Lab 8

To Practice Binary to Gray Code & BCD to Excess-3 Conversion

Note: You may draw all the logic diagrams with hand and paste the pictures here. Also, the conversions in the tasks can be done by hand if doing it in soft seems difficult to you.

Use Logicly software with your name, roll number & section mentioned in your workspace. Make sure that all of your connections are clearly visible and distinguishable. In logicly, use "text" label to point out/show all your inputs & outputs.

Task 1

a) **Convert the given binary codes into respective gray codes. Mention each step while converting the codes.**

1111, 1101,1001, 010, 011, 110

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Task #1

Part (a)

1 1 1 1 → Binary

1000 → gray code

(ii) 1101
1011

(iii) 1001
1101

(iv) 010
011

(v) 011
010

(vi) 110
101

b) Convert the given gray codes into respective binary codes. Mention each step while converting the codes.

1011, 0101, 1100, 0100

Task #1 (2)

Part- (b)

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Gray-codes into Binary Codes

(i) 1011

1101

(ii) 0101

0110

(iii) 1100

1000

(iv) 0100

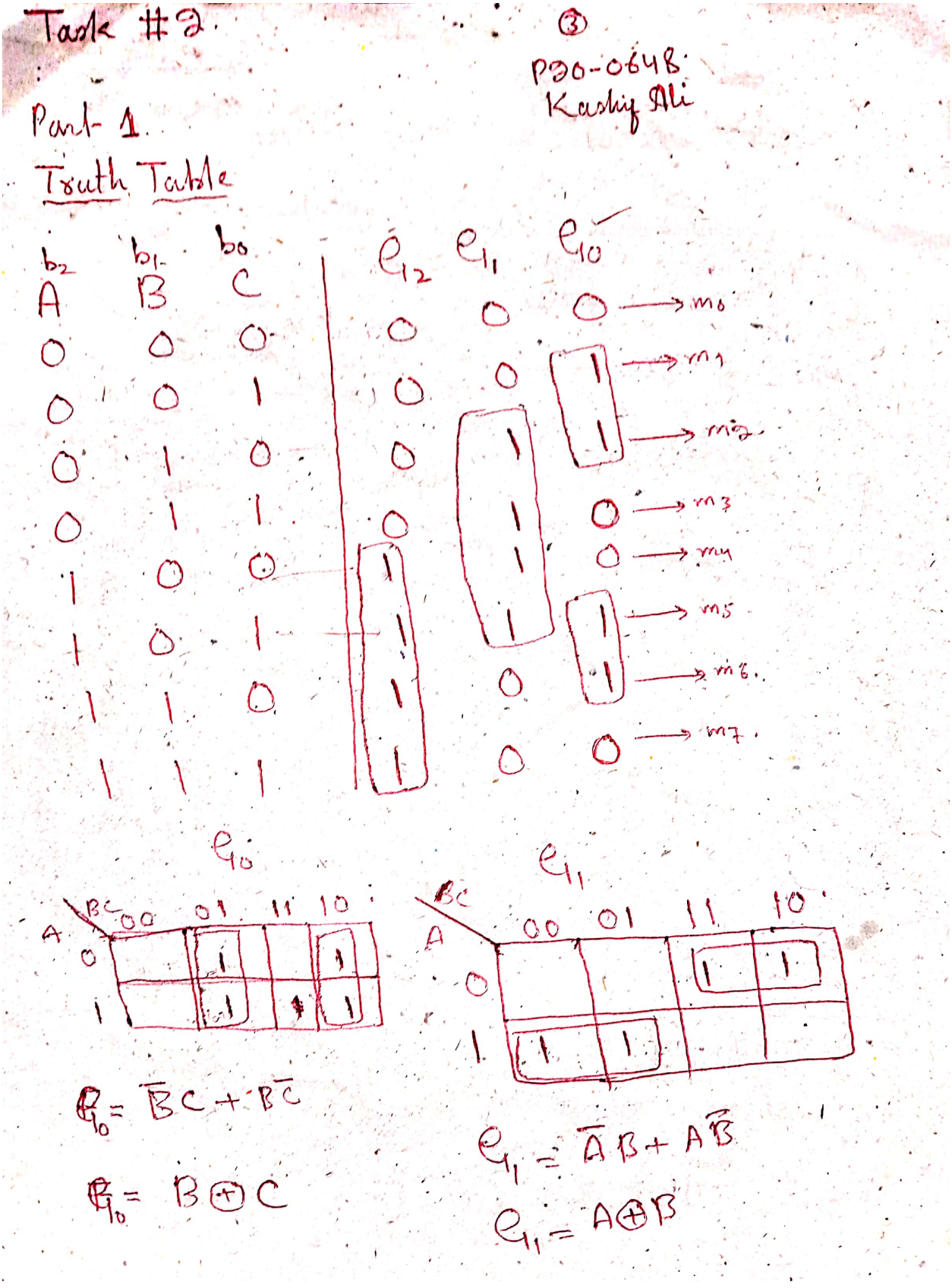
0111

Task 2

Devise a truth table for 3-bit Binary to Gray code converter. Write simplified logical expressions and simulate the logic diagram in Logicly software to verify your results. Show KMap simplification as well.

a) Truth Table

b) Boolean Expression (Simplified using Kmap)



c) Logic Diagram

(4)

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Q_2:

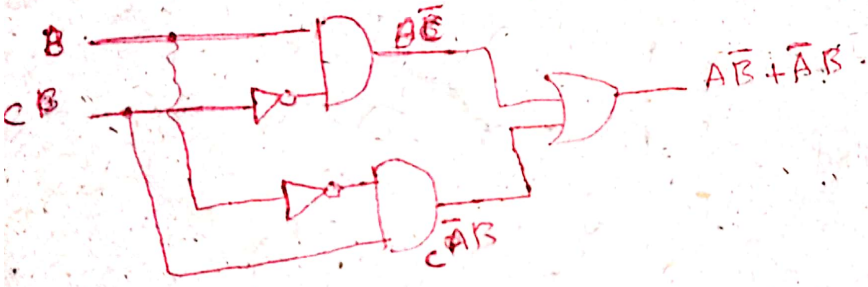
A \ BC	00	01	11	10
0				
1	1	1	1	1

100 101 111 110

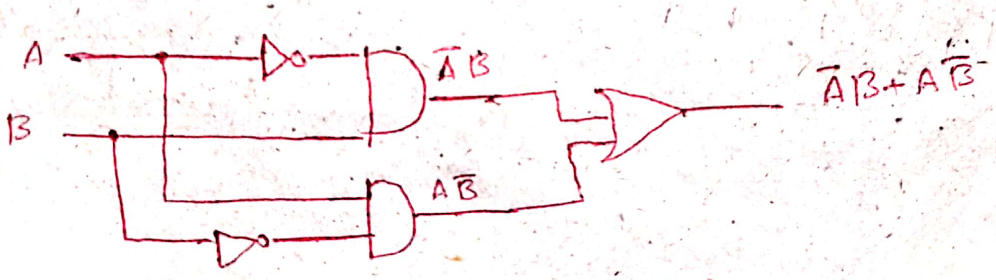
$Q_2 = A$

Part (c) Logic diagram.

$Q_0 = B \oplus C = \bar{B}C + B\bar{C}$



$Q_1 = A \oplus B = \bar{A}B + A\bar{B}$



a) Software Simulation (Show here your results for a few combinations to verify the circuit)

Task 3

a) For the given numbers, find excess-3 codes. Mention all the steps of conversion.

4, 9, 25, 50, 250, 405.

Task #3 Part (a)

(5)

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(1) 4

4
+3
7
0111

(2) 9

9
+3
12
1100

(3) 25

2 5
+3 +3
5 8
0101 1000

(0101 1000)

(4) 50

5 0
+3 +3
8 3
1000 0011

(10000011)

(5) 250

2 5 0
+3 +3 +3
5 8 3
0101 1000 0011

(010110000011)

(6) 405

4 0 5
+3 +3 +3
7 3 8
0101 0011 1000

(0101 0011 1000)

b) Devise a truth table for BCD to Excess-3 conversion (as discussed in the lecture). Write simplified expressions and simulate the logic circuit in Logicly software to verify your truth table. You may paste screenshots of a few combinations from the truth table to check your circuit.
Show your KMap simplification as well.

BCD to Excess-3 Converter

b) Truth Table

c) Boolean Expression (Simplified Using KMap)

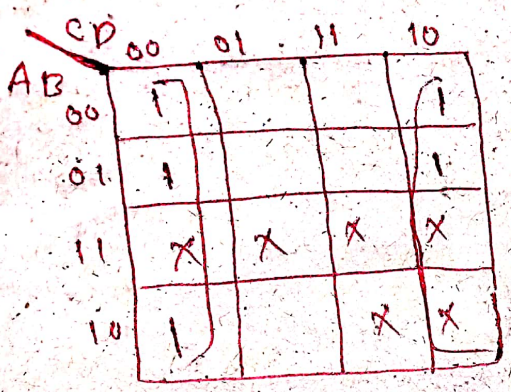
d) Logic Diagram

Task 12 # 5 (4)

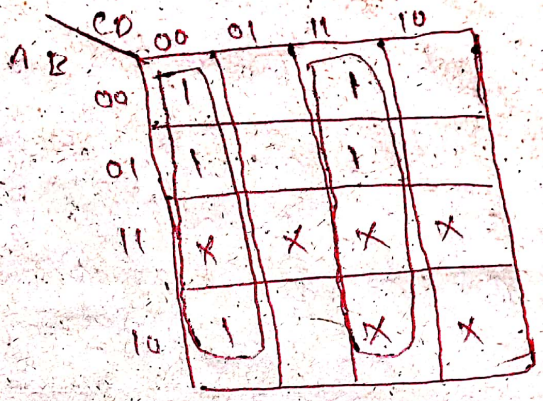
Part-(a) Truth Table

A	B	C	D	w	x	y	z
0	0	0	0	0	0	1	1
0	0	0	1	0	1	0	0
0	0	1	0	0	1	0	1
0	0	1	1	0	1	1	0
0	1	0	0	0	1	1	1
0	1	0	1	1	0	0	0
0	1	1	0	1	0	0	1
0	1	1	1	1	0	1	0
1	0	0	0	1	0	1	1
1	0	0	1	1	1	0	0
1	0	1	0	x	x	x	x
1	0	1	1	x	x	x	x
1	1	0	0	x	x	x	x
1	1	0	1	x	x	x	x
1	1	1	0	x	x	x	x
1	1	1	1	x	x	x	x

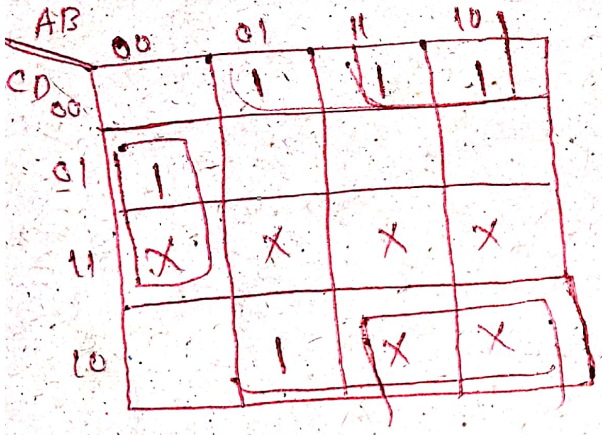
Pin 1- (b) Boolean Suppression (Using K. Map).



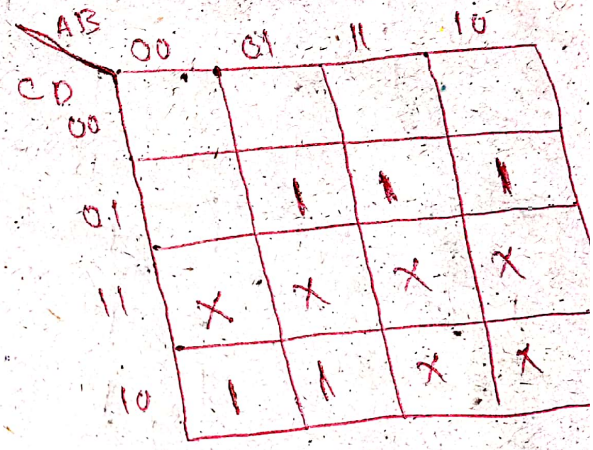
$Z = D'$



$y = CD + C'D'$



$x = B'C + B'D + BC'D'$



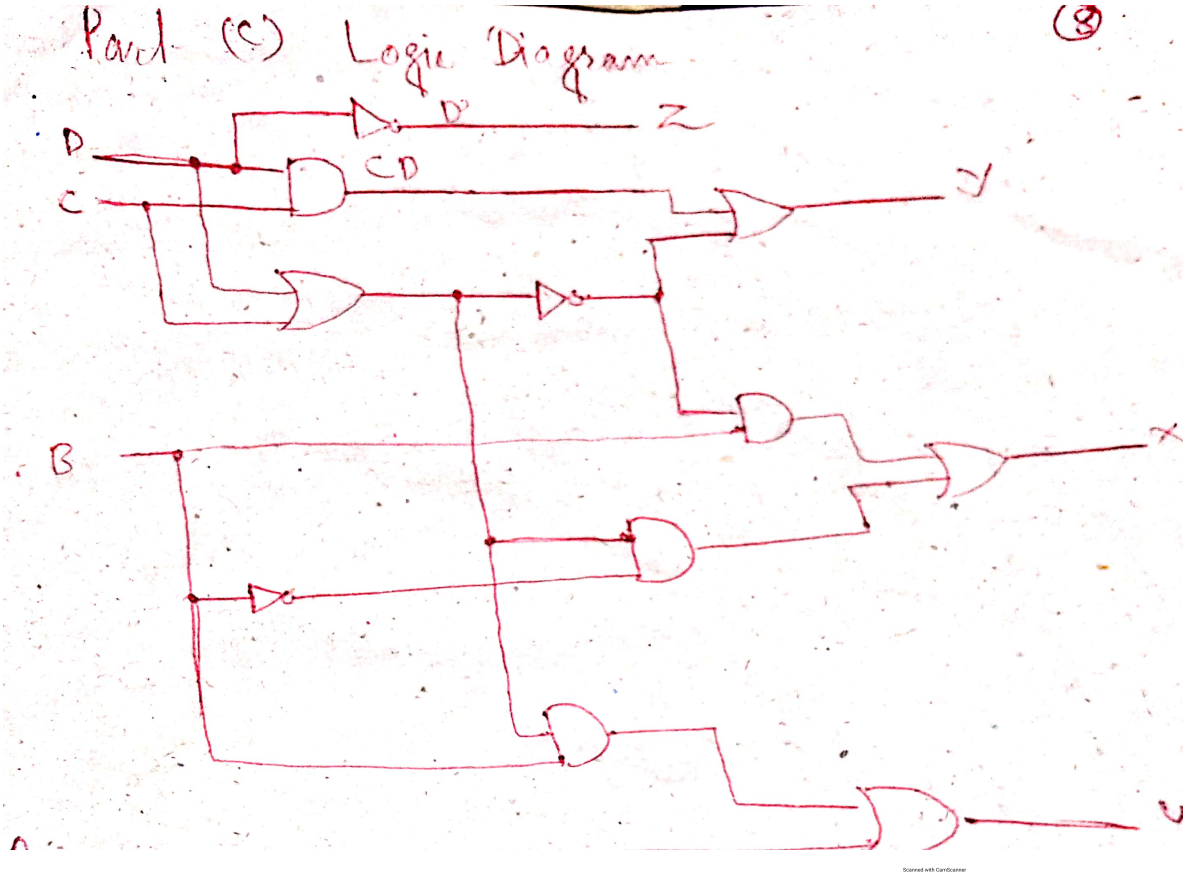
$W = A + BC + BD$

$W = A + BC + BD$

$x = B'C + B'D + BC'D'$

$y = CD + C'D'$

$Z = D'$



e) Software Simulation (Show here your results for a few combinations to verify the circuit)