تمرین سری اول اصول سیستم دیجیتال

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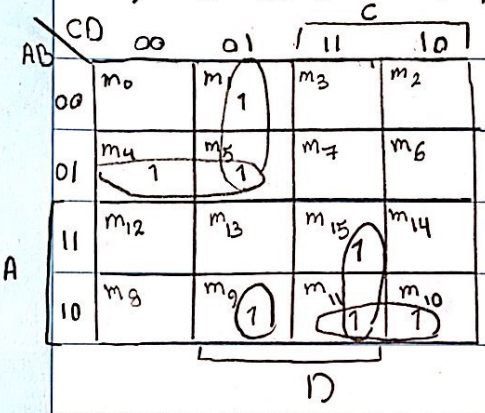
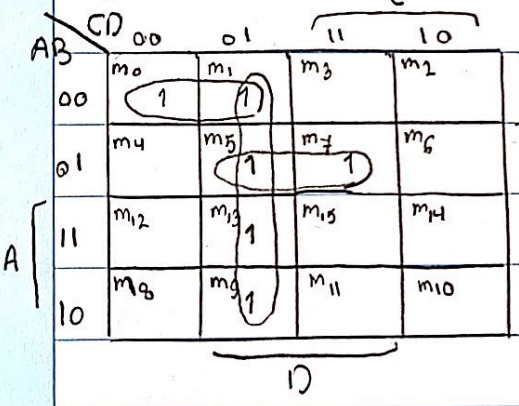
سوال 1)

الف) $A'B'C'D + AB'D + A'BC' + ABCD + AB'C$



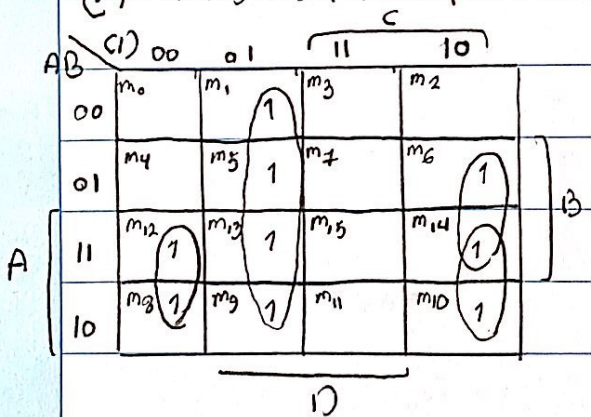
$F = A'BC' + B'C'D + ACD + AB'C$

ب) $A'B'C'D' + BC'D + A'C'D + A'BCD + ACD'$



$F = C'D + A'BD + A'B'C'$

ج) $AD' + B'C'D + BCD' + BC'D$



$F = AD' + C'D + BCD'$

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سوال 2)

a) $y = a(bcd)'e = a(b'+c'+d')e$

$y = a(b'+c'+d')e = ab'e + ac'e + ad'e = \sum(17,19,21,23,25,27,29)$

a bcde	y	a bcde	y
0 0000	0	1 0000	0
0 0001	0	1 0001	1
0 0010	0	1 0010	0
0 0011	0	1 0011	1
0 0100	0	1 0100	0
0 0101	0	1 0101	1
0 0110	0	1 0110	0
0 0111	0	1 0111	1
	0		0
0 1000	0	1 1000	0
0 1001	0	1 1001	1
0 1010	0	1 1010	0
0 1011	0	1 1011	1
0 1100	0	1 1100	0
0 1101	0	1 1101	1
0 1110	0	1 1110	0
0 1111	0	1 1111	0

b) $y_1 = a \oplus (c+d+e) = a'(c+d+e) + a(c'd'e') = a'c + a'd + a'e + ac'd'e'$

$y_2 = b'(c+d+e)f = b'cf + b'df + b'ef$

$a'_c___$

001000 = 8
001001 = 9
001010 = 10
001011 = 11
001100 = 12
001101 = 13
001110 = 14
001111 = 15
011000 = 24
011001 = 25
011010 = 26
⋮
= 31

$a'__d'__$

001000 = 8
001111 = 15
010100 = 20

$a'___e_$

000010 = 2

$a_c'd'e'_$

100000 = 32
100001 = 33
110000 = 34
110001 = 35

$_b'c__f$

001001 = 9
⋮

$_b'_d_f$

001001 = 9
⋮

$_b'__ef$

000011 = 3
⋮

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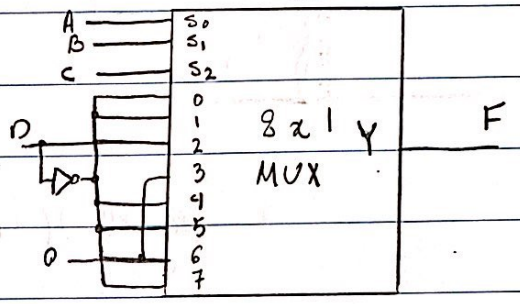
سوال 3)

a) $F(A,B,C,D) = \sum(0,2,5,8,10,14)$

inputs ABCD	mux input	value	F(A,B,C,D)
0000	0	0	1
0001	0	1	1 $F = D'$
0010	1	2	1
0011	1	3	0 $F = D'$
0100	2	4	0
0101	2	5	1 $F = D$
0110	3	6	0
0111	3	7	0 $F = 0$
1000	4	8	1
1001	4	9	0 $F = D'$
1010	5	10	1
1011	5	11	0 $F = D'$
1100	6	12	0
1101	6	13	0 $F = 0$
1110	7	14	1
1111	7	15	0 $F = D'$



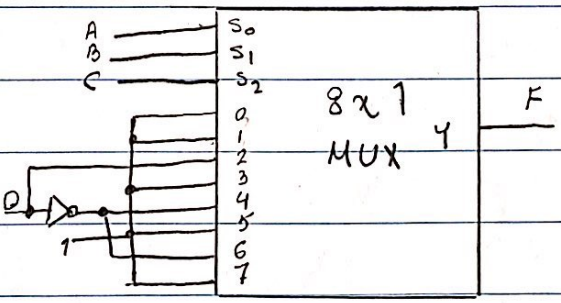
b) $F(A,B,C,D) = \Pi(2,6,11)$

$F = \Pi(2,6,11) = (A'+B'+C+D')(A'+B+C+D')(A+B'+C+D)$

$F' = (ABC'D) + (AB'C'D) + (A'BC'D') = \sum(13,9,4)$

$F = \sum(0,1,2,3,5,6,7,8,10,11,12,14,15)$

0000	0	0	1
0001	0	1	1 $F = 1$
0010	1	2	1
0011	1	3	1 $F = 1$
0100	2	4	0
0101	2	5	1 $F = D$
0110	3	6	1
0111	3	7	1 $F = 1$
1000	4	8	1
1001	4	9	0 $F = D'$
1010	5	10	1
1011	5	11	1 $F = 1$
1100	6	12	1
1101	6	13	0 $F = D'$
1110	7	14	1
1111	7	15	1 $F = 1$



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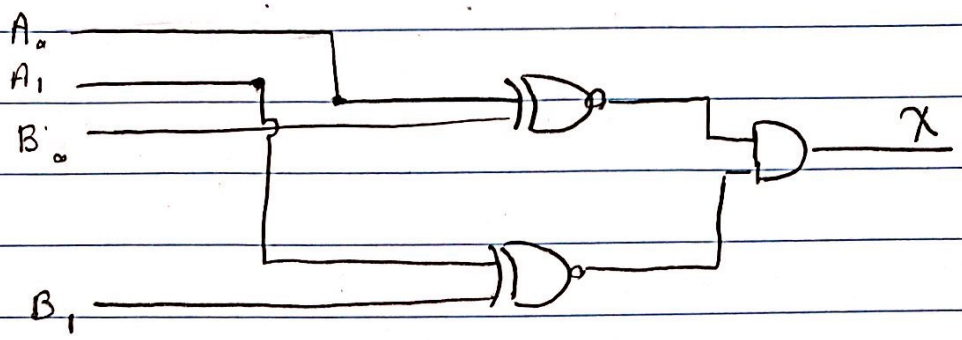
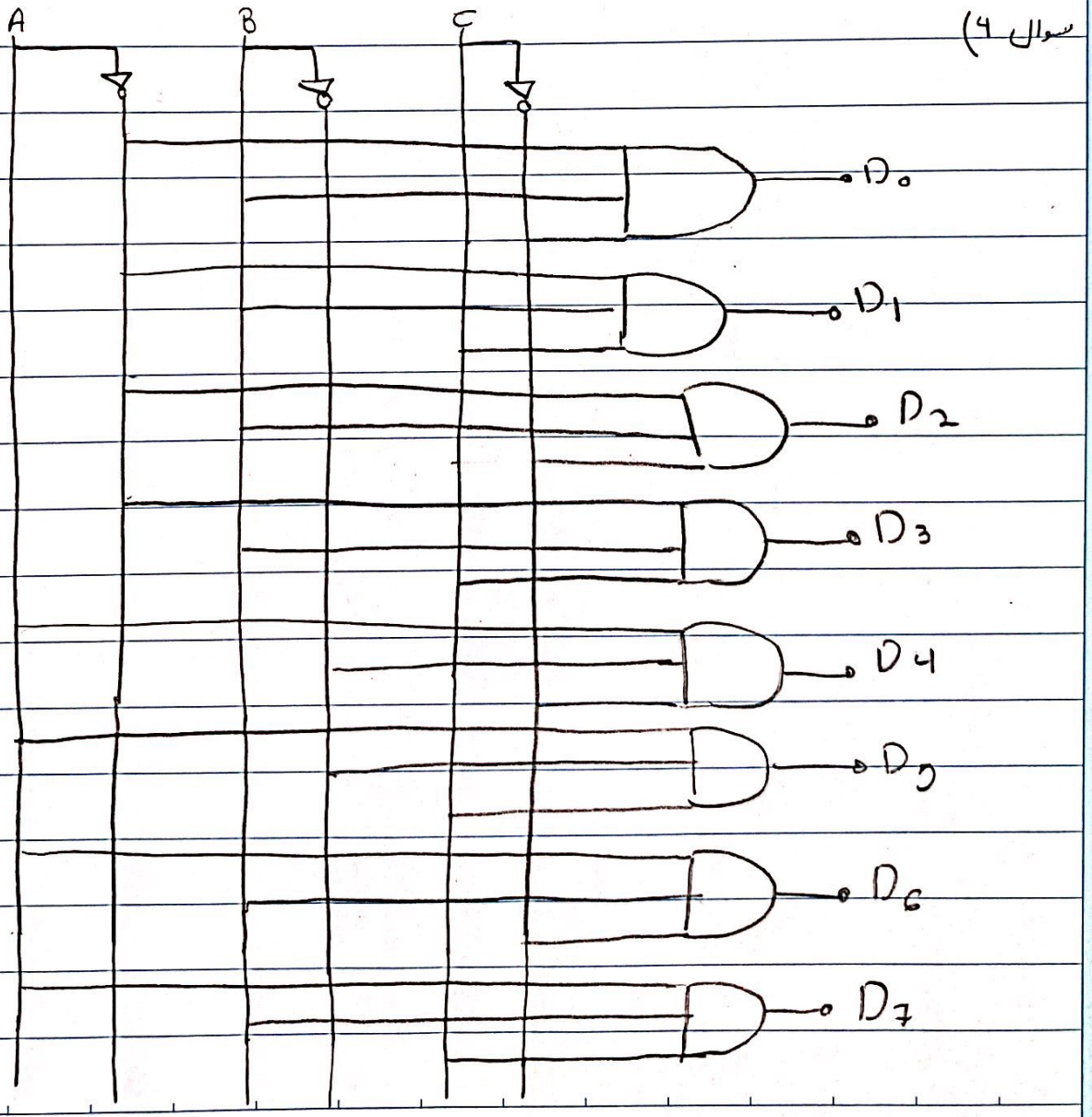
سوال 5)



$$\chi = (\overline{A_0 \oplus B_0}) \cdot (\overline{A_1 \oplus B_1})$$

سوال 6)



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