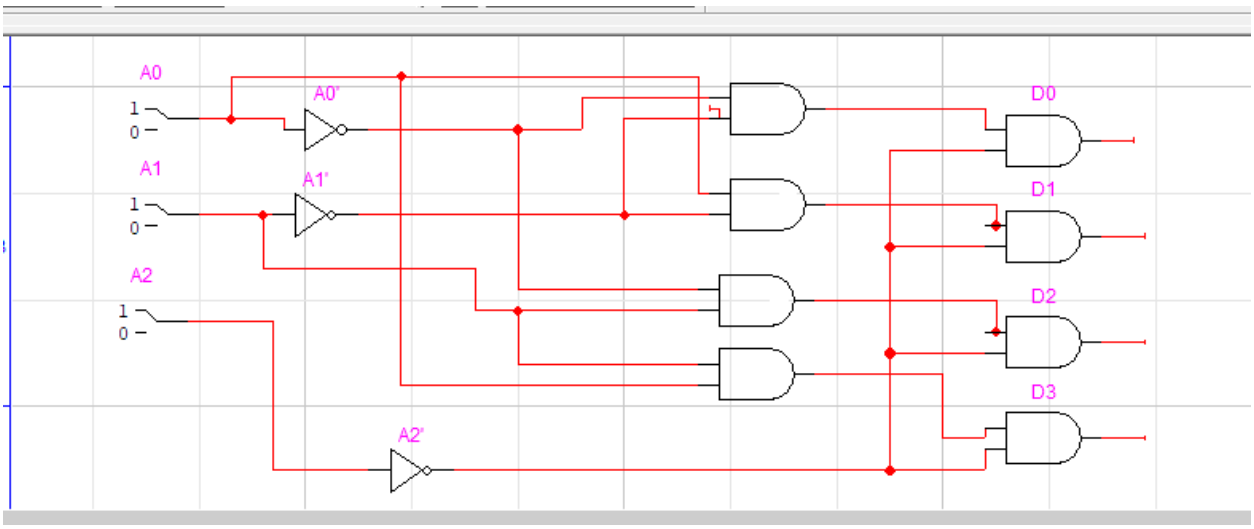
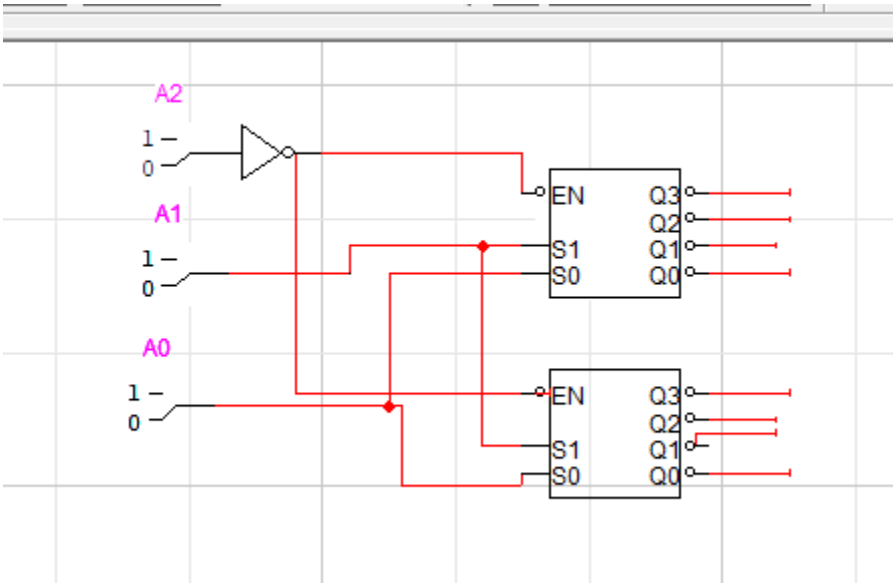
20L-0921
Aisha Muhammad Nawaz
Section 2E2 DLD LAB 07 BSCS

Q1,



Q2,



Q3,

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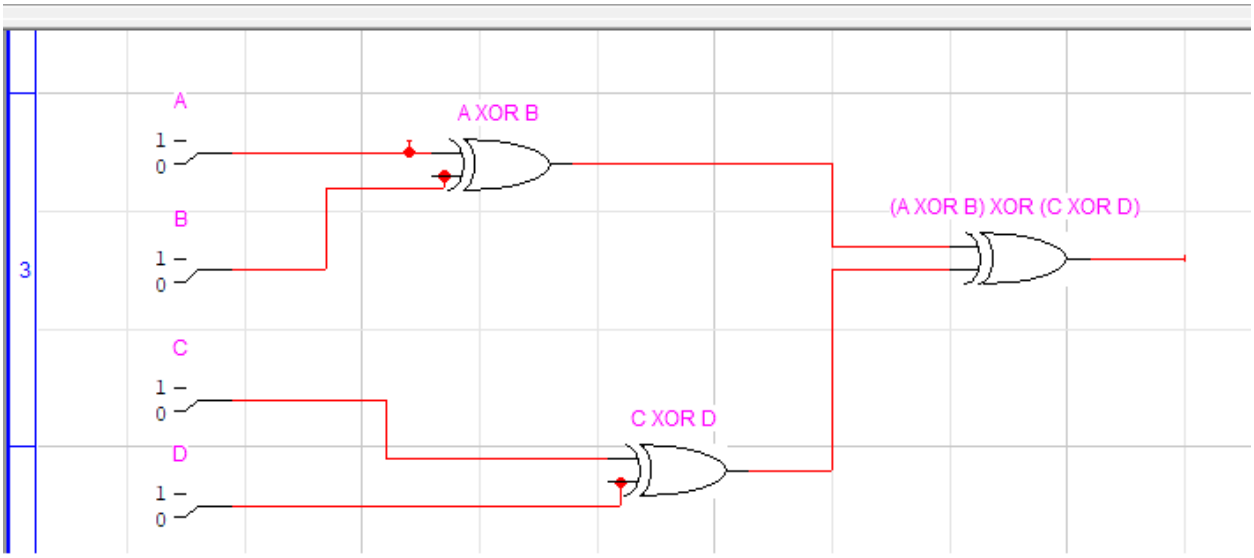
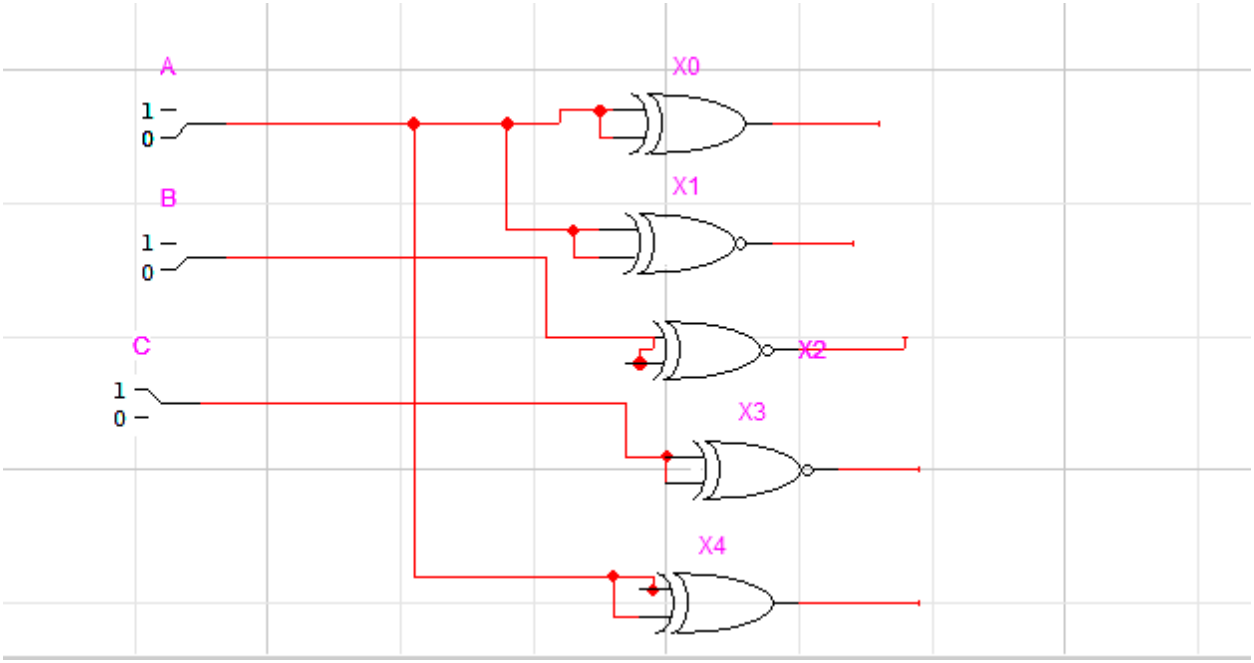


Q4,



Name: Aisha Muhammad Nawaz

Roll # 20L-0921

Section BSCS 2E2 D2D

LAB MANUAL 07

Question 1

2x4 decoder with a low enable using 8 AND gates & 3 NOT gates

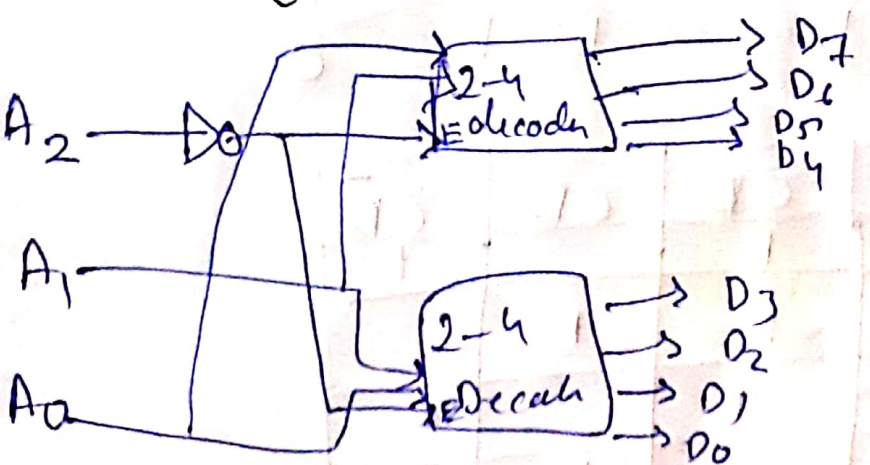
truth table

A_1	A_0	A_2	D_0	D_1	D_2	D_3
0	0	0	1	0	0	0
0	1	0	0	1	0	0
1	0	0	0	0	1	0
1	1	0	0	0	0	1

Question 2

3x8 decoder using two 2x4 decoders and NOT gate

*(DONE ON LOGIC WORKS)



A_2 A_1 A_0
A_2 A_1 $\overline{A_0}$
A_2 $\overline{A_1}$ A_0
A_2 $\overline{A_1}$ $\overline{A_0}$

$\overline{A_2}$ A_1 A_0
$\overline{A_2}$ A_1 $\overline{A_0}$
$\overline{A_2}$ $\overline{A_1}$ A_0
$\overline{A_2}$ $\overline{A_1}$ $\overline{A_0}$

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Question 3

4 bit parity checker

Decimal	A	B	C	D	E
0	0	0	0	0	0
1	0	0	0	1	1
2	0	0	1	0	1
3	0	0	1	1	0
4	0	1	0	0	1
5	0	1	0	1	0
6	0	1	1	0	0
7	0	1	1	1	1
8	1	0	0	0	1
9	1	0	0	1	0
10	1	0	1	0	0
11	1	0	1	1	1
12	1	1	0	0	0
13	1	1	0	1	1
14	1	1	1	0	1
15	1	1	1	1	0

K map

	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$		1		1
$\bar{A}B$	1		1	
AB		1		1
$A\bar{B}$	1		1	

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

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

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

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

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

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

Question 4 :

A	B	C	X_0	X_1	X_2	X_3	X_4
0	0	0	0	0	0	0	0
0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	0
0	1	1	0	0	1	1	0
1	0	0	0	1	0	0	0
1	0	1	0	1	0	1	0
1	1	0	0	1	1	0	0
1	1	1	0	1	1	1	0

Expression

$X_4 = 0$

$X_0 = 0$

$X_1 = A\bar{B}\bar{C} + A\bar{B}C + AB\bar{C} + ABC$

$= A(\bar{B}\bar{C} + BC) + A(\bar{B}C + B\bar{C})$

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

$Y_1 = A$

$X_2 = \bar{A}B\bar{C} + \bar{A}BC + \cancel{A\bar{B}\bar{C}} + \cancel{AB\bar{C}} + ABC$

$= \cancel{\bar{A}(B\bar{C} + BC) + A\bar{B}(C\bar{C} + C)}$

$= B(\bar{A}\bar{C} + AC) + BC(\bar{A}C + A\bar{C})$

$= B(\overline{A \oplus C}) + B(A \oplus C) = B \quad (Y_2 = B)$

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$$X_3 = \bar{A}\bar{B}C + \bar{A}BC + A\bar{B}C + ABC$$

$$= C(\bar{A}\bar{B} + AB) + C(\bar{A}B + A\bar{B})$$

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

$$\boxed{X_3 = C}$$

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