1

Name : Muhammad Istafa Malik.

Q.1

$(4F.B)_{16} - (29.A)_{16}$

With 2'C Method

4F → 0100 1111

29 → 0010 1001

4F 0100 1111

29 0010 1001

we will take 2'C of 29

2'C of 29 11010111

Now Add

4F	0100 1111
29	1101 0111 +
	0010 0110

Discard carry.

0010 → 2, 0110 → 6

Now Fractional Part

B . A

B → 1011, A → 1010

B 1011
A − 1010

Take 2'C of

A 0110

Now Add

B	1011
2'C of A	0110
	0001

discard carry

$(4F.B)_{16} - (29.A)_{16}$

$= (0010\ 0110 . 0001)_2$

$(2\ 6 . 1)_{16}$

Q1 (b) $(-118)_{10} + (-32)_{10}$

- - - - - - - - - - 128 64 32 16 8 4 2 1

0 0 0 0 0 0 0 0 0 1 1 1 0 1 1 0

0 0 0 0 0 0 0 0 0 0 1 0 0 0 0 0

2'C of 118 and 32

1 1 1 1 1 1 1 1 1 0 0 0 1 0 1 0

Add + 1 1 1 1 1 1 1 1 1 1 1 0 0 0 0 0

1 1 1 1 1 1 1 1 0 1 1 0 1 0 1 0

Taking 2'C Again For checking the decimal value

0 0 0 0 0 0 0 0 1 0 0 1 0 1 1 0

= 150

So 11111111 01101010 = $(-150)_{10}$ in 2'C

3

o ~~1000001~~ 10111000 00000000 0000 0000

d) 01111111 127

$\times$ 0000 0101 $\times$ 5

635

1 1 1 1

0 1 1 1 1 1 1 1

1 0 0 0 0 0 0 0 0 X

0 1 1 1 1 1 1 1 X X

1 0 0 1 1 1 1 0 1 1

Now converting into Binary to Decimal

512	256	128	64	32	16	8	4	2	1
1	0	0	1	1	1	1		1	1

$= 512 + 64 + 32 + 16 + 8 + 2 + 1$

$= 635$

Verified

0100

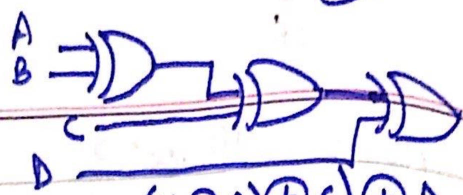
5

Divisi

$$\begin{array}{r|l} & 0010 \\ 00001100 & 00110000 \\ & 00001100 \\ \hline & 101100 \end{array}$$

$$\begin{array}{r|l} & 4 \\ 12 & 48 \\ & 48 \\ \hline & 0 \end{array}$$

(5)



Q2

Expression $((A \oplus B) \oplus C) \oplus D$

Output 1 $= (((1 \oplus 0) \oplus 0) \oplus 0)$

$= (1 \oplus 0) \oplus 0$

$1 \oplus 0$

1

Output 2 : $((1 \oplus 1) \oplus 0) \oplus 1)$

$= (0 \oplus 0) \oplus 1$

$(0) \oplus 1$

1

Output 3 $(((1 \oplus 0) \oplus 1) \oplus 0)$

$(1 \oplus 1) \oplus 0$

$0 \oplus 0$

0

Redraw Expressin $((A \oplus B) \oplus C) \oplus D$

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

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

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

Q.3

Roll No = 19P-0033
Name = M. Istafa Malik.

My last Digit of Rollno is 3

A	B	C	D	Output
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

we will write all the sop expressi of these

We will write this SOP form

$\bar{A}\bar{B}CD + \bar{A}B\bar{C}\bar{D} + \bar{A}B\bar{C}D + \bar{A}BC\bar{D} + \bar{A}BCD + A\bar{B}\bar{C}\bar{D}$
$+ A\bar{B}\bar{C}D + A\bar{B}C\bar{D} + A\bar{B}CD + AB\bar{C}\bar{D} + AB\bar{C}D$
$+ ABC\bar{D} + ABCD$

7

Q4

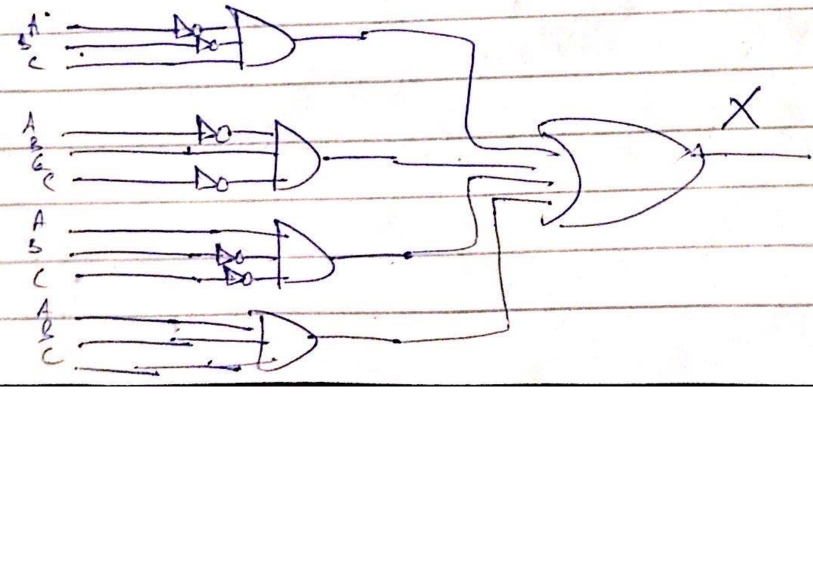
A	B	C	X	Y
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

Express for X in SoP

$$= \underset{001}{\bar{A}\bar{B}C} + \underset{010}{\bar{A}B\bar{C}} + \underset{100}{A\bar{B}\bar{C}} + \underset{111}{ABC}$$

Kmap

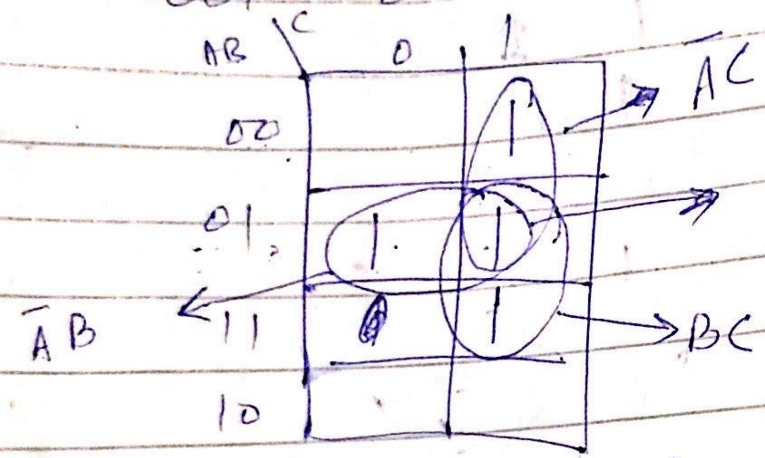
AB \ C	0	1
00		1
01	1	
11		1
10	1	



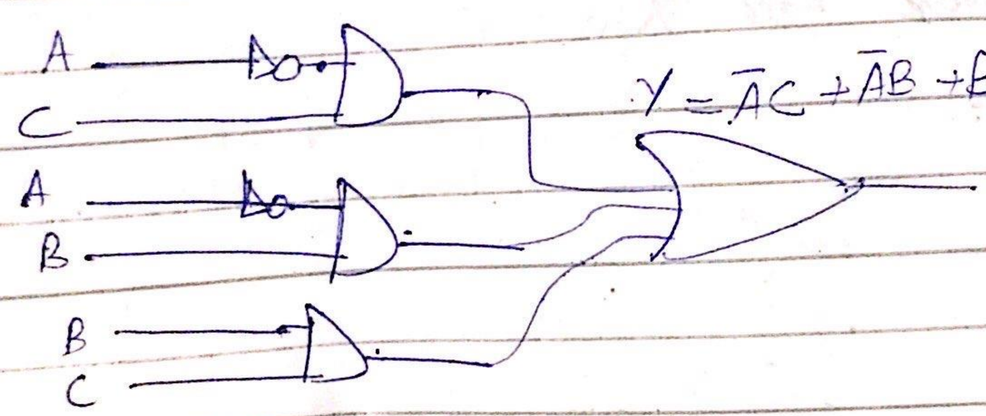
Expression for Y

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

001 010 011 111



Express after minimizati. $\bar{A}C + \bar{A}B + BC$



$Y = \bar{A}C + \bar{A}B + BC$

Q6 **For circuit 1**

$D_1 = \overline{\overline{AB} \cdot Z}$

$D_1 = \overline{\overline{AB}} + \overline{Z}$

$D_1 = AB + \overline{Z}$

D

D F.Flop		
D	CLK	Q
0	↑	0
1	↑	1

$D_1 = AB + \overline{Z}$	Z
0	0
1	1

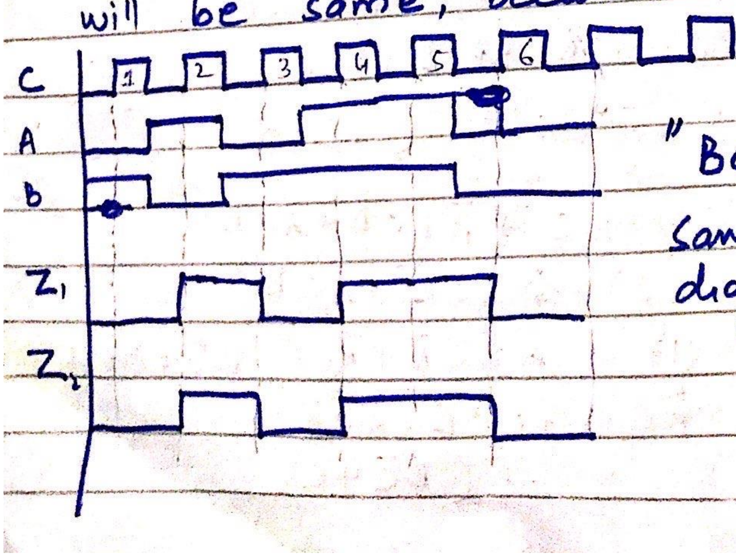
[Assume Z is Initially Low]

[Note when A and B both 1. Output will be 1 otherwise Output will be 1 when Z is 0]

For circuit 2

$D_2 = AB + \overline{Z}$

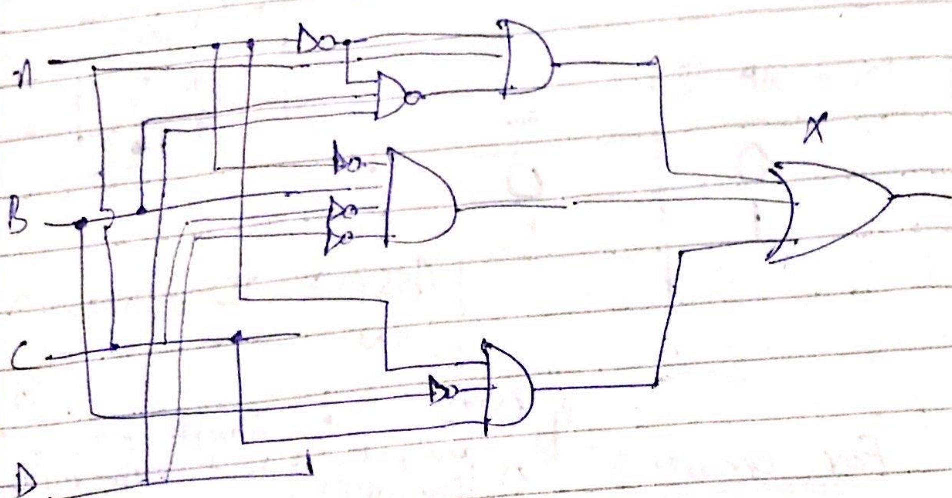
Both ~~are~~ have same input, so Output Z will be same, because D flipflop.



"Both Z have same Time diagram."

Q7

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



Simplification: $\bar{A}C(\overline{\bar{A}BD}) + \bar{A}B\bar{C}\bar{D} + A\bar{B}C$

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

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

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

$0 + \bar{A}\bar{B}C + \bar{A}C\bar{D} + \bar{A}B\bar{C}\bar{D} + A\bar{B}C$ Rule $A\bar{A}=0$

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

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

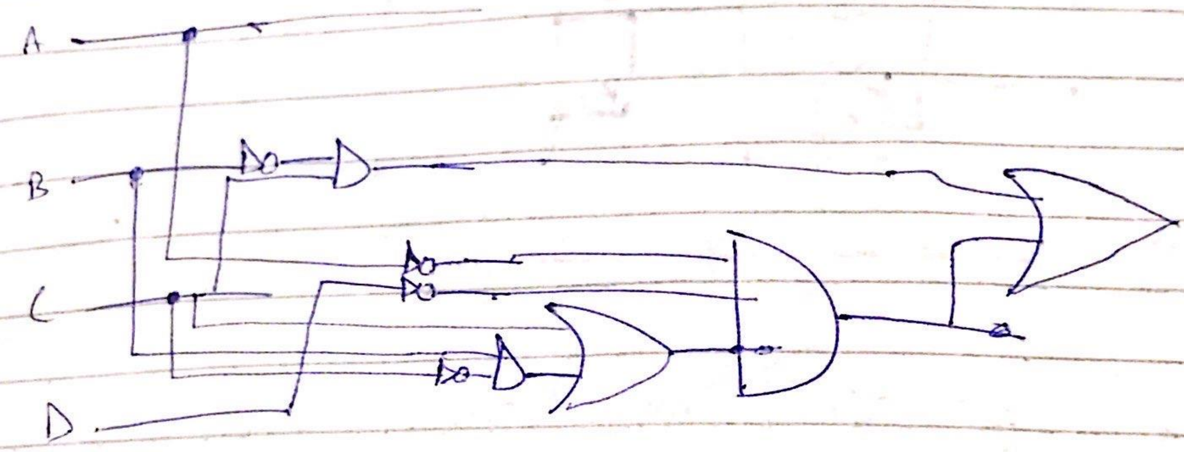
$\bar{B}C(\bar{A}+A) + \bar{A}B\bar{C}\bar{D} + \bar{A}C\bar{D}$

$\bar{B}C\ (1) + \bar{A}B\bar{C}\bar{D} + \bar{A}C\bar{D}$ Rule: $A+\bar{A}=1$

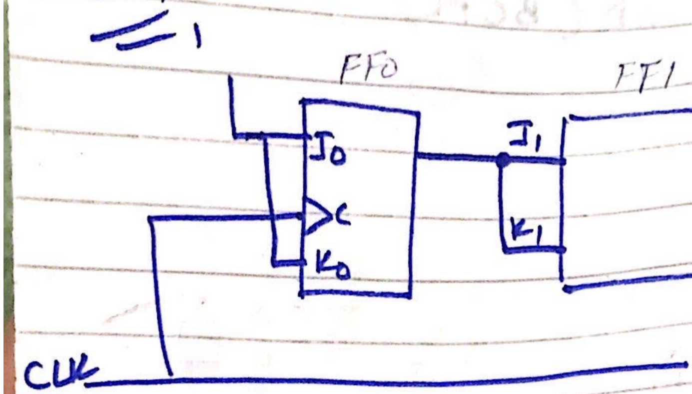
$\bar{B}C + \bar{A}B\bar{C}\bar{D} + \bar{A}C\bar{D}$

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

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



Q9



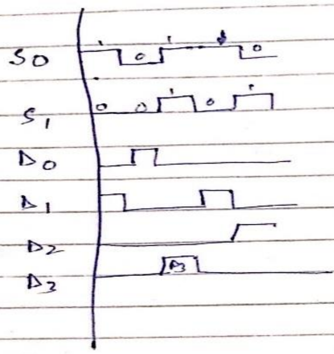
The operation of this synchronous counter is as follows. First, assume that the counter is initially in the binary 0 state; that is, both flip flops are reset. When the positive edge of the first clock pulse is applied, FF0 will toggle and Q_0 will be therefore go high. What happens to FF1 at the ~~positive going edge of CLK1? To find~~

Look at the input conditions of FF1. Inputs J_1 and K_1 are both low because Q_0 to which they are connected has not yet gone High. Remember there is a propagation delay.

Q5:

Q5

D1	D0	D3	D1	D2
S_1 S_0	S_1 S_0	S_1 S_0	S_1 S_0	S_1 S_0
0 1	0 0	1 1	0 1	1 0



S_1	S_0	
0	0	D_0
0	1	D_1
1	0	D_2
1	1	D_3