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LAB SEC: 11/___/___
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HOMEWORK 4

P1.

a.

F_1

	AB	00	01	11	10
C	1	0	0	1	
	1	1	0	0	1

$$F_1 = \overline{B}$$

F_2 WX

YZ	00	01	11	10
00	0	0	0	0
01	1	1	1	1
11	0	0	0	0
10	1	0	0	1

$$F_2 = \overline{Y}Z + Y\overline{Z}\overline{X}$$

b.

F_1

	AB	00	01	11	10
0	1	0	0	1	
1	1	0	0	1	

$$F_1 = (\overline{B})$$

F_2 WX

YZ	00	01	11	10
00	0	0	0	0
01	1	1	1	1
11	0	0	0	0
10	1	0	0	1

$$F_2 = (Y+Z)(Y+\overline{Z})(Y+\overline{X})$$

$$\begin{array}{r} 9'24 \\ -51 \\ \hline 22 \end{array}$$

P2.

a.

$$G_1$$

	wx	00	01	11	10
yz	00		1	1	
	01	1	1	1	
	11		1	1	
	10		1		

$$G_2$$

	wx	00	01	11	10
yz	00				1
	01		1		1
	11				
	10				

$$G_1 = x\bar{y} + x\bar{y} + \bar{y}z\bar{w} + \bar{w}yx$$

$$G_2 = \bar{w}x\bar{y}z + w\bar{x}\bar{y}$$

$$F = x\bar{y} + xz + \bar{y}z\bar{w} + \bar{w}xy + \bar{w}x\bar{y}z + w\bar{x}\bar{y}$$

b.

$$G_1$$

	xy	00	01	11	10
z	00	1	1	1	
	01	1			
	11				
	10				

$$G_2$$

	xy	00	01	11	10
z	00	1	1	1	
	01	1			
	11				
	10				

$$G_1 = \bar{x}\bar{y} + \bar{x}\bar{z} + y\bar{z}$$

$$G_2 = \bar{x}\bar{y} + \bar{z}\bar{x} + \bar{y}\bar{z} + xy$$

$$F = \bar{x}\bar{y} + \bar{x}\bar{z} + y\bar{z} + xy \quad (A+A=A)$$

c.

$$G_1$$

	ab	00	01	11	10
c	00	0	0	1	1
	01	0	0	1	1
	11	0	0	1	1
	10	0	0	1	1

$$G_2$$

	ab	00	01	11	10
c	00	1	1	1	0
	01	1	1	1	0
	11	1	1	1	0
	10	1	1	1	0

$$G_1 = \bar{a}bc + a\bar{c} + a\bar{b}$$

$$G_2 = \bar{a}\bar{c} + b\bar{c} + ab$$

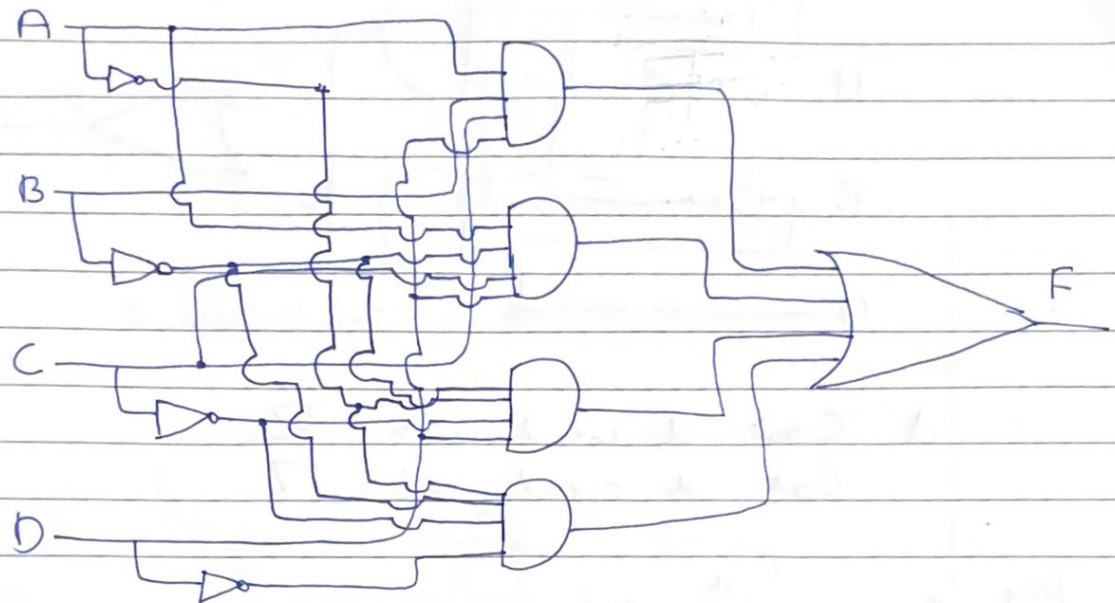
$$F = \bar{a}bc + a\bar{c} + a\bar{b} + \bar{a}\bar{c} + b\bar{c} + ab$$

0100
8 42 12

0, 4, 11, 15

1/1

P3. a)



b)

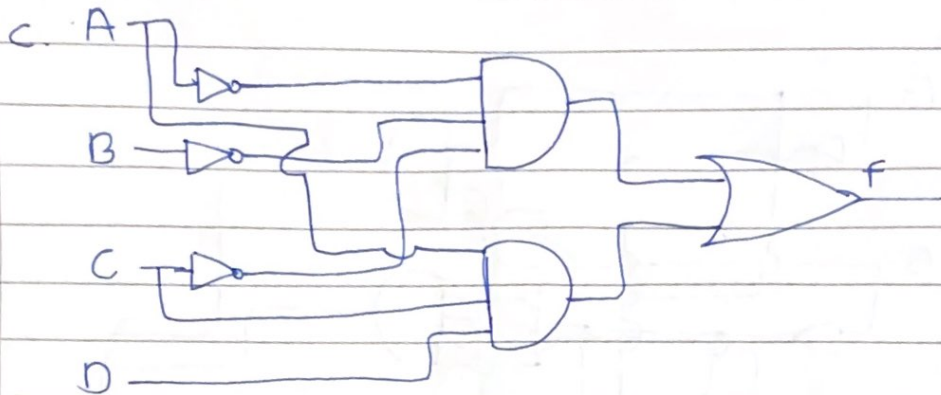
	AB			
CD	00	01	11	10
00	1			
01	1			
11			1	1
10				

$$f = \bar{A}\bar{B}\bar{C} + ACD$$

c)

TBC 1KCP

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d. Cost of circuit in a : 33

Cost of circuit in c : 17

P4. a.

M_1

	ab	00	01	11	10
cd					
00	0	0			d ₁₂
01				d ₁₃	d ₁₄
11			0		0
10		0	0		

$$M_1 = (\bar{a} + \bar{c} + \bar{d})(a + \bar{b} + \bar{c})(\bar{b} + \bar{c} + d)(\bar{a} + b + \bar{d})$$

b.

M_2

	ab	00	01	11	10
c					
0	0	0	0		d ₄
1	d ₁	0	0	0	

$$M_2 = \bar{b}$$

//_

c.

M_3 cd \ ab	00	01	11	10
00	0	0	0	0
01	d	0		
11	d	0		0
10	d			

$$M_3 = (c + d)(b + \bar{c} + \bar{d})(a + \bar{d})$$

P5. a.

Z cd \ ab	00	01	11	10
00	0	0	1	1
01	0	0	0	0
11	0	0	0	1
10	1	1	1	1

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

b. $Z = C\bar{D} + A\bar{C}\bar{D} + A\bar{B}C$

c. The SOP expression will cost less because it will have less number of gates & inputs.

P6. a.

		Q_1			
		AB			
CD	00		1		
	01	1	1	1	1
	11	1	1	1	1
	10				1

$$Q = \bar{A}\bar{B}\bar{C} + \bar{C}D + BD + A\bar{B}C$$

b.

		Q_2			
		AB			
CD	00	1	1	1	1
	01	1	0	1	1
	11	1	0	1	1
	10	1	1	0	1

$$Q_2 = \bar{A}\bar{B} + \bar{C}\bar{D} + A\bar{B} + \bar{A}C\bar{D} + AD$$

c.

		Q_3			
		AB			
CD	00	0	0	1	1
	01	1	1	1	1
	11	1	1	0	1
	10	0	0	0	0

$$Q_3 = A\bar{C} + D$$