	Fakülte/MYO	Müh.-Mim.	Sınav	Vize	Numara	
	Bölüm/Program	Elektronik Müh.	Tarih	18/04/2012	Ad-Soyad	
	Ders	Mantık Devreleri	Süre	90 dk.	İmza	


# SORULAR

SORU 1	a) Aşağıdaki dönüşümleri gerçekleştiriniz. [12 puan]
	<ul style="list-style-type: none"> <li>➤ <math>(12)_{16} = (?)_{BCD} = (?)_{+3} = (?)_{Gray}</math></li> <li>➤ <math>(111)_{Gray} = (?)_{Aiken} = (?)_2 = (?)_{5'te2}</math></li> </ul>
	b) 10 tabanındaki 11-26 çıkarma işlemini, 2 tabanında ve "r-1 tümleyen" ile yapınız. [8 puan]
c) 7408 (dört tane iki girişli VE) mantık kapısı entegresinin akım parametreleri $I_{LL(mA)} = -1.6 mA$ , $I_{IH(mA)} = 40 \mu A$ , $I_{OL(mA)} = 16 mA$ ve $I_{OH(mA)} = -800 \mu A$ olduğuna göre çıkış kapasitesini (fan-out) hesaplayınız. [5 puan]	

CEVAP 1	a)	<ul style="list-style-type: none"> <li>➤ <math>(12)_{16} = (0001 1000)_{BCD} = (0100 1011)_{+3} = (11011)_{Gray}</math></li> <li>➤ <math>(111)_{Gray} = (1011)_{Aiken} = (101)_2 = (01010)_{5'te2}</math></li> </ul>
	b)	$\begin{array}{r} 01011 \\ - 11010 \\ \hline \end{array} \rightarrow \begin{array}{r} 01011 \\ + 00101 \\ \hline \end{array}$ $\begin{array}{r} 10000 \\ \rightarrow -(1111) \end{array}$
	c)	"H" için: $\frac{I_{OH}}{I_{IH}} = \frac{800}{40} = 20$ "L" için: $\frac{I_{OL}}{I_{IL}} = \frac{16}{1.6} = 10 \rightarrow 10$

SORU 2	$F_{(ABCD)} = \sum(0,2,5,7,8,10,13,15)$ fonksiyonunu tablo (Quine McCluskey) yöntemiyle sadeleştiriniz. [13 puan]
	2'şer bitlik $S_1$ ve $S_2$ sayılarını toplayan devreyi tek kod çözücü ve VEYA kapıları kullanarak gerçekleştiriniz. [12 puan]

CEVAP 2	a)	<table border="1"> <thead> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>(0)</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>√</td> <td>(0,2)</td> <td>0</td> <td>0</td> <td>-</td> <td>0</td> <td>√</td> <td>(0,2,8,10)</td> <td>-</td> <td>0</td> <td>-</td> <td>0</td> </tr> <tr> <td>(2)</td> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>√</td> <td>(0,8)</td> <td>-</td> <td>0</td> <td>0</td> <td>0</td> <td>√</td> <td>(0,8,2,10)</td> <td>-</td> <td>0</td> <td>-</td> <td>0</td> </tr> <tr> <td>(8)</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>√</td> <td>(2,10)</td> <td>-</td> <td>0</td> <td>1</td> <td>0</td> <td>√</td> <td>(5,7,13,15)</td> <td>-</td> <td>1</td> <td>-</td> <td>1</td> </tr> <tr> <td>(5)</td> <td>0</td> <td>1</td> <td>0</td> <td>1</td> <td>√</td> <td>(8,10)</td> <td>1</td> <td>0</td> <td>-</td> <td>0</td> <td>√</td> <td>(5,13,7,15)</td> <td>-</td> <td>1</td> <td>-</td> <td>1</td> </tr> <tr> <td>(10)</td> <td>1</td> <td>0</td> <td>1</td> <td>0</td> <td>√</td> <td>(5,7)</td> <td>0</td> <td>1</td> <td>-</td> <td>1</td> <td>√</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>(7)</td> <td>0</td> <td>1</td> <td>1</td> <td>1</td> <td>√</td> <td>(5,13)</td> <td>-</td> <td>1</td> <td>0</td> <td>1</td> <td>√</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>(13)</td> <td>1</td> <td>1</td> <td>0</td> <td>1</td> <td>√</td> <td>(7,15)</td> <td>-</td> <td>1</td> <td>1</td> <td>1</td> <td>√</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>(15)</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>√</td> <td>(13,15)</td> <td>1</td> <td>1</td> <td>-</td> <td>1</td> <td>√</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		A	B	C	D		A	B	C	D		A	B	C	D	(0)	0	0	0	0	√	(0,2)	0	0	-	0	√	(0,2,8,10)	-	0	-	0	(2)	0	0	1	0	√	(0,8)	-	0	0	0	√	(0,8,2,10)	-	0	-	0	(8)	1	0	0	0	√	(2,10)	-	0	1	0	√	(5,7,13,15)	-	1	-	1	(5)	0	1	0	1	√	(8,10)	1	0	-	0	√	(5,13,7,15)	-	1	-	1	(10)	1	0	1	0	√	(5,7)	0	1	-	1	√						(7)	0	1	1	1	√	(5,13)	-	1	0	1	√						(13)	1	1	0	1	√	(7,15)	-	1	1	1	√						(15)	1	1	1	1	√	(13,15)	1	1	-	1	√					
		A	B	C	D		A	B	C	D		A	B	C	D																																																																																																																																										
	(0)	0	0	0	0	√	(0,2)	0	0	-	0	√	(0,2,8,10)	-	0	-	0																																																																																																																																								
	(2)	0	0	1	0	√	(0,8)	-	0	0	0	√	(0,8,2,10)	-	0	-	0																																																																																																																																								
(8)	1	0	0	0	√	(2,10)	-	0	1	0	√	(5,7,13,15)	-	1	-	1																																																																																																																																									
(5)	0	1	0	1	√	(8,10)	1	0	-	0	√	(5,13,7,15)	-	1	-	1																																																																																																																																									
(10)	1	0	1	0	√	(5,7)	0	1	-	1	√																																																																																																																																														
(7)	0	1	1	1	√	(5,13)	-	1	0	1	√																																																																																																																																														
(13)	1	1	0	1	√	(7,15)	-	1	1	1	√																																																																																																																																														
(15)	1	1	1	1	√	(13,15)	1	1	-	1	√																																																																																																																																														
	<table border="1"> <thead> <tr> <th></th> <th>0</th> <th>2</th> <th>5</th> <th>7</th> <th>8</th> <th>10</th> <th>13</th> <th>15</th> </tr> </thead> <tbody> <tr> <td>B'D'</td> <td>(0,2,8,10)</td> <td>(x)</td> <td>(x)</td> <td></td> <td>(x)</td> <td>(x)</td> <td></td> <td></td> </tr> <tr> <td>BD</td> <td>(5,7,13,15)</td> <td></td> <td>(x)</td> <td>(x)</td> <td></td> <td></td> <td>(x)</td> <td>(x)</td> </tr> <tr> <td></td> <td></td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> </tr> </tbody> </table>		0	2	5	7	8	10	13	15	B'D'	(0,2,8,10)	(x)	(x)		(x)	(x)			BD	(5,7,13,15)		(x)	(x)			(x)	(x)			√	√	√	√	√	√	√																																																																																																																				
	0	2	5	7	8	10	13	15																																																																																																																																																	
B'D'	(0,2,8,10)	(x)	(x)		(x)	(x)																																																																																																																																																			
BD	(5,7,13,15)		(x)	(x)			(x)	(x)																																																																																																																																																	
		√	√	√	√	√	√	√																																																																																																																																																	
	$F_{(ABCD)} = \sum(0,2,5,7,8,10,13,15) = B'D' + BD$																																																																																																																																																								

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b)

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

$$x = \sum (7,10,11,13,14,15)$$

$$y = \sum (2,3,5,6,8,9,12,15)$$

$$z = \sum (1,3,4,6,9,11,12,14)$$

Devre

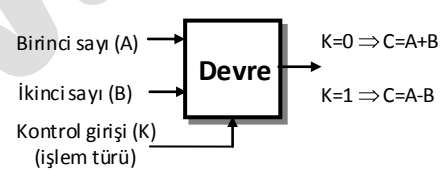
**SORU 3**

$F_{(ABCD)} = A'B'C' + ABC + AB'$  fonksiyonunu sadece 4x1 MUX'lar kullanarak gerçekleştiriniz. [13 puan]

Not: Gerçeklemede en fazla 3 tane 4x1 MUX kullanabilirsiniz. İlave mantık kapıları kullanılmayacaktır.

Bir adet 74LS83 4 bitlik paralel toplayıcı kullanarak; K kontrol girişinin "0" olması durumunda toplama ve "1" olması durumunda çıkarma yapan devrenin, prensip şemasını çiziniz. [12 puan]

Not: Prensip şemasında 1 tane 4 bitlik paralel toplayıcı ve en fazla 4 tane aynı türden mantık kapısı kullanılabilir.

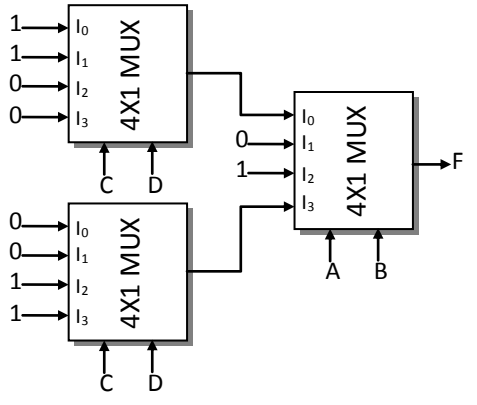


**CEVAP 3**

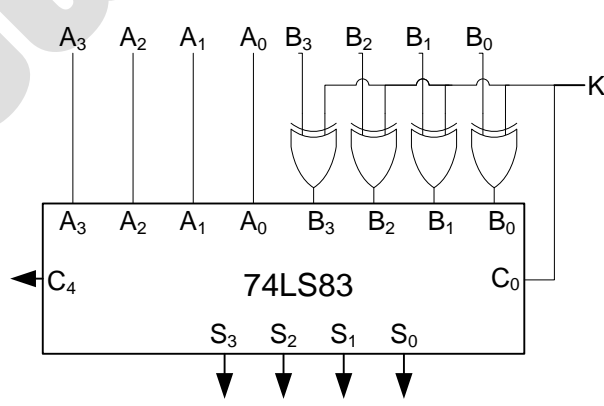
a)


$$F_{(ABCD)} = A'B'C' + ABC + AB' = \sum(0,1,8,9,10,11,14,15)$$

	A'B'	A'B	AB'	AB
C'D'	1	0	1	0
C'D	1	0	1	0
CD'	0	0	1	1
CD	0	0	1	1



b)



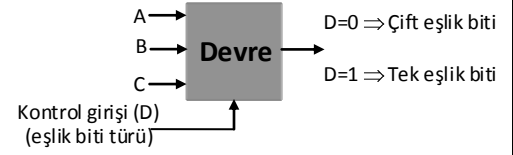
	Fakülte/MYO	Müh.-Mim.	Sınav	Vize	Numara	
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SORU 4

3 bitlik  $ABC$  sayısına  $D$  kontrol girişinin durumuna göre tek/çift eşlik (parity) biti üreten devreyi mantık kapılarıyla gerçekleştiriniz. [25 puan]

Not: Tasarım aşamaları:

- ✓ Doğruluk tablosunu oluşturma
- ✓ Karnaugh haritalarıyla sadeleştirme işlemleri
- ✓ Devre çizimi



CEVAP 4

D	A	B	C	f
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

	00	01	11	10
00		1		1
01	1		1	
11		1		1
10	1		1	

$$F_{(DABC)} = \sum (1,2,4,7,8,11,13,14)$$

Devre

*Başarılar dilerim ...*  
Yrd.Doç.Dr. Fahri Vatanserver