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**LAB - 3**

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**Semester: BSCS - 3**

**Course: Digital Logic Design Lab**

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**Q:1** Simplify given expression using Standard Sum of Product, also show step by step process of building a circuit and designing a truth table.

**1:** F(A,B,C) = ~A ~B C + B ~C + A ~C

= ~A~B C + B ~C (A + ~A) + A ~C (B + ~B)

= ~A ~B C + A B ~C + ~A B ~C + A B ~C + A ~B ~C

**2:** F(A,B,C) = A B ~C + A ~C + ~B ~C

= A B ~C + A ~C (B + ~B) + ~B ~C (A + ~A)

= A B ~C + A B ~C +A ~B ~C + A ~B ~C + ~A ~B ~C

**3:** F(A,B,C,D) = ~A ~B ~C ~D + A B ~C + A ~C

= ~A ~B ~C ~D + A B ~C (D + ~D) + A ~C (B +~B)

= ~A ~B ~C ~D + A B ~C D + A B ~C ~D + A B ~C (D +~D) +A ~B ~C(D +~D)

= ~A ~B ~C ~D + A B ~C D + A B ~C ~D + A B ~C D + A B ~C ~D + A ~B ~C D + A ~B ~C ~D

**Q;2** Simplify given expression using Standard Product of Sum, also show step by step process of building a circuit and designing a truth table.

**1:** F(A,B,C) = (~A + ~B + C) (B + ~C) (A + ~C)

= (~A + ~B + C) (B + ~C) (A ~A) (A + ~C) (B ~B)

= (~A + ~B + C) (A + B + ~C) (~A + B + ~C) (A + B + ~C) (A + ~B + ~C)

**2:** F(A,B,C) = (~A + ~B) (A + ~C) (B + ~C)

= (~A + ~B) (C ~C) (A + ~C) (B ~B) (B + ~C) (A + ~A)

= (~A + ~B + C) (~A + ~B + ~C) (A + B + ~C) (A + ~B + ~C) (A + B + ~C) (~A + B + ~C)

**3:** F(A,B,C,D) = (~A+~B+C+D )( B+~C+D) ( A+~C)

= (~A+~B+C+D ) ( B+~C+D) (A + ~A) ( A+~C) (B + ~B)

= (~A+~B+C+D ) (A + B+~C+D) (~A + B+~C+D) ( A+B+~C) (D + ~D) ( A+~B+~C) (D + ~D)

= (~A+~B+C+D ) (A + B+~C+D) (~A + B+~C+D) ( A+B+~C +D) ( A+B+~C + ~D) ( A+~B+~C +D) ( A+~B+~C + ~D)

**Q:3** Why do we convert SOF & POS into their Canonical form?

**ANS** We Perform Sum of Product & Product of Sum for converting Truth Table into Logical Expression. Standardization makes the evaluation, simplification, and implementation of Boolean expressions much more systematic and easier.

**Q:4** What is Combinational Analysis?

**ANS** The Combinational Analysis module of Logisim allows you to convert between these three representations in all directions. It is a particularly handy way of creating and understanding circuits with a handful of one-bit inputs and outputs.

**Q:5** What are minterms and Maxterms?

**ANS** In a Boolean function, a product term in which all the variables appear is called a minterm of the function. Minterms specify the function as an OR of the minterms

In a Boolean function, a sum term in which all the variables appear is called a maxterm of the function. Maxterms specify the function as an AND of the maxterms (product terms)

**THE END**