**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**ACHARYA INSTITUTE OF TECHNOLOGY**

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**Subject:** Digital Design and Computer Organization (BCS302)

2nd Year (3rd Sem CSE, 2024-2025)

**Assignment No 1**

1. Find the minimum sum of products for each function using a k map

i)F1(a, b, c) =M0+M2+M5+M6

ii)F2(d, e, f) = 𝚺m (0,1,2,4)

2.Prove the Boolean algebraic theorems:

i) x + x = x and x.x =x

ii) x +1 = 1 and x.0 = 0

iii) x + (x . y) = x and x . (x + y) = x

iv) Commutative law and associative law

3.Identify prime implicant and Essential Prime implicants of the following functions:

i)f (A, B, C, D) = 𝚺(1,3,4,5,10,11,12,13,14,15)

ii)f (W, X, Y, Z) = 𝚺(0,1,2,5,7,8,10,15)

4. Simplify the following Boolean expression using K-map method and also draw the relevant logic circuit diagram using various logic gates:

i)A’B’CD + ABCD + ABCD’+A’B’C’D+A’B’C’D’+A’BCD’

ii) X’Z’+WYZ+W’Y’Z’+X’Y

5.Simplify the following Boolean expression using K-map method and also draw the relevant logic circuit diagram using various logic gates:

i) F(x,y,z) = 𝚺 (0,1,4,5,6) + d(2,3,7)

ii)F(W, X,Y,Z)= 𝚺(5,6,7,12,14,15)+ d(13,9,11)

6. Realize following expressions using NAND gates only

i) F=AB+CD

ii) F (x, y, z) = (1, 2, 3, 4, 5, 7)

7. Explain the difference between combinational circuit and sequential circuits with their block diagrams and examples.

8. Design a full adder and full subtractor circuit and draw their logic circuit diagram.