Roll.No. | | 25UCAGT1001

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.C.A- END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - I
25UCAGT1001 - Mathematics -I

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

Section B

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

1. a) Write the truth table for conjunction and conditional statement.
   b) Define Tautology and Contradiction.
2. Show that the product of two unitary matrices of the same order is unitary.
3. If $\tan(\alpha + i\beta)$=x+iy then prove that $x^2 + y^2 + 2x \cot 2x = 1$
4. Explain the various types of matrices with example.
5. Find the Eigen Values of the matrix
   $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$
6. Using Cayley Hamilton theorem, find A^{-1} if A= $\begin{pmatrix} 3 & 2 \\ 2 & 3 \end{pmatrix}$
7. Express $\cos 8\theta$ in terms of $\sin\theta$.
8. If $\tan(x + iy) = u + iv$ then prove that $\frac{u}{v} = \frac{\sin 2x}{\sinh 2y}$

Section C

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

9. a) Verify whether $(P \wedge (P \rightarrow\leftarrow Q)) \rightarrow Q$ is a tautology.
   b) Prove that P $P \vee Q \Leftrightarrow \neg(\neg P \wedge \neg Q)$
10. Define orthogonal matrix.Is product of 2 orthogonal matrix orthogonal? Also prove that the matrix

    $A = \begin{pmatrix} 2/3 & 2/3 & 1/3 \\ -2/3 & 1/3 & 2/3 \\ 1/3 & -2/3 & 2/3 \end{pmatrix}$

    is orthogonal.

Contd...

11. Find the rank of the matrix

$$A = \begin{bmatrix} 1 & 2 & 1 & 0 \\ -2 & 4 & 3 & 0 \\ 1 & 0 & 2 & -8 \end{bmatrix}$$

12. Expand $\sin^7\theta$ in a series of sines of multiples of θ

13. If $\cos(x+iy) = \cos\theta + i\sin\theta$ then prove that $\cos 2x + \cosh 2y = 2$.

*****