into real and imaginary parts of $\tan(x + iy)$.
6. Differentiate symmetric and skew symmetric matrix with an example.
7. Show that $\sin^6 \theta = \frac{-1}{32}[\cos 6\theta - 6\cos 4\theta + 15\cos 2\theta - 10]$
8. Prove that $\sin h^{-1}x = \log_e(x + \sqrt{x^2 + 1})$.

Section C

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

9. Find the sum of infinity of the series $\frac{5}{3.6} + \frac{5.7}{3.6.9} + \frac{5.7.9}{3.6.9.12} + ...$
10. Find the Eigen values and Eigen vector of $A = \begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$.
11. Prove that
$\cos^5 \theta \sin^7 \theta = \frac{-1}{2^{11}}\big[\sin 12\theta - 2\sin 10\theta - 4\sin 8\theta + 10\sin 6\theta + 5\sin 4\theta - 20\sin 2\theta\big]$.

Contd...

12. A function $f(x)$ is give by the following table. Find $f(0.2)$ by a suitable formula.

x	0	1	2	3	4	5	6
f(x)	176	185	194	203	212	220	229

13. If $\tan(A + iB) = x + iy$,
prove that $x^2 + y^2 + 2x \cot 2A = 1$ and $x^2 + y^2 - 2y \cot h2B + 1 = 0$.

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