JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY, NOIDA
Electronics and Communication Engg.
B.Tech. IInd year
Digital Systems (18B11EC213) Even Sem
Tutorial-2

1. Find out simplified SOP expression for the function given below by K-map.
i. f(x,y,z,w)=Σm(1,3,6,7,9,13,14,15)

ii. f(x,y,z,w)=Σm(0,1,2,3,4,7,8,11,12,14,15)

iii. f(x,y,z,w)= ΠM(4,6,7,9,12,14,15)

iv. f(x,y,z,w)= ΠM(0,1,2,3,4,7,8,12,14)

2. Simplify the following Boolean function in POS form using K-map.
i. f(x,y,z,w)= Σm(1,2,3, 6,7,10,11)+ Σd (5,8,9)

ii. f(x,y,z,w)= ΠM(1,2,3,5,6,7)+ Πd(8,9)

iii. f(x,y,z,w)= Σm(2,3,10,11)+ Σd (1,8,9)

iv. f(x,y,z,w)= ΠM(1,2,3,8)+ Πd(4,9)

3. Realize 4-bit Binary to Gray Code converter using any logic gate.

4. Realize full subtractor with 2-level NAND-NAND realization.

5. Implement the following Boolean function with 8 x 1 multiplexer.
i. f(x,y,z,w)=ΠM(1,2,3,5,7,8,11)

ii. f(x,y,z,w)= Σm(0,2,3,5,6,7,11)

6. Implement the following Boolean function with 4 x 1 multiplexer and external logic gates.
i. f(x,y,z)=Σm(1,2,3,5,7)

ii. f(x,y,z)=Σm(0,2,3, 7)

iii. f(x,y,z,w)=Σm(1,2,3,5,9,10,14)

iv. f(x,y,z,w)=Σm(1,2,4,5,9,10,14)

7. Design 1x8 demultiplexer using two 1x4 demultiplexers.

8. Design 4x1 and 8x1 multiplexer using 2x1 multiplexer.

9. Design a magnitude comparator for comparing two numbers of three bits.

10. Find out the set of prime-implicants and essential prime-implicants from the given functions and obtain the minimal expression using K-map
i. f(x,y,z,w)= Σ m (0,1,2,5,7,8,9,10,13,15)

ii. f(x,y,z,w)= Σ m (0,1,2,3,4,6,8,9,10,11)