Roll.No. | 25UCGGT1001

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 CGS- END SEMESTER EXAMINATIONS - NOVEMBER 2025
SEMESTER - I
25UCGGT1001 - Discrete Mathematics

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

Section B

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

1. Examine whether the given terms are tautology or contradiction
   (i)$p \to (q \to r)$
   (ii) $(p \vee q) \wedge (7p \wedge 7q)$
2. (i) Prove that $\sqrt{2}$ is an irrational number.
   (ii) Show that A $\cap(B \cup C) = (A \cap B) \cup (A \cap C)$ by using characteristic function.
3. If $f(x) = x + 2; g(x) = x - 2$ and $h(x) = 3x$ for all $x \in R$ where R is the set of real numbers,find the following
   (i) $g \circ f \quad (ii) f \circ g \quad (iii) f \circ f \quad (iv) g \circ g \quad (v) f \circ h \quad (vi) h \circ g \quad (vii) h \circ f \quad (viii) f \circ h \circ g.$
4. Show that the symmetries of an equilateral triangle is a group.
5. Prove that $(Z_5, +_5)$ is an abelian group were $Z_5 = \{$all integer modulo 5$\}$
6. Prove that a graph G is connected if and only if for any partition of V into subset V_1 and V_2 there is an edge of G joining a vertex of V_1 to a vertex of V_2
7. (i) Prove that $\tau(G) = \tau(G - e) + \tau(G.e)$ where G be a graph and $e \in E(G)$
   ii) A tree with n vertices has (n-1) degree.
8. Prove that
   i) (A+B)(A+B') = A
   ii) Simplify F = A'B'C + AB'C + ABC' + ABC

Section C

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

9. i) Show that $(p \wedge q) \vee r$ and (p $\vee$ r)$\wedge$(q $\vee$ r) are logically equivalent using the truth table
   ii)Prove that the logical equivalence of (p $\vee$ q) $\Leftrightarrow$ 7 $p \wedge q$, without using truth table

Contd..

10. Let f:$R - \{3\} \rightarrow R - \{1\}$ be given by f(x) = (x-2)/(x-3). Show that f is a bijection.

11. i) Let G be a group and let a^5 = e, $aba^{-1} = b^2$ for all a, b $\in$ G then show that O(b) = 31
    ii) Show that union of two subgroups is a subgroup iff one of them is contained in the other.

12. Prove that a tree with n vertices has (n-1) edges

13. A Boolean function is defined as F(A, B, C) = $\sum$ (0, 1, 2, 5, 7)
    i) Construct the truth table
    ii) Draw the Karnaugh map
    iii) Find the simplified Sum of Product and Product of Sum forms.

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