Assignment 6. Manjot Uniyal (1)

19EE10039

Q1. even parity checker

(a)

(i) Data 1000000 , parity D. ⟶ parity error

(ii) 11111110 (8) ⟶ 0 ⟶ No error

(iii) 1100111 (5) ⟶ 1 ⟶ No error.

(b) full adder.

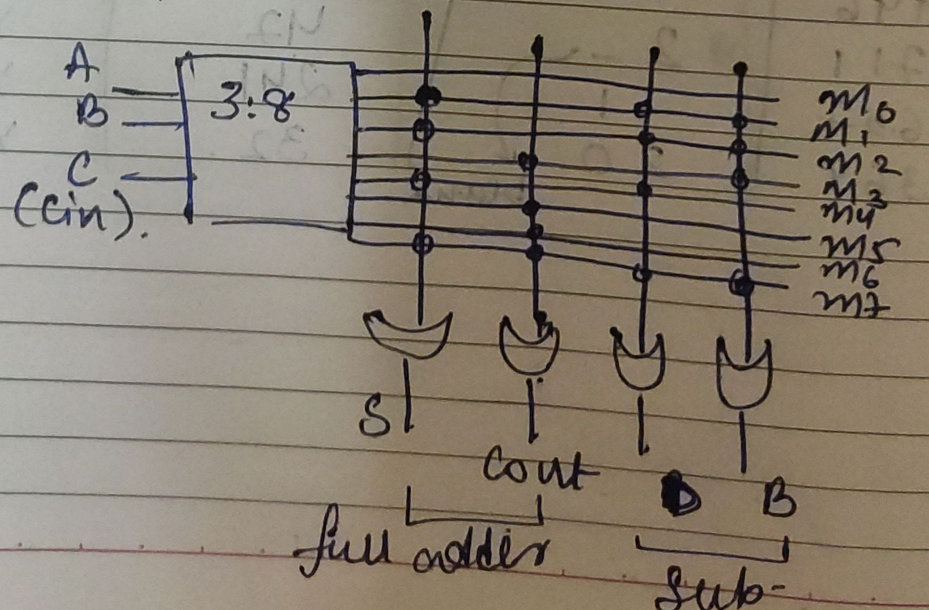
A	B	C	S	Cout	D	B.
0	0	0	0	0	0	0
0	0	1	1	0	1	1
0	1	0	1	0	1	1
0	1	1	0	1	0	1
1	0	0	1	0	1	0
1	0	1	0	1	0	0
1	1	0	0	1	0	0
1	1	1	1	1	1	1

$Cout = \Sigma m(3,5,6,7)$

$S = \Sigma m(1,2,4,7)$

$D = \Sigma m(1,2,4,7)$

$B = \Sigma m(1,2,3,7)$.



Q2.

a). Select lines in

1:8192

DEMUX $= \log_2 8192 = 13$

(b) $Y_2 = D_5' D_7' = (D_5 + D_7)'$

$D_0 = I_1' I_0' = (P'+Q)'(PQ)' = (P'+Q+PQ)'$

$= (P'+Q)'$

$D_2 = I_1 I_0' = (P'+Q)(PQ')' = (P'+Q)(P'+Q')$.

$= P' + QQ' = P'$.

$Y_1 = D_0 + D_2 = PQ' + P = P' + Q'$

$D_5 = I_3' I_2 = (P'+Q')' P = PQ P = PQ$.

$D_7 = I_3' I_2 = (P'+Q') P = PQ'$.

$Y_2 = (D_5 + D_7)' = (PQ + PQ')' = P'$.

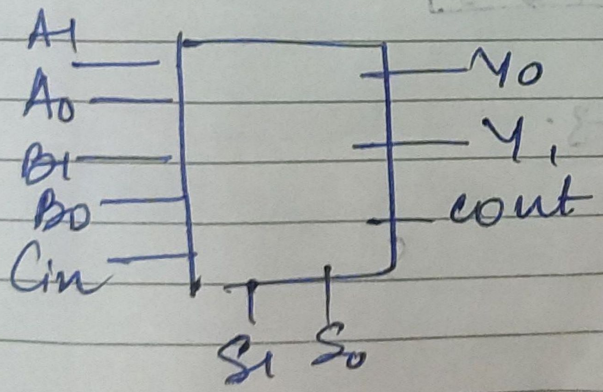
$Y_1 = P' + Q'$

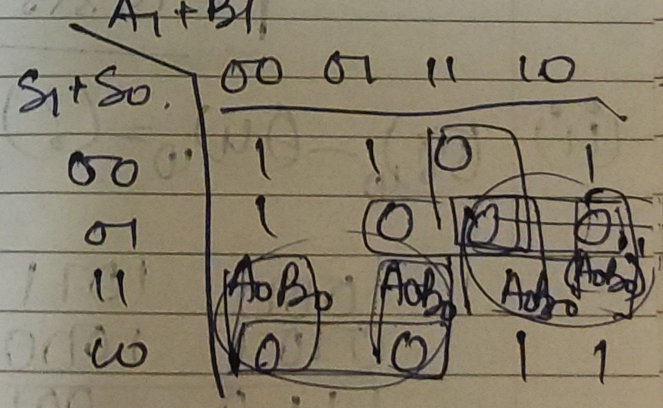
$\therefore Y_1' Y_2 = (P'+Q')' P' = ((PQ)')' P' = PQ P' = 0$.

$\therefore \boxed{Y_1' Y_2 = 0}$

Q3.

(a)





$Y_1 = (S_1 + A_1' + B_1')(S_1 + S_0' + B_1')(S_1 + S_0' + A_1')(S_1 + S_0 + A_1)$.

$(S_1' + A_1 + B_1 + A_0 B_0)(S_1' + A_1 + B_1' + (AB_0)')$

$(S_0' + A_1' + B_1' + A_0 B_0)(S_0 + A_1' + B_1' + (A_0 B_0)')$.

(b) 3 bit comparator:

Q combinations $= 2^{3} \cdot 2^{3} = 64$

(i) # A=B at 8 combination

left over = 64 − 8 = 56.

(ii) # A>B = 56/2 = 28

(iii) # A<B = 56/2 = 28.

Q4. (i) $(768.65)_{10} + (253.9)_{10} \rightarrow (?)_{XS-3}$

```
Carry→ 1111        11       1111
        .1010  .  1001  .  1011    1001    1000
      + 0101      1000     0110    1100    0011
      1 0000      0010     0010    0101    1011
 +11  + 0011    + 0011   + 0011  + 0011  - 011
 100    0011      0101     0101    1000    1000
  1      0         2        2       5       5
```

$= (4355.88)_{XS-3}$

(ii) $(58)_{10} - (24)_{10} = (?)_{XS-3}$.

```
  1000    1011
  0101    1000
  1110    0011
- 0011  + 0011
  1011    0110
→ 0100    1001
   1       6
```

$= (49)_{XS-3}$

(4)

Q5 (a) (547)8.

(i) $(1011001111)_2$

grey code. = 1110101100 = (764)8.

(ii) $(DEC)_{16} \rightarrow (110111101100)_2$

grey code = 1011 0001 1010

(b) grey code to binary

1111 0011 1001 → $(1010\ 0010\ 1110)_2$

(c) ASCII

American Standard code for information Interchange.

uses 7bit for each character.

EBDIC.

Extended Binary Coded Decimal Interexchange code.

uses 8bit for each character.

Q6. S=0, f = XOR (x, y)

S=1, f = XNOR (x, y)

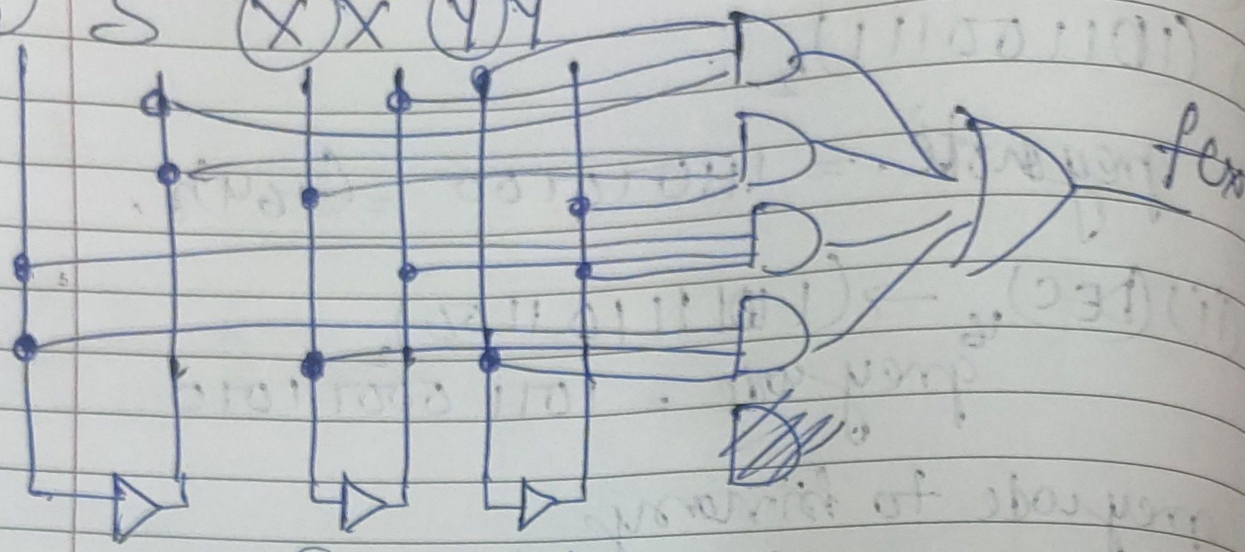
S	X	Y	f
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

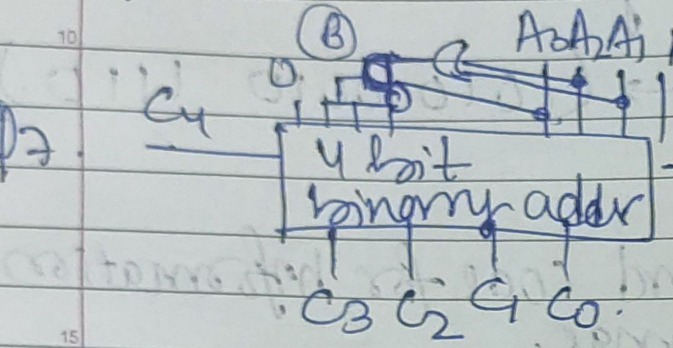
S \ xy	xy'	x'y	x'y'	xy
0	1	1		1
1			1	

$f = S'x'y + S'xy' + S'x'y' + Sxy$

(6)

(5) S' (X) X' (Y) Y'





$A = A_3 A_2 A_1 A_0$ $\quad B_2 = B_1 = A_3(A_1 + A_2)$.

$B = B_3 B_2 B_1 B_0$

$\oplus\ A_3(A_1+A_2)\ 0$.

(10) Unique o/p.

$A_3A_2A_1A_0$	$B_2=B_1$	C_3-C_0
0 0 0 0	0	0000
0 0 0 1	0	0001
0 0 1 0	0	0010
0 0 1 1	0	0011
0 1 0 0	0	0100
0 1 0 1	0	0101
0 1 1 0	0	0110
0 1 1 1	0	0111
1 0 0 0	1	1000
1 0 0 1	1	1111
1 0 1 0	1	0000
1 0 1 1	1	0001
1 1 0 0	1	0010
1 1 0 1	1	0011
1 1 1 0	1	0100
1 1 1 1	1	0101

(8).

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(a)

Q8. m parity bit. n=16 data bit.

$2^m > m+n$.

$2^m > m+16$.

$m=5$ $2^5 > 5+16$

$32 > 21$.

So 5 parity bit are required to transfer 16 bit data.

(b) X_1X_0. Y_1Y_0.

P { 1 $X < Y$

0 $X \geq Y$.

X_1X_0 \ Y_1Y_0	00	01	11	10
00				
01				
11			1	1
10				

$F = X_1'Y_1 + X_1'Y_0'Y_0 + X_0'Y_1Y_0$.

X_1	X_0	Y_1	Y_0	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

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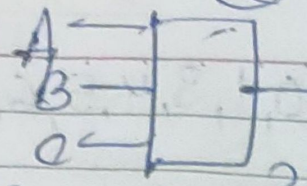
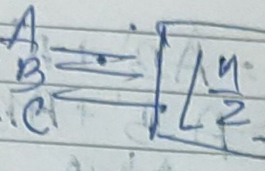
Q8. Q9.



P=1 when odd no. of i/p is high.

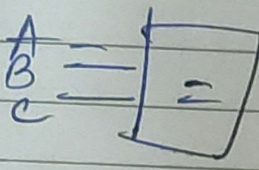
2n+1.

A	B	C	P
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1



Q=1 when either 0 i/p high or 1 i/p high.

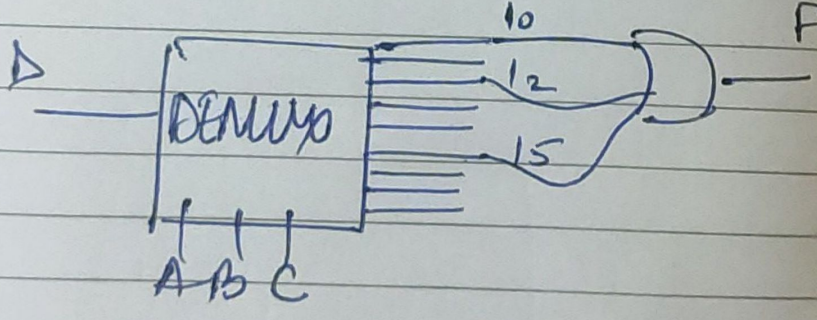
A	B	C	Q
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0



R=0. gate high when all i/p are equal

A	B	C	R
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

Q10 (a)



$F = \Sigma m(?)$.

$I_0 = A'B'C'$

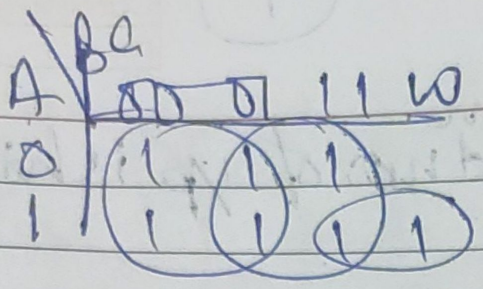
$I_2 = (A'BC')'$

$I_5 = AB'C$.

$F = A'B'C' + A'B'C + AB'C = A \oplus B' \oplus C$

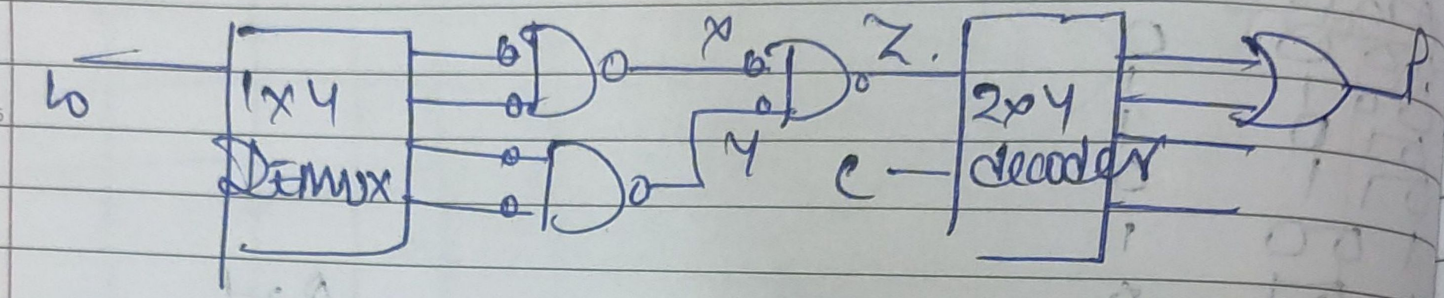
2.07 + 0.65 − 0.1 = 2.6.

(8)



$f = \Sigma m(0,1,3,4,5,6,7)$

(b)



$X = (D_0' D_1')' = D_0 + D_1 = AB' + A'B = A'$

$Y = (D_2' D_3')' = D_2 + D_3 = AB' + AB = A$

$Z = (X' Y')' = X + Y = A' + A = 1$

$A_0 = 1 \quad A_1 = C$

$P = A_1 A_0 + A_1' A_0 = A_1'$

$\boxed{P = C'}$