

Q.1. Using Boolean Algebraic techniques, simplify the following Boolean expressions:

i) $\bar{X} + XYZ + X\bar{Y}Z + X\bar{Y}\bar{Z}$

ii) $\overline{(A + \bar{B} + C)(\bar{A}\bar{B} + \bar{C}\bar{D})ACD}$

Q.2. Using Given the function $F(A, B, C, D) = (A + B C) (D + A') + B' D'$

- (i) Determine the minterms of the function F and express it as an algebraic sum of minterms.
- (ii) Determine the maxterms of the function F and express it as an algebraic product of maxterms.

Q.3. Boolean Shown is the **K-Map** of some Boolean function **F(A, B, C, D)** along with the don't care conditions.

- a. Obtain a minimal sum-of-products expression of the function and show the logic implementation using NAND gates.
- b. Obtain a minimal product-of-sums expression of the function and show the logic implementation using NOR gates.
- c. Are the 2 expressions obtained in (a) and (b) the same? Explain

	CD			
AB	00	01	11	10
00	1	0	X	1
01	X	0	1	1
11	0	0	X	X
10	1	0	0	1

Q.4. Consider the multiple-level circuit given below:

- (i) Implement the circuit using minimum number of **2-input NAND** gates and **INVERTERS**.
- (ii) Implement the circuit using minimum number of **2-input NOR** gates and **INVERTERS**.

