NAME: MASOOD AHMED

ID : 38186

DEPT: BSCS

DLD: ASSIGNMENT: 02

1) PROBLEM 1:-

a) Develop a truth table for each of the following standard SOP expressions.

$$\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}BC + A\bar{B}C + ABC$$

Sol-

	A	B	C	X	
	0	0	0	1	$\bar{A}\bar{B}\bar{C}$
→	0	0	1	0	
	0	1	0	1	$\bar{A}B\bar{C}$
	0	1	1	1	$\bar{A}BC$
→	1	0	0	0	
	1	0	1	1	$A\bar{B}C$
→	1	1	0	0	$AB\bar{C}$
	1	1	1	1	ABC

b) Convert the SOP expression in part a) to an equivalent POS expression.

Sol.

We can write POS expression from above truth table where $X = 0$.

So,

$$(A + B + \bar{C})(\bar{A} + B + C)(\bar{A} + \bar{B} + C).$$

This is standard POS expression from SOP expression.

2) PROBLEM 2:

From truth table, derived a standard SOP and a standard POS expression.

	A	B	C	D	X
1)	0	0	0	0	1
2)	0	0	0	1	1
3)	0	0	1	0	0
4)	0	0	1	1	1
5)	0	1	0	0	0
6)	0	1	0	1	1
7)	0	1	1	0	1
8)	0	1	1	1	0
9)	1	0	0	0	0
10)	1	0	0	1	1
11)	1	0	1	0	0
12)	1	0	1	1	0
13)	1	1	0	0	1
14)	1	1	0	1	0
15)	1	1	1	0	0
16)	1	1	1	1	0

Sol:

i) SOP expression from above truth table

$$\bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}C\bar{D} + \bar{A}B\bar{C}D + \bar{A}BC\bar{D} + \bar{A}BCD + AB\bar{C}\bar{D}.$$

ii) POS expression from above truth table.

$(A+B+\bar{C}+D)(A+\bar{B}+C+D)(A+\bar{B}+\bar{C}+\bar{D})$
$(\bar{A}+B+C+D)(\bar{A}+B+\bar{C}+D)(\bar{A}+B+\bar{C}+\bar{D})$
$(\bar{A}+\bar{B}+C+\bar{D})(\bar{A}+\bar{B}+\bar{C}+D)(\bar{A}+\bar{B}+\bar{C}+\bar{D})$.

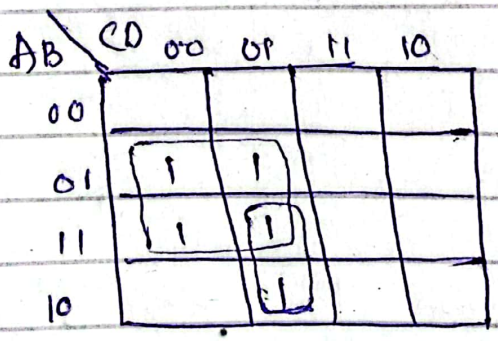
3) PROBLEM 3:-

a) Use a Karnaugh map to reduce the given expression to a minimum SOP form.

$$\bar{A}B(\bar{C}\bar{D}+\bar{C}D)+AB(\bar{C}\bar{D}+\bar{C}D)+A\bar{B}\bar{C}D$$

Sol:

$$\Rightarrow \bar{A}B\bar{C}\bar{D}+\bar{A}B\bar{C}D+\bar{A}B\bar{C}\bar{D}+\bar{A}B\bar{C}D+\bar{A}\bar{B}\bar{C}D$$
$$0100 \quad 0101 \quad 1100 \quad 1101 \quad 1001$$



$$B\bar{C}+A\bar{C}D$$

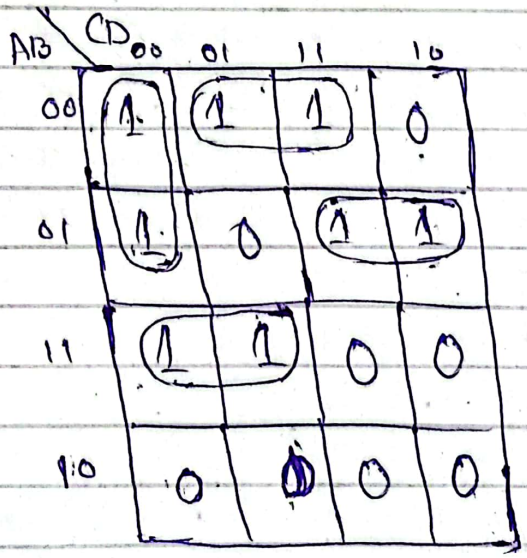
b) Convert each of the following POS expressions to minimum SOP expressions using a Karnaugh map.

$$(\bar{A}+B)(\bar{A}+\bar{B}+\bar{C})(B+\bar{C}+D)(A+\bar{B}+C+\bar{D})$$

Sol:

$(\bar{A}+B)$ $(\bar{A}+\bar{B}+\bar{C})$ $(B+\bar{C}+D)$ $(A+\bar{B}+C+\bar{D})$

1. 0 0 0 0 0 0 0 0
1 0 0 1 0 0 0 1 0 0 0 1
1 0 1 0 1 1 1 0 0 0 1 0 0 1 0 1
1 0 1 1 1 1 1 1 1 0 1 0



$\bar{A}\bar{C}\bar{D} + \bar{A}\bar{B}D + AB\bar{C} + \bar{A}BC$