

12 Pages

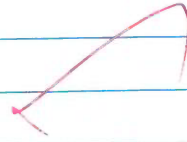
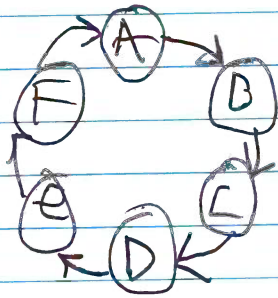
1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can be charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	2217176
2	Title of Examination Paper	Electronics
3	Module Code	ACd95001
4	Date and Time of Examination	8/5/2025 9:00
5	Examination Venue	IG 310
6	Seat Number	9
7	Number of Answer Books handed in	2

List the numbers of the questions you have attempted	Office Use
Q1	25
Q2	07
Q3	08+1
Q4	17
Total	58/100

Question No.

Q1

(i)
a)

4

b)

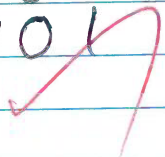
PS	NS
A	B
~~B~~	C
C	d
d	e
e	F
F	A

Q	Q+1	J	K
0	0	0	d
0	1	1	d
1	0	d	1
1	1	d	0

4

c)

$A = 000$
 $B = 001$
 $C = 010$
 $d = 011$
 $e = 100$
 $F = 101$



2

$q_2 q_1 q_0$ NS
PS

d)

$q_2 q_1 q_0$	$q_2 q_1 q_0$	$J_2 K_2$	$J_1 K_1$	$J_0 K_0$
000	001	0d	0d	1d
001	010	0d	1d	d1
010	011	0d	d0	1d
011	100	1d	d1	d1
100	101	d0	0d	1d
101	000	d1	0d	d1
110	ddd	dd	dd	dd
111	ddd	dd	dd	dd

5

Q	$Q+1$	J	K
00	01	0	d
01	11	1	d
10	10	d	1
11	00	d	0

e)

q_2	$q_1 q_0$	00	01	11	10
0	0	0	0	1	0
1	d	d	d	d	d

$$J_2 = q_1 q_0$$

K_2	$q_1 q_0$	00	01	11	10
0	0	0	1	d	d
1	0	1	1	d	d

$$K_2 = q_0$$

	$Q_1 Q_0$				
T_1	00	01	11	10	
Q_2 0	0	1	d	d	
1	0	0	d	d	

$T_1 = \overline{Q_2} Q_0$

	$Q_1 Q_0$				
K_1	00	01	11	10	
Q_2 0	d	d	1	0	
1	d	d	d	d	

$K_1 = Q_0$

	$Q_1 Q_0$				
T_0	00	01	11	10	
Q_2 0	1	d	d	1	
1	1	d	d	d	

$T_0 = 1$

	$Q_1 Q_0$				
K_0	00	01	11	10	
Q_2 0	d	1	1	d	
1	d	1	d	d	

$K_0 = 1$

$$J_2 = Q_1 Q_0$$

$$K_2 = Q_0$$

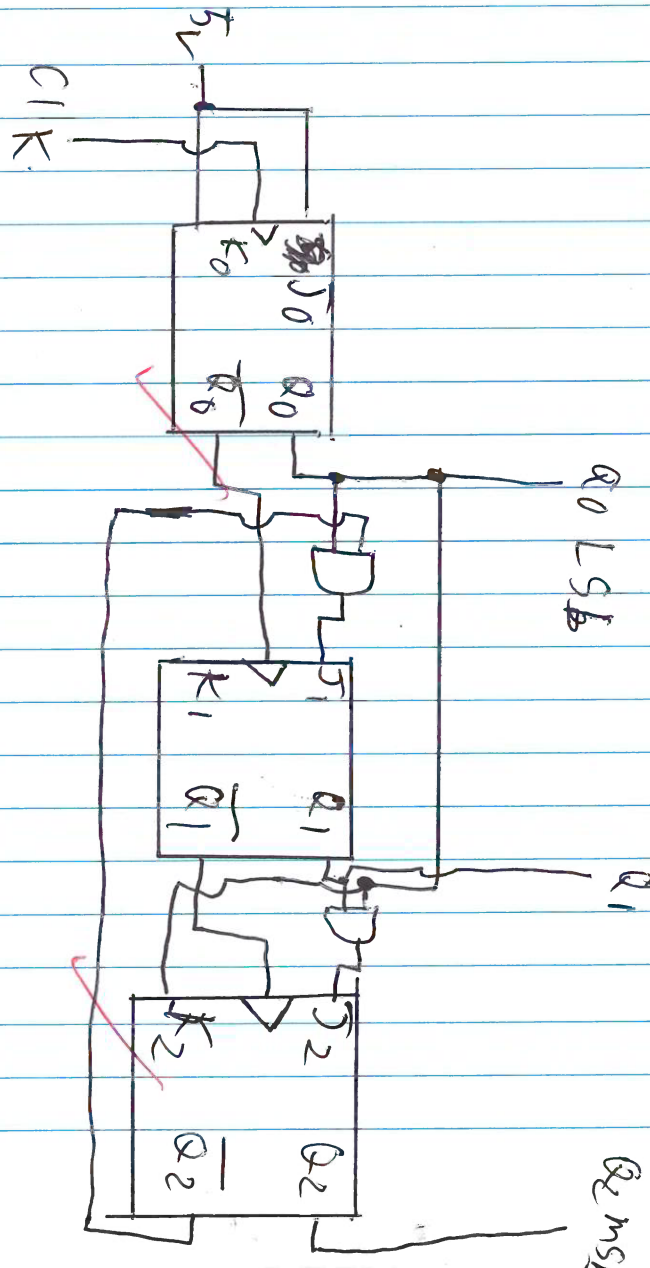
$$J_1 = \overline{Q_2} Q_0$$

$$K_1 = Q_0$$

$$J_0 = 1$$

$$K_0 = 1$$

B



25/25

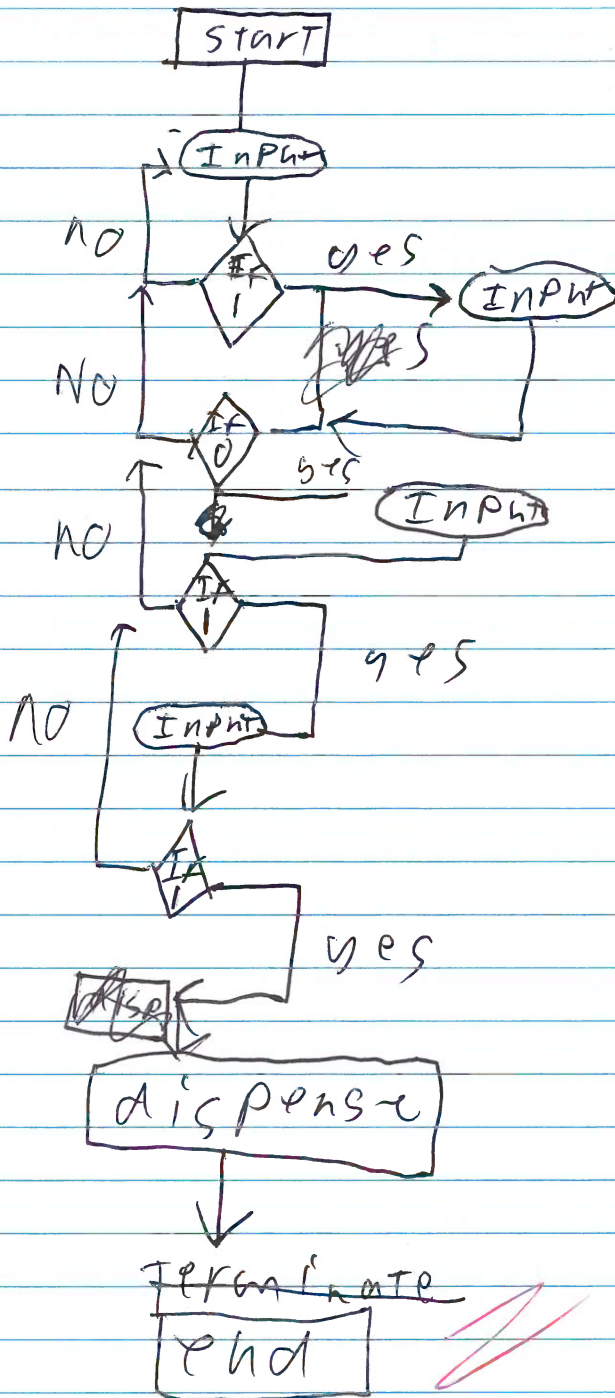
4

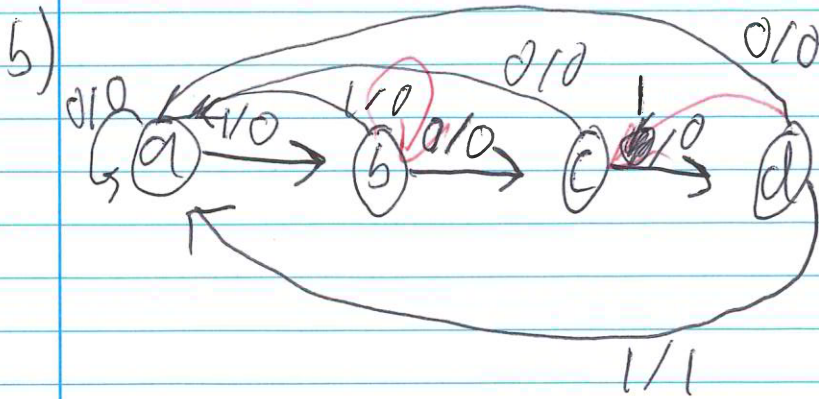
Q2

sea detect

~~ok~~ ~~ok~~ ~~ok~~

a)





c)

PS	XC	NS	Z
a	0	~~a~~	0
a	1	b	0
b	0	c	0
b	1	a	0
c	0	a	0
c	1	d	0
d	0	a	0
d	1	a	1

$a = 00$
 $b = 01$
 $c = 10$
 $d = 11$

d)

PS $q_1 q_0$	x	NS $q_1 q_0$	z	$D_1 D_0$
00	0	00	0	0 0
00	1	01	0	0 1
01	0	10	0	1 0
01	1	00	0	0 0
10	0	00	0	0 0
10	1	11	0	1 1
11	0	00	0	0 0
11	1	00	1	0 0

e)

z	$q_0 x$			
0	00	01	11	10
0	0	0	0	0
1	0	0	1	0

$$z = q_1 q_0 x$$

$$+ = 01$$

D_1	$q_0 x$			
0	00	01	11	10
0	0	0	0	1
1	0	1	0	0

$$D_1 = q_1 \overline{q_0} x + \overline{q_1} q_0 \overline{x}$$

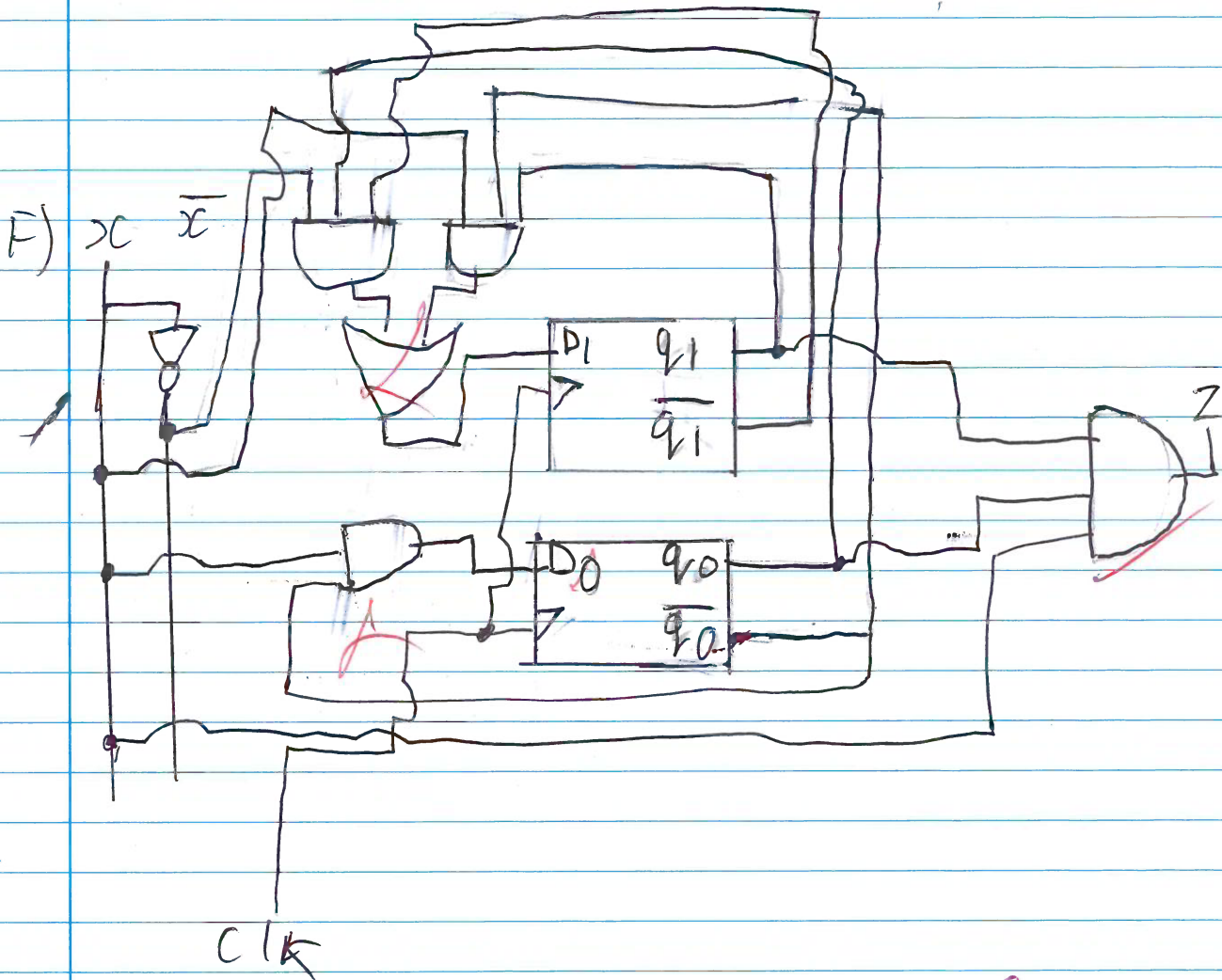
D_0	$q_0 x$			
0	00	01	11	10
0	0	1	0	0
1	0	1	0	0

$$D_0 = \overline{q_0} x$$

$$Z = q_1 q_0 x$$

$$D_1 = q_1 \bar{q}_0 x + \bar{q}_1 q_0 \bar{x}$$

$$D_0 = \bar{q}_0 x$$



01/25

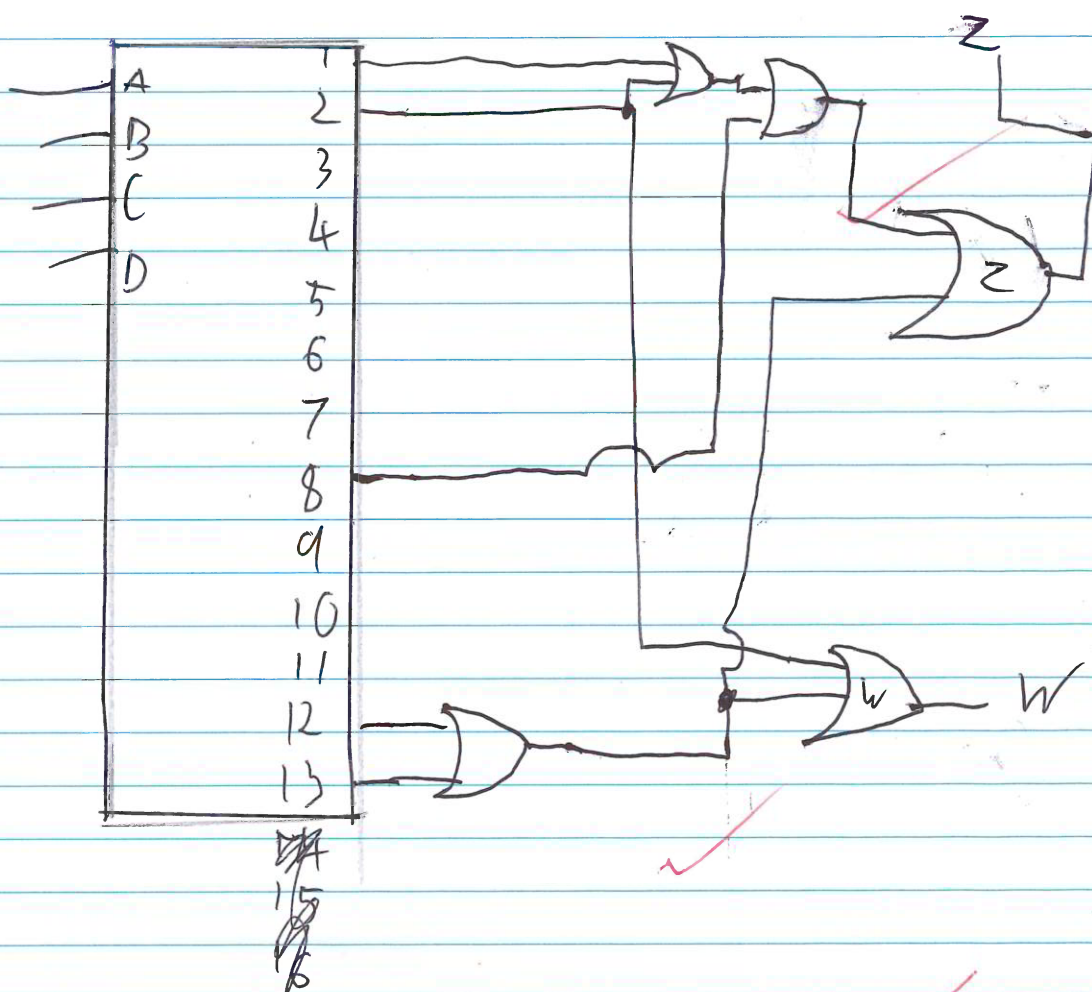
Question No.

Q3

a)

$$W \text{ (a b c d)} = (2, 12, 13)$$

$$Z \text{ (a b c d)} = (4, 8, 12, 13)$$


~~A B C D~~

b)

	A	B	C	D	Z	W
0 =	0	0	0	0	0	0
1 =	0	0	0	1	1	0
2 =	0	0	1	0	1	1
3 =	0	0	1	1	0	0
4 =	0	1	0	0	0	0
5 =	0	1	0	1	0	0
6 =	0	1	1	0	0	0
7 =	0	1	1	1	0	0
8 =	1	0	0	0	1	0
9 =	1	0	0	1	0	0
10 =	1	0	1	0	0	0
11 =	1	0	1	1	0	0
12 =	1	1	0	0	1	1
13 =	1	1	0	1	1	1

~~$$C \oplus D \oplus A \oplus B$$~~

$$(D \oplus C) \oplus AB$$

$$W = C \oplus (A \oplus B \oplus D)$$

$$W = C \oplus ((A \oplus B) \oplus D)$$

$$Z = (D \oplus C) \oplus (A \oplus B) \oplus A$$

Question No.

Q4

a

$$F = \overline{A} \overline{B} \overline{C} D + \overline{A} \overline{B} C D + A \overline{B} C D$$

$$0001 \quad 0011 \quad 1011$$

$$+ A B C D$$

$$1111$$

~~ABC D~~	~~X~~
0000	0
0001	1
0010	0
0011	1
0100	0
0101	0
0111	0
1000	0
1001	0
1010	0
1011	1
1100	0
1101	0
1110	0
1111	1
~~0110~~	~~0~~
0110	0

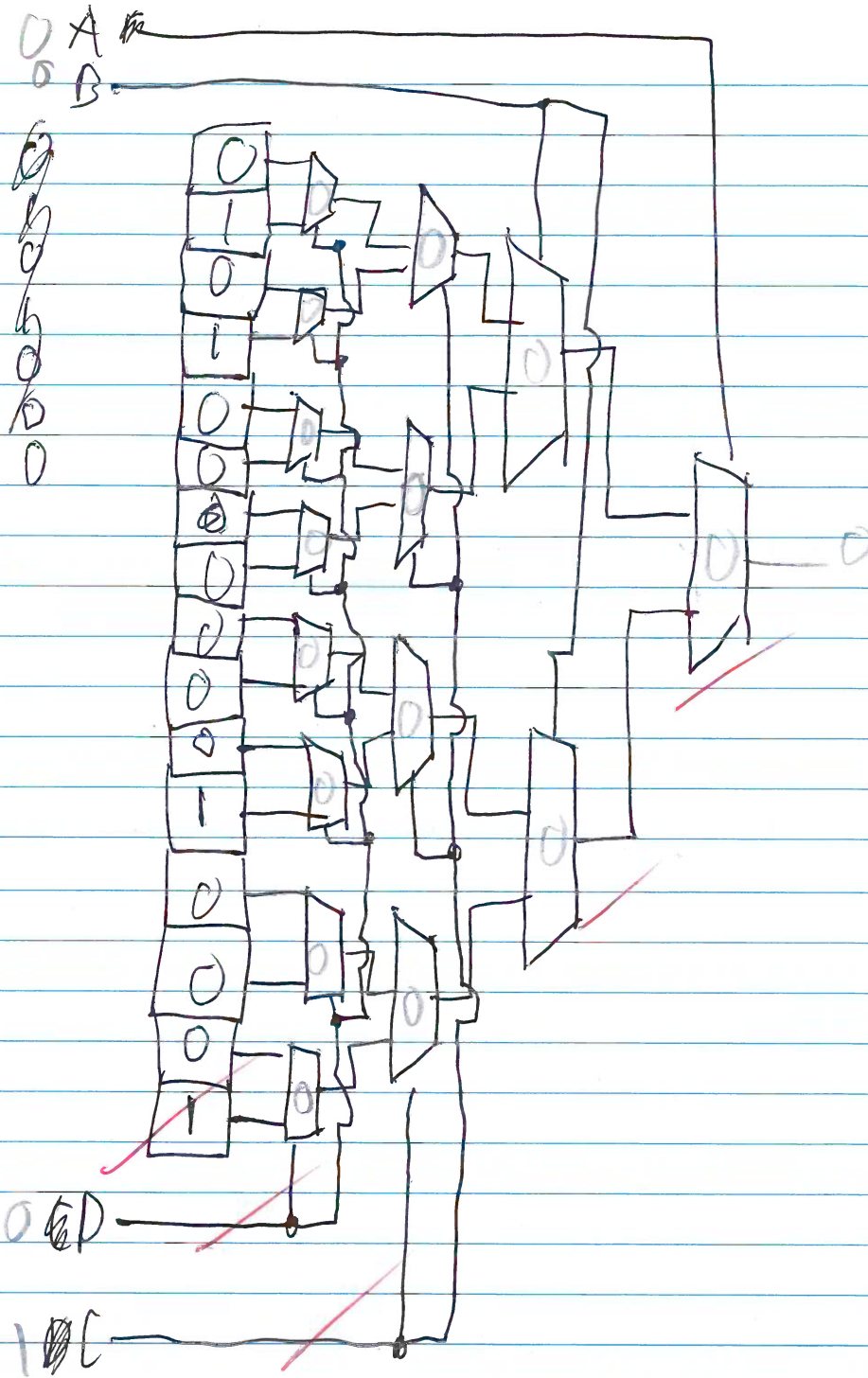
a

=

ABC D	X
0000	0
0001	1
0010	0
0011	1
0100	0
0101	0
0110	0
0111	0
1000	0
1001	0
1010	0
1011	1
1100	0
1101	0
1110	0
1111	1

2

b)



c

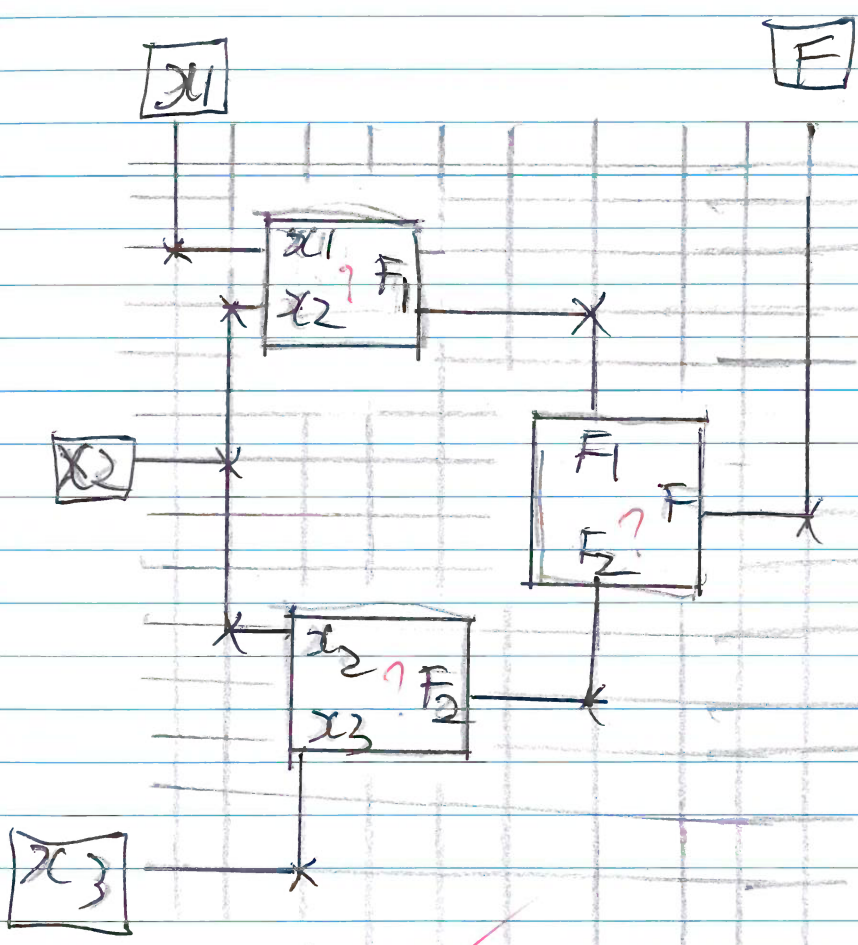
mux when feed a zero
 take the top value the
 pencil is now it comes out
 when feed a 1 from A
 it takes the bottom value to
 C, D, A, B

~~answer next 2~~

Q4
ii)

$$F = x_1 + x_2$$

$$x_1 = x_1 \quad x_2 = \bar{x}_2 \quad x_3 = x_3$$



3
✓

17
25

Q3

d

