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Year :- E2-SEM1 semster :- 1

Online Batch :- Batch 1 Offline Section :- Batch I

Subject Name :- DLD **MID TEST-1** Date :- 17-07-2021

1) A

message :- 1110 Parity :- even

Hamming code formula :-

$$2^k = n+k+1$$

here $n=4 \Rightarrow 2^k = 4+k+1$

$$k=3$$

Here are 3 Parity bits are added for this message

111	110	101	100	011	010	001
D_7	D_6	D_5	P_4	D_3	P_2	P_1
1	1	1	?	0	?	?

$\Rightarrow$ For Finding P1 collect the bits which has first bit as $1 \rightarrow$ (i.e, 1,3,5,7)

P_1 D_3 P_5 D_7 even parity

P_1 0 1 1 $\Rightarrow P_1 = 0$

$\Rightarrow$ For Finding P_2 collect the bits which has second bit as 1.

P_2 D_3 D_6 D_7

P_2 0 1 1

Even no. of ones are there so, $P_2 = 0$

for finding P_4, collect the bits which has third bit as 1

$$P_4 \; D_5 \; D_6 \; D_7$$

$$P_4 \; 1 \; 1 \; 1$$

odd no. of ones are there so, $P_4 = 1$

original Message 1110

Transmitted message

D_7	D_6	D_5	P_4	D_3	P_2	P_1
1	1	1	1	0	0	0

$\therefore$ Transmitted Message is 1111000

1) b

$$(101101110001.00101)_2 = (\quad)_{10}$$

1	0	1	1	0	1	1	1	0	0	0	1	.	0	0	1	0	1
2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0		2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}

$$\Rightarrow (1\times2^{11} + 0\times2^{10} + 1\times2^9 + 1\times2^8 + 0\times2^7 + 1\times2^6 + 1\times2^5 + 1\times2^4 + 0\times2^3 + 0\times2^2 + 0\times2^1 + 1\times2^0).(0\times2^{-1} + 0\times2^{-2} + 1\times2^{-3} + 0\times2^{-4} + 1\times2^{-5})$$

$$\Rightarrow (2929.15625)_{10}$$

ii) $(292)_{16} = (\quad)_2$

2 9 2

0010 1001 0010

$\Rightarrow (292)_{16} = (001010010010)_2$

iii) $(163.789)_{10} = (\quad)_8$

$$\begin{array}{r|l} 8 & 163 \\ \hline 8 & 20 - 3 \\ \hline & 2 - 4 \end{array}$$

$\therefore (163)_{10} = 243$

	Integerpart	decimal Part
0.789×8	6	0.312
0.312×8	2	0.496
0.496×8	3	0.968
0.968×8	7	0.744
0.744×8	5	0.952
0.952×8	7	0.616
0.616×8	4	0.928
0.928×8	7	0.424
0.424×8	3	0.392
0.392×8	3	0.136

$\therefore (163.789)_{10} = (243.6237574733)_8$

2) a) $F(x,y,z) = x'y'z' + x'y'z + xy'z = y'(x'+z)$

Ans

L.H.S $\Rightarrow x'y'z' + x'y'z + xy'z$

$\Rightarrow x'y'(z'+z) + xy'z$

$\Rightarrow x'y'(1) + xy'z \quad (\because A + \bar{A} = 1)$

$\Rightarrow x'y' + xy'z$

$\Rightarrow y'(x' + xz)$

$\Rightarrow y'((\bar{x}+x) \cdot (x'+z)) \quad (\because A + BC = (A+B).(A+C))$

$\Rightarrow y'(1\,(x'+z))$

$\Rightarrow y'(x'+z)$

$\Rightarrow$ R.H.S

$\therefore$ L.H.S = R.H.S

2b) Ans $F(a,b,c) = (a'+b').(a'+b).(a+b') = a'.b'$

L.H.S $\Rightarrow (a'+b').(a'+b).(a+b')$

$\Rightarrow [(a'+b').(a'+b)].(a+b') \quad (\because (A+B).(C+D) = AC + BC + AD + BD)$

$\Rightarrow (a'a' + a'b + b'a' + b'b).(a+b') \quad (\because \bar{a}.a = 0$ domination law$)$

$\Rightarrow (a'a'a + a'a'b' + a'ba + a'bb' + b'a'a +$

$b'a'b' + b'ba + b'bb$

$\Rightarrow 0 + a'b' + 0 + 0 + 0 + a'b' + 0 + 0$

$\Rightarrow a'b' + a'b' = a'b'$ ($a+a = a$ idempotent law)

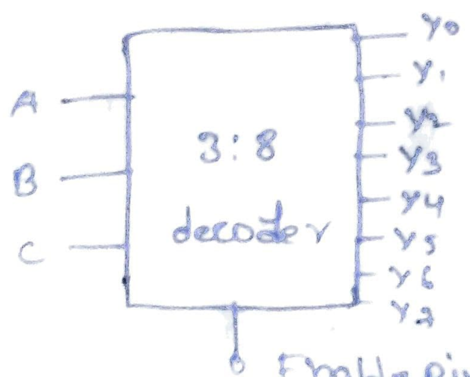
$\therefore (a'+b')\cdot(a'+b')\cdot(a+b') = a'\cdot b'$

3)
Ans $\Rightarrow$ 3 to 8 decoder

Decoder : It is combinational logic circuit. It is used to decode the data which is already encoded

$\Rightarrow$ It is exact opposite to Encoder

Block - diagram



$\Rightarrow$ To Represent 8 inputs 3 bits are enough so encoder encodes these i/ps to 3 bits

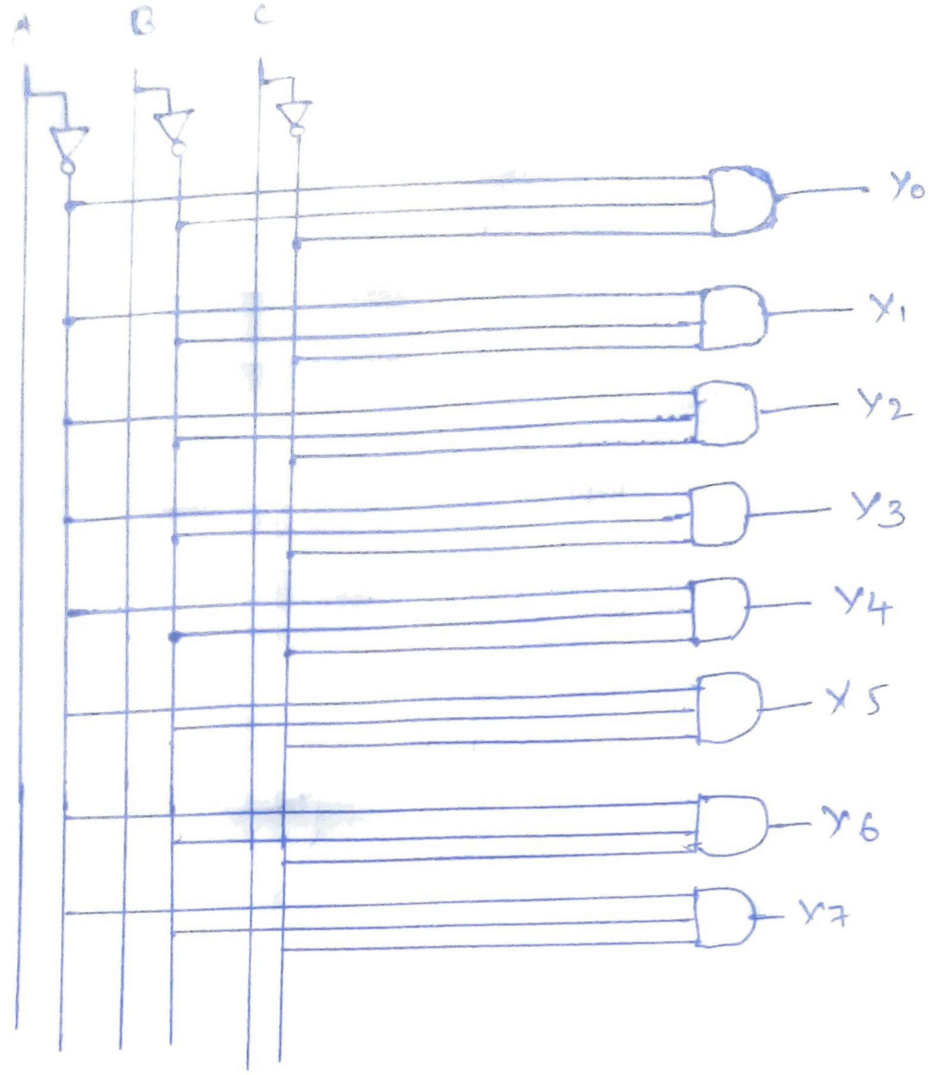
Decoder decodes the encoded data into 8 inputs

Truth table

E	A	B	C	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7
0	x	x	x	x	x	x	x	x	x	x	x
1	0	0	0	1	0	0	0	0	0	0	0
1	0	0	1	0	1	0	0	0	0	0	0
1	0	1	0	0	0	1	0	0	0	0	0
1	0	1	1	0	0	0	1	0	0	0	0
1	1	0	0	0	0	0	0	1	0	0	0
1	1	0	1	0	0	0	0	0	1	0	0
1	1	1	0	0	0	0	0	0	0	1	0
1	1	1	1	0	0	0	0	0	0	0	1

=> If Enable (E) is 0 then decoder won't be working

=> To make decoder active we have to give Enable as 1.



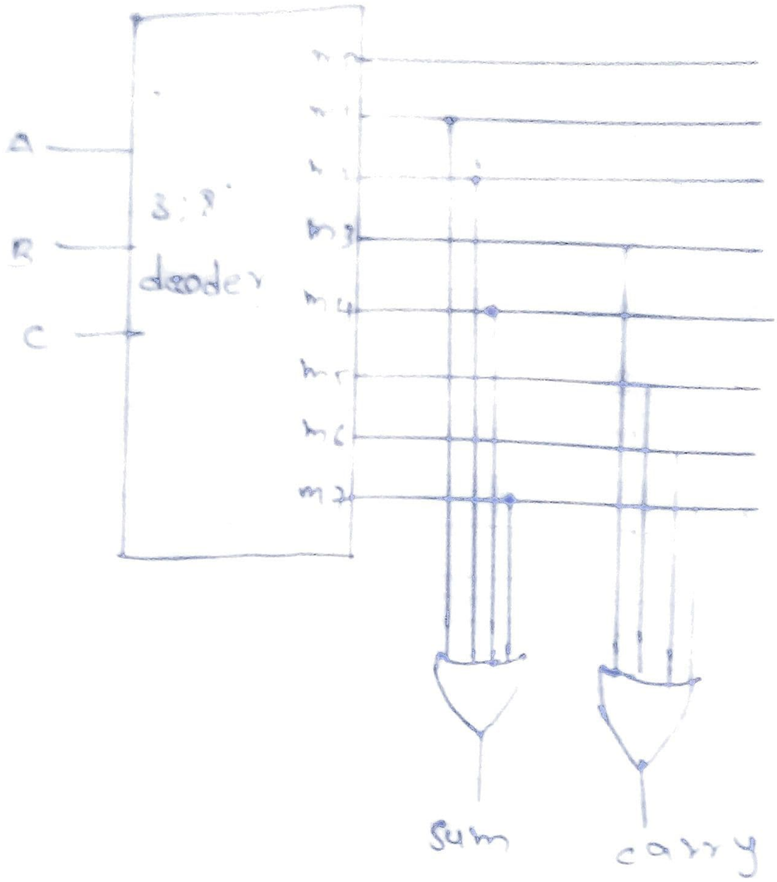
Full Adder :-

A	B	C	Sum	Carry
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

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

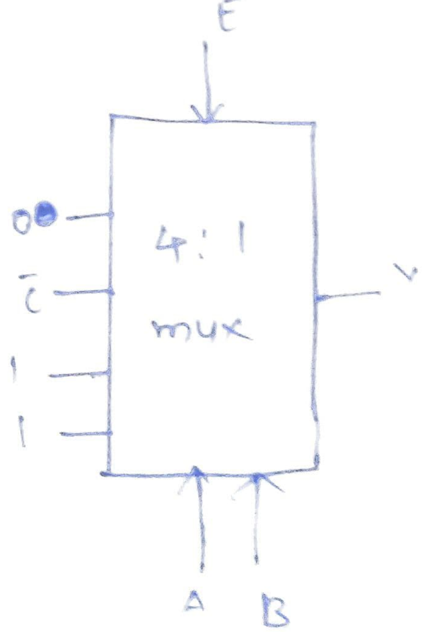
$carry = \Sigma m(3,5,6,7)$

Implementation of Full Adder using 3:8 decoder



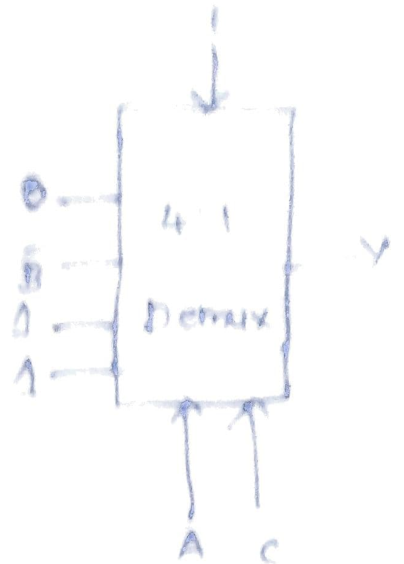
8)
Ans
i) AB as select line

	D_0	D_1	D_2	D_3
$\bar{C}$	0	1	2	3
C	4	5	6	7
	0	$\bar{C}$	1	1



ii) AC as select line

	D_0	D_1	D_2	D_3
$\bar{B}$	0	1	2	3
B	4	5	6	7
	0	$\bar{B}$	1	1



iii) BC as select line

	D_0	D_1	D_2	D_3
$\bar{A}$	0	1	2	3
A	4	5	6	7
	0	$\bar{A}$	1	1