Roll.No. | | 25UCHGT1001

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 - NOVEMBER 2025
SEMESTER - I
25UCHGT1001 - Mathematics for Chemistry - I

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

Section B

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

1. Show that $\frac{1+\frac{1}{2!}+\frac{2}{3!}+\frac{2^2}{4!}+....}{1+\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+...} = \frac{e}{2}$
2. a) Prove that every orthogonal matrix commutes with its transpose.
   b) Prove that the product of two orthogonal matrix is orthogonal.
3. Find the characteristic equation of the matrix commutes with its transpose.
   $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and hence obtain its inverse.
4. Express $\frac{\sin 6\theta}{\sin \theta}$ in terms of $\cos\theta$.
5. Evaluate $\sin^7\theta$ in a series of sines of multiples of θ.
6. Express $\cos h^6\theta$ in terms of hyperbolic cosines of multiples of θ.
7. Estimate the population for 1925 by using Newton Gregory backward formula.

x	1891	1901	1911	1921	1931
f(x)	46	66	81	93	101

8. If y(75) = 246; y(80) = 202; y(85) = 118; y(90)=40. Find y(79).

Section C

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

9. Find the sum to infinity of the series
   $\frac{7}{9}+\frac{7.9}{9.12}+\frac{7.9.11}{9.12.15}+...$

Contd...

10. Find the EigenValues and Eigenvectors of the matrix
$$\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 8 & 1 & 1 \end{bmatrix}$$
11. a)Expand $\sin^4\theta\cos^2\theta$ in a series of cosines of multiples of θ.
b) Express $\cos 8\theta$ in terms of $\sin\theta$.
12. Predict the real and imaginary parts of $\tan^{-1}(x+iy)$
13. From the following table estimate the number of students who obtained marks between 40 and 45.

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

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