

**Vidush Somany Institute of Technology and Research, Kadi**

**Semester: 3 (CE/CSE/IT)**

**Assignment-2**

**Subject Name: Digital Electronics**

**Chapter-2 Boolean Algebra and Logic Gates**

No.	Questions
1.	<b>Simplify the following Boolean functions to a minimum number of literals</b> a) $XY + XY'$ b) $(X + Y)(X + Y')$ c) $XYZ + X'Y + XYZ'$ d) $ZX + ZX'Y$ e) $(A + B)'(A' + B')$ f) $Y(WZ' + WZ) + XY$
2.	<b>Reduce the following Boolean expressions to the required number of literals.</b> a) $ABC + A'B'C + A'BC + ABC' + A'B'C'$ to five literals b) $BC + AC' + AB + BCD$ to four literals c) $[(CD') + A]' + A + CD + AB$ to three literals
3.	<b>Find the complement of the following Boolean functions and reduce them to a minimum number of literals.</b> a) $(BC' + A'D)(AB' + CD')$ b) $B'D + A'BC' + ACD + A'BC$
4.	<b>Obtain the truth table of the function</b> $F = xy + xy' + y'z$
5.	<b>Given the Boolean function :</b> $F = xy + x'y' + y'z$ a) Implement it with AND, OR and NOT Gates. b) Implement it with only OR and NOT Gates. c) Implement it with only AND and NOT gates.

6.	Simply the functions T1 and T2 to a maximum number of literals. <table><tr><td>A</td><td>B</td><td>C</td><td>T1</td><td>T2</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td></tr></table>	A	B	C	T1	T2	0	0	0	1	0	0	0	1	1	0	0	1	0	1	0	0	1	1	0	1	1	0	0	0	1	1	0	1	0	1	1	1	0	0	1	1	1	1	0	1
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7.	Express the following functions in a sum of minterms and a product of maxterms a) $F(A, B, C, D) = D(A' + B) + B'D$ b) $F(w, x, y, z) = y'z + wxy' + wxz' + w'x'z$ c) $F(x, y, z) = 1$																																													
8.	Convert the following to the other canonical form a) $F(x, y, z) = \sum (1, 3, 7)$ b) $F(x, y, z) = \sum (0, 2, 6, 11, 13, 14)$ c) $F(x, y, z) = \prod (0, 3, 6, 7)$																																													
9.	Obtain the simplified expressions in sum of products for the following Boolean functions using K-Map. a) $F(x, y, z) = \sum (2, 3, 6, 7)$ b) $F(A, B, C, D) = \sum (7, 13, 14, 15)$																																													
10.	Use K-Map and Obtain the simplified expressions in sum of products for the following Boolean functions. a) $xy + x'y'z' + x'yz'$ b) $A'B + BC' + B'C'$																																													
11.	Obtain the simplified expressions in sum of products for the following Boolean functions using K-Map. a) $D(A' + B) + B'(C + AD)$ b) $ABD + A'C'D' + A'B + A'CD' + AB'D$																																													
12.	Use K-Map to Obtain the simplified expressions in product of sums a) $F(x, y, z) = \prod (0, 1, 4, 5)$ b) $F(A, B, C, D) = \prod (0, 1, 2, 3, 4, 10, 11)$																																													
13.	Simplify the Boolean function F in sum of products using the don't-care conditions using K-Map. a) $F = y' + x'z'$ $d = yz + xy$ b) $F = B'C'D' + BCD' + ABCD'$ $d = B'CD + A'BC'D$																																													
14.	Simplify the Boolean function F using Tabulation Method and determine Prime Implicants. a) $F(w, x, y, z) = \sum (0, 1, 2, 8, 10, 11, 14, 15)$ b) $F(w, x, y, z) = \sum (1, 4, 6, 7, 8, 9, 10, 11, 15)$																																													