FPGA Lab Assignment 1

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1 Question

[CBSE 2019 Q6 (a)] State any one Distributive Law of Boolean Algebra and verify it using truth table.

2 Solution

Distributive Law is as follows:-

$$A.(B+C) \tag{2.1}$$
$$= A.B + A.C \tag{2.2}$$

3 Truth Table

Verification of the above stated distributive law using truth table is as follows.

A	B	C	B+C	A.(B+C)	A.B	A.C	A.B+A.C
0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	1	0	1	1
1	1	0	1	1	1	0	1
1	1	1	1	1	1	1	1

$$A.(B+C) = A.B + A.C \tag{3.1}$$

4 Karnaugh Map

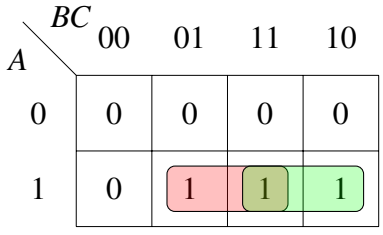
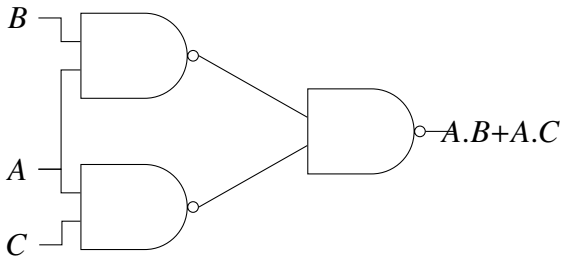


Fig. 1: K-Map for $A.B + A.C$

5 Circuit Diagram(Inplementation using NAND gates)



Proof:-

$$\overline{\overline{A.B}.\overline{A.C}} = \overline{\overline{A.B}} + \overline{\overline{A.C}} \tag{5.1}$$
$$\implies A.B + A.C \tag{5.2}$$

The eq 5.1 is through Demorgan's law.