Palayil
ECE 218

7.14) a) $D_1\ P_2\ P_3\ P_4\ P_5\ P_6\ P_7$
0 0 1 0
P_1: XOR (0,0,0) = 0
P_2: XOR (0 1 0) = 1
P_4: XOR (0 1 0) = 1
$P_1\ P_2\ P_3\ P_4\ P_5\ P_6\ P_7$ (write)
0 1 0 1 0 1 0

b) C_1: XOR (0, P_1) = 0
C_2: XOR (1, P_2) = 0
C_4: XOR (1, P_4) = 0
$C_4\ C_2\ C_1$
0 0 0 : no error

1 2 3 4 5 6 7
c) 0 1 0 1 1 1 0 (read)
C_1: XOR (0, 0, 1, 0) = 1
C_2: XOR (1, 0, 1, 0) = 0
C_4: XOR (1, 1, 1, 0) = 1
$C_4\ C_2\ C_1$
1 0 1 : error bits

1 2 3 4 5 6 7 8
d) 0 0 0 1 1 1 0 1 (read)
C_1: XOR (0, 0, 1, 0) = 1
C_2: XOR (0, 0, 1, 0) = 1
C_4: XOR (1, 1, 1, 0) = 1
P_8: XOR (0, 0, 0, 1, 1, 1, 0) = 1
C_8: XOR (1, 1, 1) = 1
$C_4\ C_2\ C_1$
1 1 1 : error bit 7
P: XOR (0, 0, 1, 1) = 0.
$C \neq 0$, $P = 0$
double bit error

7.19 $A(x,y,z) = \Sigma(1,3,5,6)$
$B(x,y,z) = \Sigma(0,1,6,7)$
$C(x,y,z) = \Sigma(3,5)$
$D(x,y,z) = \Sigma(1,2,4,5,7)$
$A = x'z + y'z + xyz'$
$B = x'y' + xy$
$C = x'yz + xy'z$
$D = x'y'z' + x'yz + xyz'$

Common Terms

xyz' $x'yz$

Product Terms	Inputs x y z	A	B	C	D
xyz'	1 1 0	1	–	–	1
$x'yz$	0 1 1	–	–	1	1
$x'z$	0 – 1	1	–	–	–
$y'z$	– 0 1	1	–	–	–
$x'y'$	0 0 –	–	1	–	–
xy	1 1 –	–	1	–	–
$xy'z$	1 0 1	–	–	1	–
$x'y'z'$	0 0 0	–	–	–	1
		T	T	T	C

7.21)

A_2 \ A_1A_0	00	01	11	10
0	0	0	0	0
1	0	0	1	1

$B_5 = A_2A_1$

A_2 \ A_1A_0	00	01	11	10
0	0	0	0	0
1	1	1	1	0

$B_4 = A_2A' + A_2A_0$

A_2 \ A_1A_0	00	01	11	10
0	0	0	1	0
1	0	1	0	0

$B_3 = A_2A_1'A_0 + A_2'A_1A_0$

A_2 \ A_1A_0	00	01	11	10
0	0	0	0	1
1	0	0	0	1

$B_2 = A_1A_0'$

Product Terms	Inputs A_2 A_1 A_0	B_5	B_4	B_3	B_2	B_1
A_2A_1	1 1 –	1	–	–	–	–
A_2A_1'	1 0 –	–	1	–	–	–
A_2A_0	1 – 1	–	1	–	–	–
$A_2A_1'A_0$	1 0 1	–	–	1	–	–
$A_2'A_1A_0$	0 1 1	–	–	1	–	–
A_1A_0'	– 1 0	–	–	–	1	–
A_0	– – 1	–	–	–	–	1

7.23) $z = D'$

$Y = CD + C'D'$

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

$W = A + BC + BD$

Product Terms	Inputs A B C D	Z	Y	X	W
D'	- - - 0	1	-	-	-
CD	- - 1 1	-	1	-	-
C'D	- - 0 0	-	1	-	-
B'C	- 0 1 -	-	-	1	-
B'D	- 0 - 1	-	-	1	-
BC'D'	- 1 0 0	-	-	1	-
A	1 - - -	-	-	-	1
BC	- 1 1 -	-	-	-	1
BD	- 1 - 1	-	-	-	1

7.24) $Z = D'$, $Y = CD + C'D'$, $X = B'C + B'D + BC'D'$

$W = A + BC + BD$

Product Terms	Inputs A B C D	Outputs
D'	- - - 0	$Z = D'$
CD	- - 1 1	$Y = CD + C'D'$
C'D'	- - 0 0	
B'C	- 0 1 -	$X = B'C + B'D + BCD'$
B'D	- 0 - 1	
BC'D'	- 1 0 0	
A	1 - - -	$W = A + BC + BD$
BC	- 1 1 -	
BD	- 1 - 1	