

Roll.No.

24UCAAT1001

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

24UCAAT1001 - 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 $p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r)$
2. In a survey of 5000 persons, it was found that 2800 read Indian express and 2300 read statesman while 400 read both papers. How many read neither Indian express nor statesman?
3. How many even numbers of 4 digits can be formed out of the digits 0,1,2,...,9 if the repetition of the digits is (i) not allowed (ii) allowed.
4. If $A = \frac{1}{\sqrt{2}} \begin{pmatrix} 1 & -1 \\ 1 & 1 \end{pmatrix}$, then prove that A is an orthogonal matrix.
5. Prove that $2^6 \cos^7 \theta = \cos 7\theta + 7 \cos 5\theta + 21 \cos 3\theta + 35 \cos \theta$.
6. Test the validity of the following argument:
If a man is a bachelor he is unhappy, If a man is unhappy he dies young, Therefore bachelors die young.
7. Let f and g be functions defined by $f(x) = 3x + 4$ and $g(x) = x^2 + 2$. Find $f \circ g$ and $g \circ f$. Check also whether they are equal or not.
8. Find all the characteristics roots of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.

Section C

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

9. Show that $(\sim P \wedge (\sim Q \wedge R)) \vee (Q \wedge R) \vee (P \wedge R) \equiv R$.
10. If N is the set of natural numbers and R be the relation \cong in $N \times N$ defined by $(a, b) \cong (c, d)$ if and only if $ad = bc$. Prove that R is an equivalence relation.

Contd...

11. (a) If $28C_{2r} : 24C_{2r-4} = 225 : 11$, find the value of r .
(b) The letters of the word NATURE are permuted and the words so formed are arranged as in a dictionary. Find the rank of the word NATURE.
12. Verify Cayley-Hamilton theorem for the matrix $= \begin{pmatrix} 1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{pmatrix}$ and hence find A^{-1} .
13. Express $\frac{\cos 7\theta}{\cos \theta}$ as a polynomial in (i) $\cos \theta$ (ii) $\sin \theta$.
