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DLDA Term Work

2b

2s compliment of $(86)_{10} - (22)_{10}$

$(86)_{10} \rightarrow (01010110)_2$

$(22)_{10} \rightarrow (00010110)_2$

2s compliment of 22 $\rightarrow (00010110)_2$

$\rightarrow$ 11101001

+ 1

$\rightarrow$ 11101010

$\therefore$ ~~86~~

$$\begin{array}{r} 01010110 \\ +\ 11101010 \\ \hline 101000000 \end{array}$$

$\therefore$ carry is generated, so discard the carry.

$\therefore$ 0100 0000 $\rightarrow (64)_{10}$

$(86)_{10} - (22)_{10} = (64)_{10}$

3b Hamming Code

→ An error correction system that can detect and correct errors when data is stored or transmitted.

→ We need to add additional parity bits to it with the data.

→ In this method, the source encodes the message by inserting redundant bits within the message.

→ These redundant bits are extra bits that are generated and inserted at specific positions in the message itself to enable error detection and correction.

→ When the destination receives the message, it performs all the recalculations to detect these errors and find the position where the error has occured.

→ The proceduer used to send this is.

1) Calculating the number of redundant bits.
2) Positioning the redundant bits.
3) Calculating the values of each redundant bits.

→ Once the receiver receives the message it performs calculations to detect the error and correct them.

1) Calculate the number of redundant bits.
2) Positioning the redundant bits.
3) Parity Checking
4) Error detection and correction.
5) Final output.

→ Eg. If the 7-bit hamming code word received by a receiver is 1101011. Assuming even parity, we have to check if our answer is correct or not.

D_7	D_6	D_5	D_4	D_3	D_2	D_1
1	0	1	1	0	1	1

$P_4 = D_5 \; D_6 \; D_7$

$1 = 1 \; 0 \; 1 \longrightarrow$ odd $\quad P_4 = 1$

$P_2 = D_3 \quad D_6 \quad D_7$

$1 \quad 0 \quad 0 \quad 1$

$P2 = 0$

$P_1 = D_3 \quad D_5 \quad D_7$

$1 \quad 0 \quad 1 \quad 1$

$P_1 = 1$

$P_4 P_2 P_1 = (101)_2 = (5)_{10}$

$\therefore$ 5th bit is having an error

$(1001011)_2$ is the correct answer.

Q4 (b)

$Y = (A+B)(A+C)(B+C)$

$= (AA + AB + BC + AC)(B+C)$

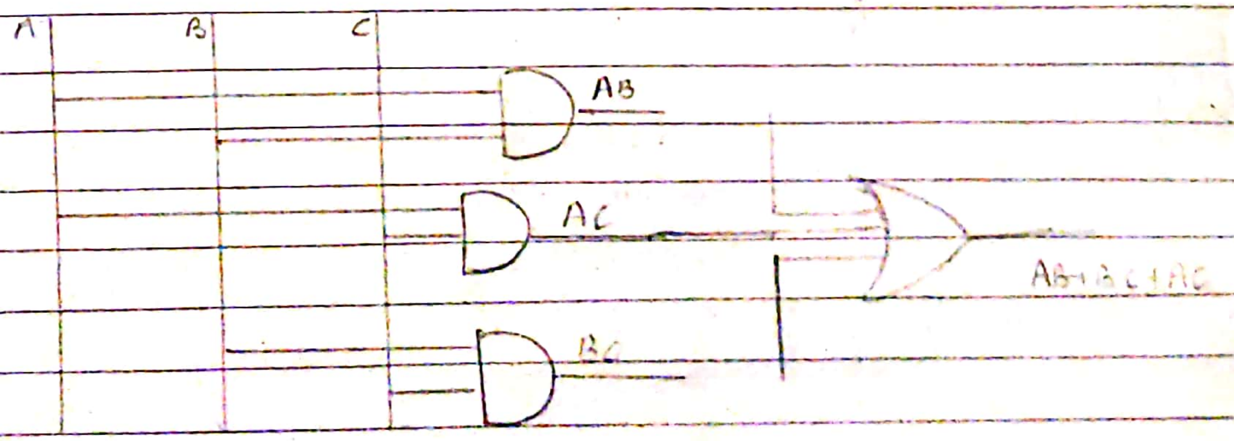
$= AAB + ABB + BBC + ABC + AAC + ABC + BCC + ACC$

$= AB + AB + BC + BC + AC + AC + 2ABC$

$= AB + BC + AC + ABC$

$= AB + AC + BC(1+A)$

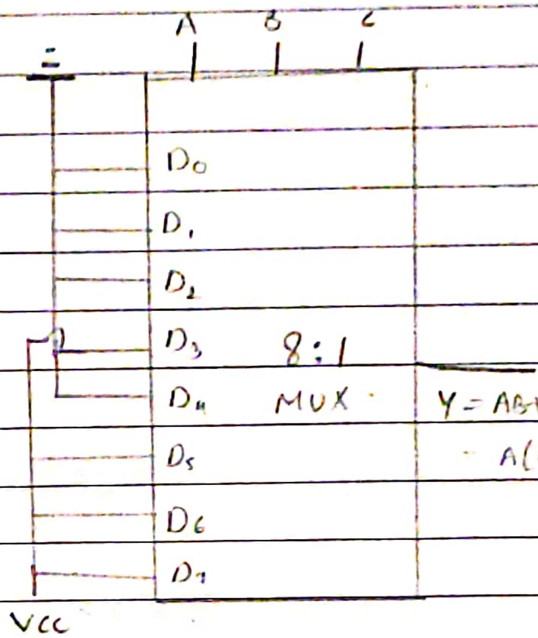
$= AB + AC + BC$



Scanned with CamScanner

Implementation using multiplexer

A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1



$Y = AB + BC + AC$

$= A(B+C) + BC$

Q5 b

i Binary to BCD code convertor

A	B	C	D	B_5	B_4	B_3	B_2	B_1
0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	1
0	0	1	0	0	0	0	1	0
0	0	1	1	0	0	0	1	1
0	1	0	0	0	0	1	0	0
0	1	0	1	0	0	1	0	1
0	1	1	0	0	0	1	1	0
0	1	1	1	0	0	1	1	1
1	0	0	0	0	1	0	0	0
1	0	0	1	0	1	0	0	1
1	0	1	0	1	0	0	0	0
1	0	1	1	1	0	0	0	1
1	1	0	0	1	0	0	1	0
1	1	0	1	1	0	0	1	1
1	1	1	0	1	0	1	0	0
1	1	1	1	1	0	1	0	1

$B_5 = AB + AC$

AB \ CD	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	1	1	1	1
10	0	0	1	1

$B_4 = A\bar{B}\bar{C}$

AB \ CD	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	0	0	0
10	1	1	0	0

$B_3 = \bar{A}B + BC$

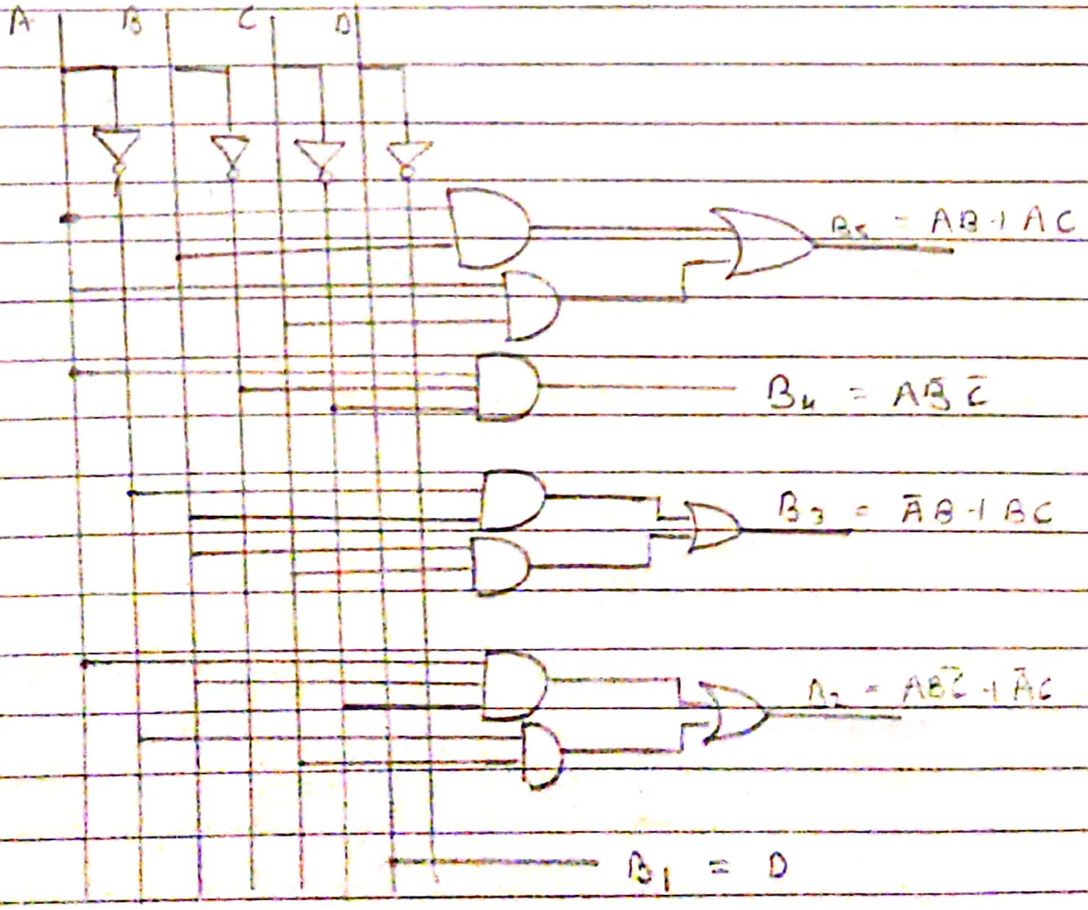
AB \ CD	00	01	11	10
00	0	0	0	0
01	1	1	1	1
11	0	0	1	1
10	0	0	0	0

$B_2 = AB\bar{C} + \bar{A}C$

AB \ CD	00	01	11	10
00	0	0	1	1
01	0	0	1	1
11	1	1	0	0
10	1	1	0	0

$B_1 = D$

AB \ CD	00	01	11	10
00	0	1	1	0
01	0	1	1	0
11	0	1	1	0
10	0	1	1	0



2) BCD to 7 segment display convertor

1. In BCD encoding scheme each of the decimal numbers (0 – 9) is represented by its equivalent binary pattern (which is generally of 4-bits)

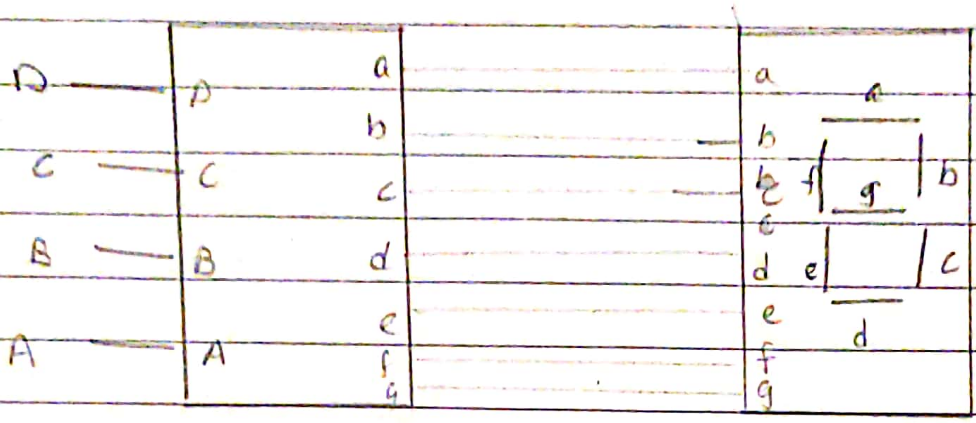
2. Here, in seven segment display it is an electronic device which consists of seven light emitting diodes (LED's) arranged in some definate pattern. (common cathode or common anode) which is used to display hexadecimal numerals (in this case decimal numbers, as input is BCD i.e 0 to 9.

3. Mainly there are two types of seven segment displays.
   a) Common cathode type.
   b) Common anode type.

Drawn below the BCD to seven segment decoder has four input lines (A, B, C, and D) and seven output lines (a, b, c, d, e, f, g) this output is given to the display.

Observation Table

A	B	C	D	a	b	c	d	e	f	g
0	0	0	0	1	1	1	1	1	1	0
0	0	0	1	0	1	1	0	0	0	0
0	0	1	0	1	1	0	1	1	0	1
0	0	1	1	1	1	1	1	0	0	1
0	1	0	0	0	1	1	0	0	1	1
0	1	0	1	1	0	1	1	0	1	1
0	1	1	0	1	0	1	1	1	1	1
0	1	1	1	1	1	1	0	0	0	0
1	0	0	0	1	1	1	1	1	1	1
1	0	0	1	1	1	1	1	0	1	1



BCD-to 7 segment decoder.

7 seven segment LED Display