

Boolean Algebra - Assignment
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Section A (Short Answer Questions)

(Each question carries 2 marks)

1. Define the principle of duality in Boolean algebra.
 2. Write the Boolean expression for the following logic circuit: (Provide a simple circuit with AND, OR, NOT gates).
 3. State and prove the Idempotent Law in Boolean algebra.
 4. Convert the Boolean function $F = A + A'B$ into its dual form.
 5. What is the significance of the Disjunctive Normal Form (DNF)?
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Section B (Medium Answer Questions)

(Each question carries 5 marks)

6. Prove the Absorption Law using Boolean identities.
 7. Express the Boolean function $F(A, B, C) = A'B + ABC$ in both Sum of Products (SOP) and Product of Sums (POS) forms.
 8. Explain the concept of a minterm and a maxterm with an example.
 9. Simplify the Boolean function using algebraic manipulation: $F = A'B + AB' + AB$.
 10. Convert the Boolean function $F = A'B + AB + C$ into Conjunctive Normal Form (CNF).
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Section C (Long Answer Questions)

(Each question carries 10 marks, Attempt any two questions)

11. Derive the Distributive Law of Boolean algebra using a truth table and verify it.
12. Find the minimal sum-of-products (SOP) expression for the function $F(A, B, C, D)$ given by the truth table:

A	B	C	D	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0

0	1	1	0	1
0	1	1	1	0

13. Construct the Disjunctive Normal Form (DNF) and Conjunctive Normal Form (CNF) of the Boolean function $F(A, B, C)$ given by the truth table:

A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1