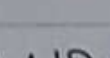
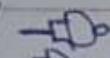
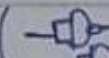
Logic Design (Final 2023)

Q.] A- NAND() - Not() - AND()

OR() - NOR().

B- ① 101010 Binary ⇒ to decimal: 32 16 8 4 2 1 → 1 0 1 0 1 0 = 32 + 8 + 2 = **42**.

⇒ to Octal: 4 2 1 | 4 2 1 → 1 0 1 | 0 1 0 = **52**. (5 | 2)

⇒ to Hexa: 8 4 2 1 | 8 4 2 1 → 0 0 1 0 | 1 0 1 0 = **2A**. (2 | A)

② 36 Decimal :-

to Binary

36	0
18	0
9	1
4	0
2	0
1	1
0	

$(100100)_2$

to Octal

36	4
4	4
0	

$(44)_8$

to Hexa

36	4
2	2
0	

$(24)_{16}$

3- 50 Octal :-

to Binary

5 → 101 , 0 → 000

$(101000)_2$

to Decimal

Binary: 32 16 8 4 2 1 → 1 0 1 0 0 0

$32 + 8 = (40)_{10}$

to Hexadecimal

Binary: 8 4 2 1 | 8 4 2 1 → 0 0 1 0 | 1 0 0 0 (2 | 8)

$(28)_{16}$

4-22 Hexdecimal :-

to Binary

2 2

0010 0010

$(00100010)_2$

to Octal

Binary: 100 010 (4 2 1 4 2 1)

4 2

$(42)_8$

to Decimal

Binary: 100010 (32 16 8 4 2 1)

$32 + 2 = (34)_{10}$

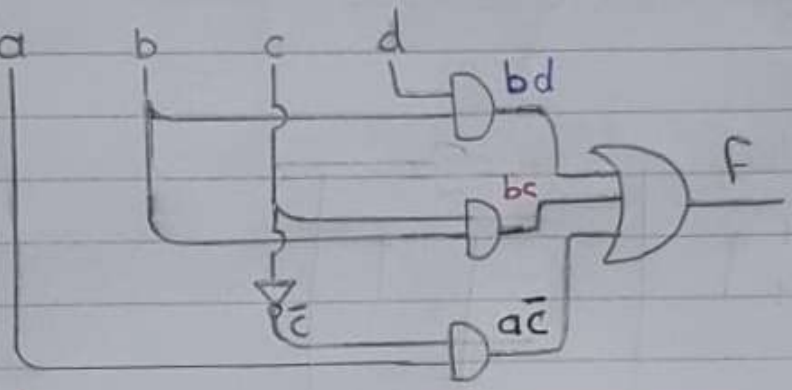
Q2]

a)

$F(a,b,c,d) = a\bar{c} + bd + bc$

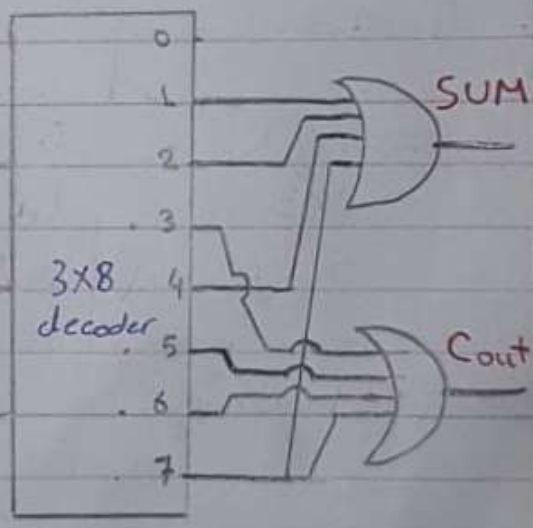
ab \ cd	00	01	11	10
00				
01		1	1	1
11	X	X	X	X
10	1	1	X	X

b)



Q3] a)

A	B	Cin	SUM	Cout
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

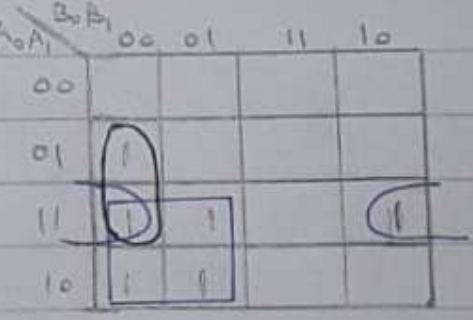


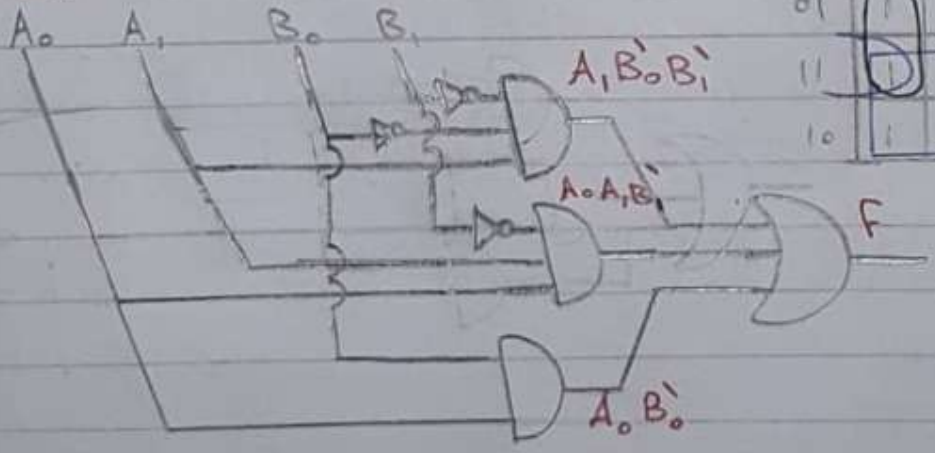
b)

A_0	A_1	B_0	B_1	$A>B$	$A=B$	$A<B$
0	0	0	0	0	1	0
0	0	0	1	0	0	1
0	0	1	0	0	0	1
0	0	1	1	0	0	1
0	1	0	0	1 → 4	0	0
0	1	0	1	0	0	0
0	1	1	0	0	0	1
0	1	1	1	0	0	1
1	0	0	0	1 → 8	0	0
1	0	0	1	1 → 9	0	0
1	0	1	0	0	1	0
1	0	1	1	0	0	1
1	1	0	0	1 → 12	0	0
1	1	0	1	1 → 13	0	0
1	1	1	0	1 → 14	0	0
1	1	1	1	0	1	0

$F(A>B) = \Sigma(4,8,9,12,13,14)$

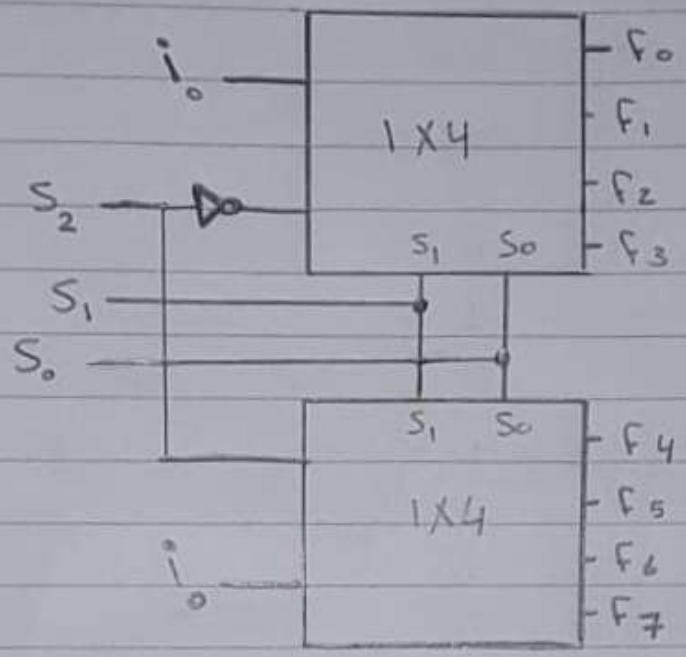
$F(A>B) = A_0 B_0' + A_0 A_1 B_1' + A_1 B_0' B_1'$





Q4]

a) 1X8 DEMUX ⇒ two 1X4 DEMUX



b) 1-A . 2-C . 3-A . 4-D . 5-A . 6-B . 7-C . 8-A . 9-D . 10-A .

1- $F = X2 + 2(\bar{X} + XY) = X2 + 2(\bar{X} + Y) = 2(\underbrace{X\bar{X}}_{1} + Y) = 2$

$2 = 2 + 2Y$ (Absorption law) (A)

2- AND gate is Low when any input is low . (C)

3- In OR gate with tree variables in case ($\overset{A}{0}$ $\overset{B}{0}$ $\overset{C}{0}$) only output is Low so $\frac{7}{8}$ cases will be High (A)

4- Both inputs are unequal (D)

5- $(1000)_{10} \rightarrow (\underbrace{1111101000}_{10 \text{ bits}})_2$ (A)

1000	0	→10
500	0	→9
250	0	→8
125	1	→7
62	0	→6
31	1	→5
15	1	→4
7	1	→3
3	1	→2
1	1	→1

6- (11110010) 2's complement
the frist one represent negative, so this number is negative.

1's 00001101
2's   1+

00001110 → Binary ⟹ 8 + 4 + 2 = 14
8 4 2 1

number is -14 (B)

7- 1111 (C)

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  1101001
- 1011010
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  0001111
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8- BCD (1000 0111 0011)
8 7 3

Decimal: 873 (A)

9- 00001100
1's 11110011
+1
2's (11110100) (D)

10- 9 1 5 → BCD (100100010101) (A)
1001 0001 0101