Roll - 2106250 Subject - D.E.

Name - Seema Kumari. Assignment - 1

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① Data word - $\overset{D_1 D_2 D_3 D_4}{1000}$

Hamming Code - $P_1 P_2 D_3 P_4 D_5 D_6 D_7$

= $P_1 P_2 1 P_4 000$

For P_i in even parity must give 0.

$P_1 \oplus D_3 \oplus D_5 + D_7 = P_1 \oplus 1 \oplus 0 + 0 \Rightarrow P_1 = 1$

$P_2 \oplus D_3 + D_6 + D_7 = P_2 \oplus 1 \oplus 0 \oplus 0 \Rightarrow P_2 = 1$

$P_4 \oplus D_5 + D_6 + D_7 = P_4 \oplus 0 \oplus 0 \oplus 0 \Rightarrow P_4 = 0$

Hamming Code - 1110000

Received Hamming Code - $\underset{P_1 P_2 P_3 P_4 D_5 D_6 D_7}{11[illegible]01[illegible]0}$

$1 \oplus 0 \oplus 1 \oplus 0 = 1$

$1 \oplus 1 \oplus 1 \oplus 0 = 1$ error is in 3rd position

$0 \oplus 1 \oplus 1 \oplus 0 = 0$

Hamming Code with out error - 1100110

Data retrived :- 0110

②.

	$R+S$	$R+\bar{S}$	$\bar{R}+\bar{S}$	$\bar{R}+S$
$P+Q$	0	0	1	X
$P+\bar{Q}$	0	1	X	1
$\bar{P}+\bar{Q}$	1	X	1	0
$\bar{P}+Q$	X	1	0	0

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02

$$(Q+S)(P+Q+R)(P+R+S)(\bar{P}+Q+\bar{R})(\bar{P}+\bar{R}+S)$$

$$(Q+S)(Q+P\bar{R}+\bar{P}+R)(S+\bar{P}R+P\bar{R})$$

$$(Q+S+QS)(P\bar{R}+\bar{P}R)$$

$$\left(\overline{\bar{Q}\cdot\bar{S}\cdot\overline{QS}}\right)\left(\overline{\overline{P\bar{R}}\cdot\overline{\bar{P}R}}\right)=f$$

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(3) (i). BCD addition (749 + 858)

749 0000 0111 0100 1001
+ 0000 1000 0101 1000

0000 1111 1010 0001
+0110 +0110 +0110

1607 → 0001 0110 0000 0111

ii.) Substraction (539 - 378)

539 0101 0011 1001
378 0011 0111 1000
1100 1000 0111 → 1's Complement
0001 1100 0000

0001 1100 0001
+1010

161 → 0001 0110 0001

iii.) (-14) - (-6) using 2's Complement method.

(-6) 2's Complement → 11111010
+ (-14) 2's Complement → 10001010

11111100 = -8

-14 + (-6) = -8

(4) Gray codes belong to a class of codes called minimum change code in which they only one-bit code group changes when going one step to the next, this is an un-weighed code which means that there are no specific weights assigned to the bit positions. In the gray code, if we go from one decimal number to next only one bit of the gray code changes because of this feature, an amount of switching is minimized. gray code actually follows adjacency property, between two successive gray codes there is only one bit change and in the binary code, there will be multiple value changes.

(5), given,

U, V and W are boolean variables -

$U\bar{V} + UW + VW$

$U\bar{V} + UW + V(W+\bar{W})$

$U\bar{V} + UW + V(1)$

$U\bar{V} + UW + V$

$U(\bar{V} + W) + V$

$U + V\bar{W} = U + V\bar{W}$

Hence proved

6.

X	Y	Z	A	B	C
0	0	0	0	0	1
0	0	1	0	1	0
0	1	0	0	1	1
0	1	1	1	0	0
1	0	0	0	1	0
1	0	1	0	1	1
1	1	0	1	0	0
1	1	1	1	0	1

$A = \Sigma m\,(3, 6, 7)$

$B = \Sigma m\,(1, 2, 4, 5)$

$C = \Sigma m\,(0, 2, 5, 7)$

K-map for A

x \ yz	00	01	11	10
0			1	
1			1	1

$A = yz$

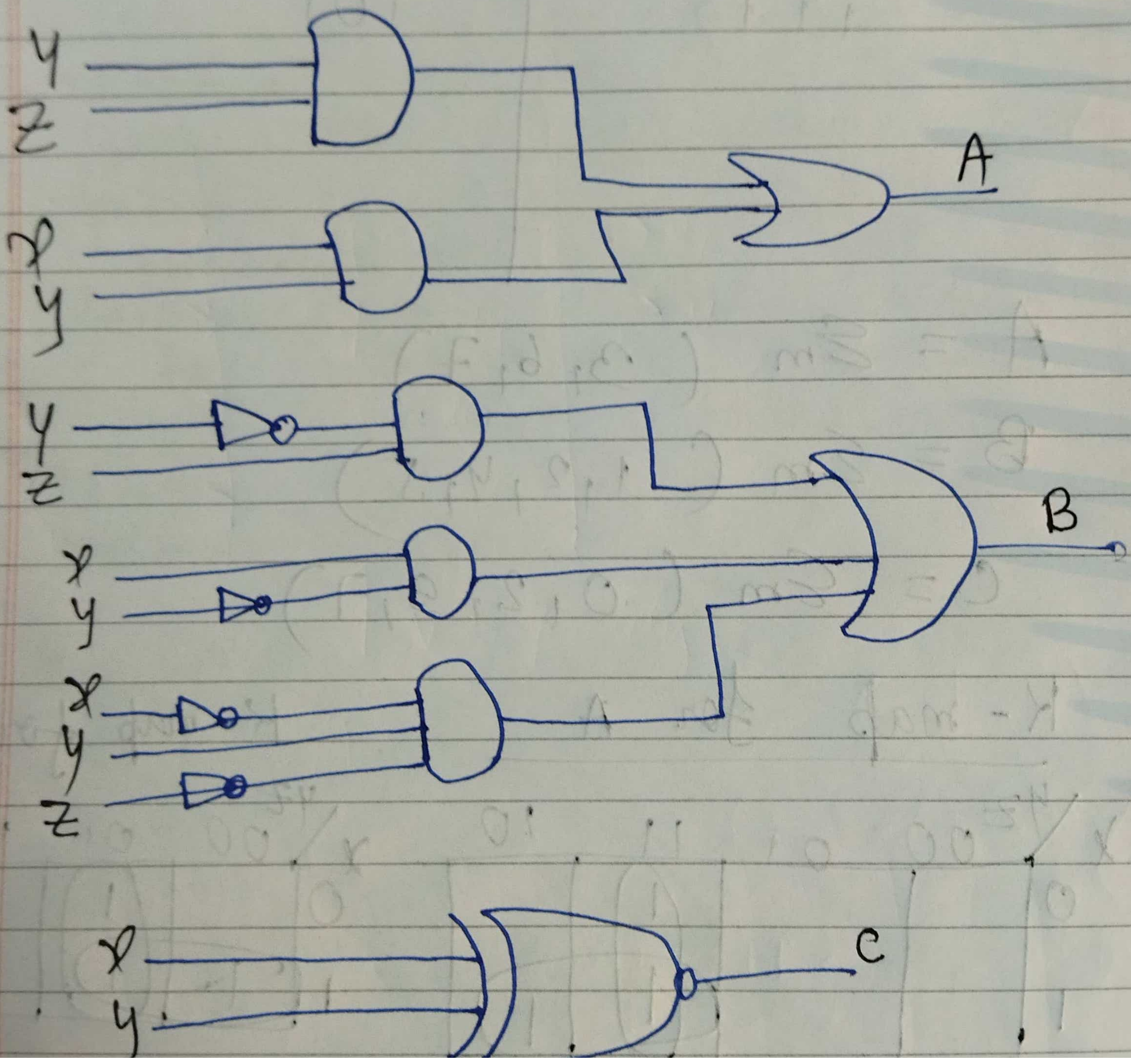
K-map for C:—

x \ yz	00	01	11	10
0		1		1
1	1	1		

K-map : for c

x \ yz	00	01	11	10
0	1			1
1		1	1	

circuit



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7.

A	B	C	Br	Diff
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	1	0
1	0	0	0	1
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

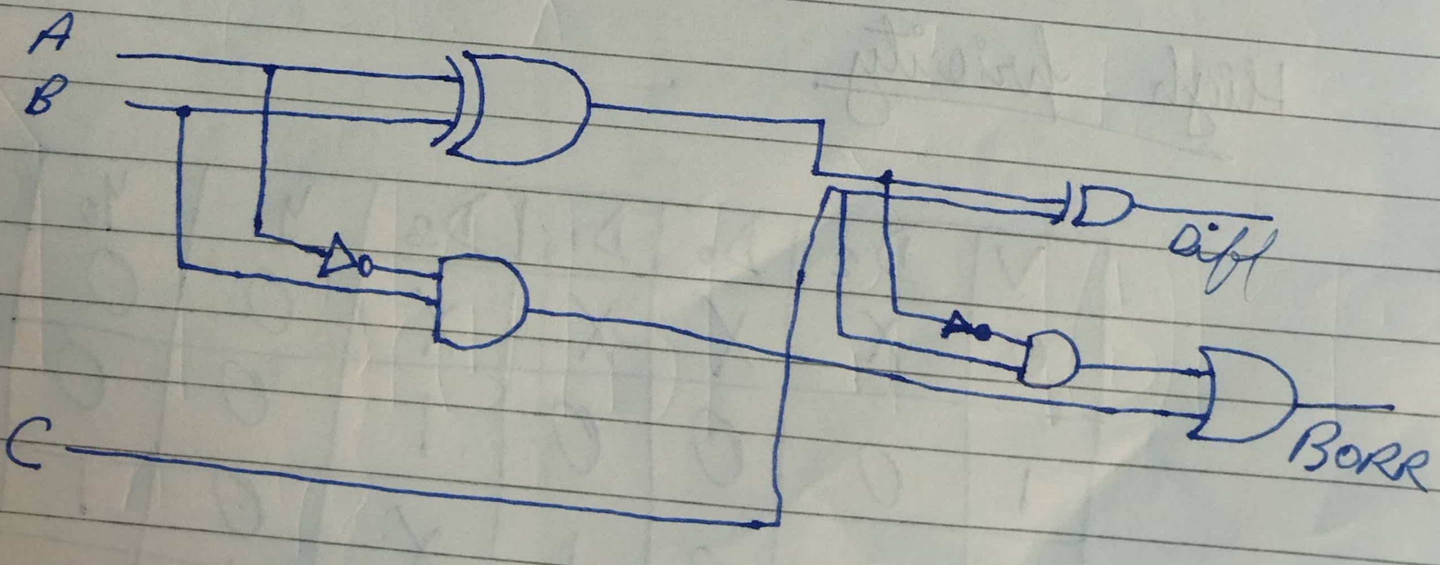
$Br = \Sigma m(1,2,3,7)$

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

from K-map,

$Br = \bar{A}B + \bar{A}C + BC$

$Diff = A \oplus B \oplus C$



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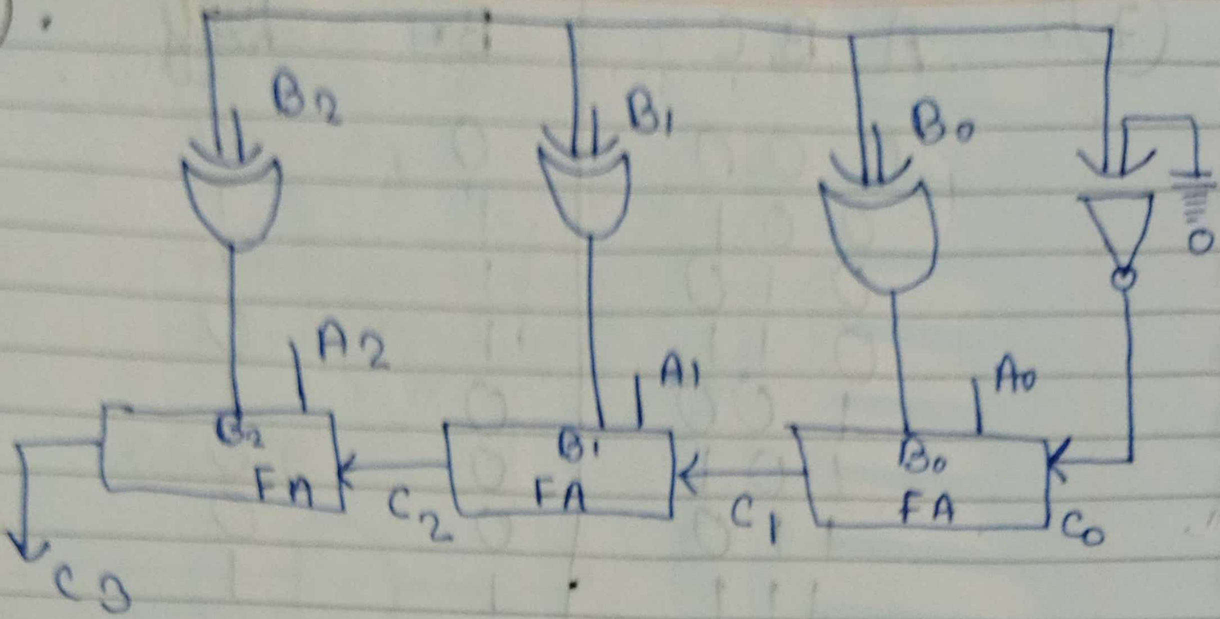
8.



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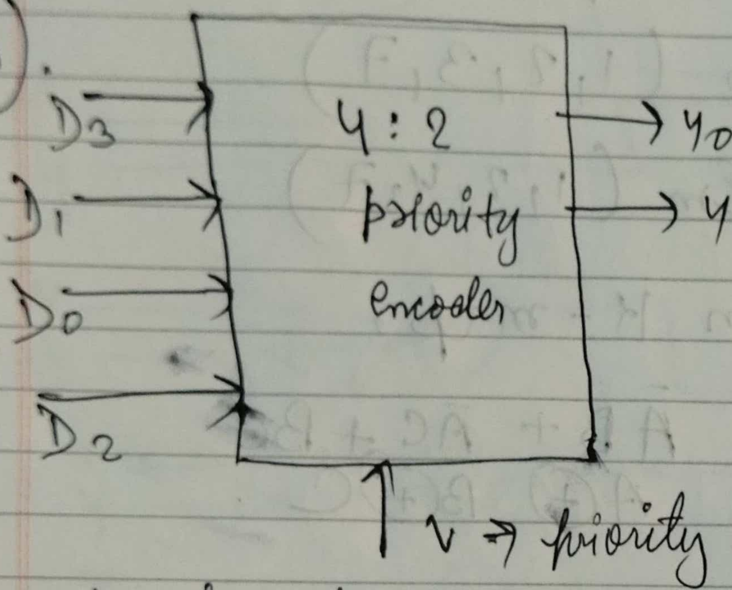


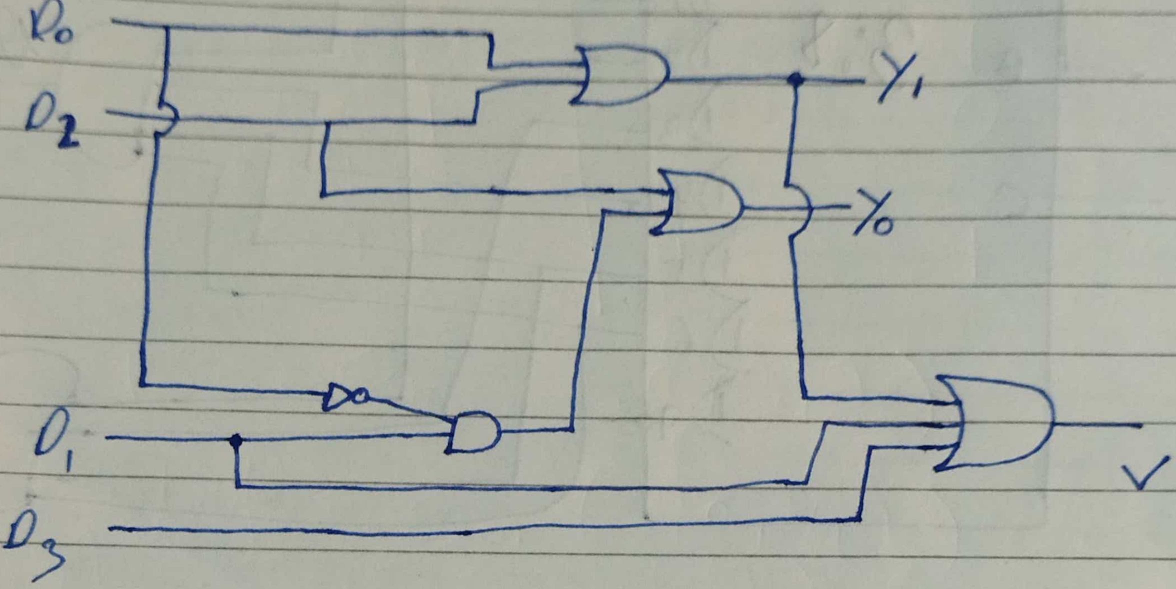
High priority

V	D_2	D_0	D_1	D_3	y_1	y_0
0	X	X	X	X	0	0
1	0	0	0	1	0	0
1	0	0	1	X	0	1
1	0	1	X	X	1	0
1	1	X	X	X	1	1

$$Y_0 = D_1 \bar{D}_0 \bar{D}_2 + D_2 \Rightarrow D_1 \bar{D}_0 + D_2$$

$$Y_1 = D_0 \bar{D}_2 + D_2 \Rightarrow D_0 + D_2$$

$$V = D_0 + D_1 + D_2 + D_3$$



(10).

A	B	C	Diff	Br
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	1	0
1	0	0	0	1
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

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$Diff = \pi m \, (0, 4, 5, 6)$

$Br = \pi m \, (0, 3, 5, 6)$