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Branch: Computer Science & Engineering, Subject: Digital Systems.

CIE-2

3. a) Sol: Given,

$$F(A, B, C, D) = \sum m(4, 5, 7, 12, 14, 15) + \sum d(3, 8, 10)$$

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

$$\therefore F(A, B, C, D) = I + II + III$$

$$\Rightarrow F(A, B, C, D) = AD + \bar{A}B\bar{C} + BCD$$

3. b) Sol:

Given,

$$AB + A\bar{B}C + \bar{A}B\bar{C} + B\bar{C}$$

A \ BC	$\bar{B}\bar{C}$	$\bar{B}C$	BC	$B\bar{C}$
\bar{A}				1
A		1	1	1

$$\therefore F(A, B, C) = I + II$$

$$= B\bar{C} + AC$$

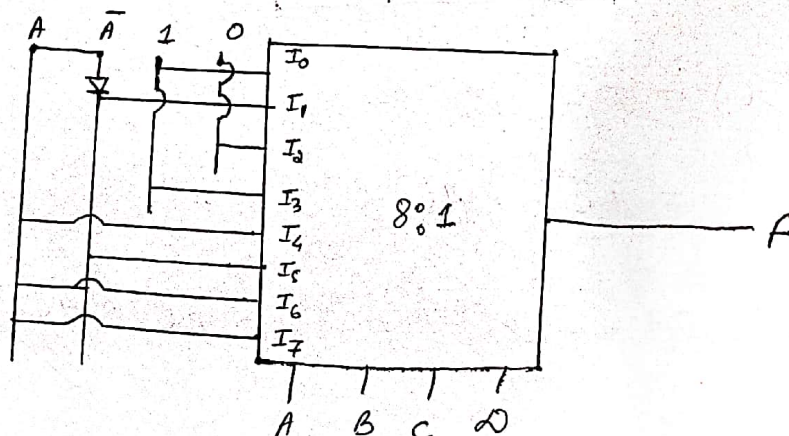
$$\therefore AB + A\bar{B}C + \bar{A}B\bar{C} + B\bar{C} \doteq B\bar{C} + AC$$

1) Soln: Given,

$$F = \sum m(0, 1, 3, 5, 8, 11, 12, 14, 15)$$

	A	B	C	D	F
0	0	0	0	0	1
1	0	0	0	1	1
2	0	0	1	0	0
3	0	0	1	1	1
4	0	1	0	0	0
5	0	1	0	1	1
6	0	1	1	0	0
7	0	1	1	1	0
8	1	0	0	0	1
9	1	0	0	1	0
10	1	0	1	0	0
11	1	0	1	1	1
12	1	1	0	0	1
13	1	1	0	1	0
14	1	1	1	0	1
15	1	1	1	1	1

	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7
\bar{A}	①	②	2	③	4	⑤	6	7
\bar{A}	⑧	9	10	⑪	⑫	13	⑭	⑮
	1	\bar{A}	0	1	A	\bar{A}	A	A



4. Ans:-

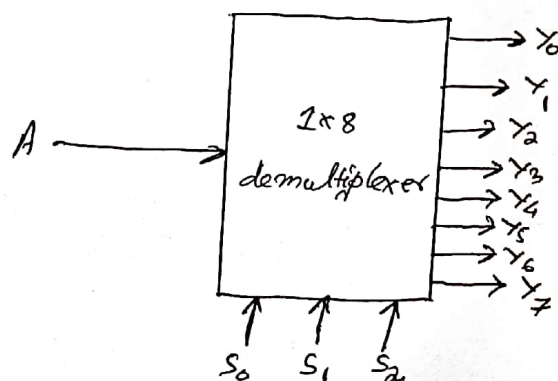
Half - Adder	Full - Adder
1) Produces sum of two inputs i.e. adds two 1-bit digits.	1) Adds three 1-bit binary numbers and i.e. produces sum of three inputs and a carry value.
2) Previous carry is not used.	2) Previous carry is used.
3) Logical expression for half-adder is, $S = A \oplus B$ $C_o = A \cdot B$	3) Logical expression for full adder is, $S = A \oplus B \oplus C_{in}$

2. Ans :- A demultiplexer is the opposite of a multiplexer. A demux has 1 input and 2^n outputs. For this reason, it is also called a data distributor.

1-line to 8-line demultiplexer :-

In this type of demux, there are a total of eight outputs from Y_0 to Y_7 , and three selection lines S_0 , S_1 , and S_2 , and it takes a single input A .

The block-diagram of a 1×8 demux is as follows:-



Truth table

S_2	S_1	S_0	Y_7	Y_6	Y_5	Y_4	Y_3	Y_2	Y_1	Y_0
0	0	0	0	0	0	0	0	0	0	A
0	0	1	0	0	0	0	0	0	A	0
0	1	0	0	0	0	0	0	A	0	0
0	1	1	0	0	0	0	A	0	0	0
1	0	0	0	0	0	A	0	0	0	0
1	0	1	0	0	A	0	0	0	0	0
1	1	0	0	A	0	0	0	0	0	0
1	1	1	A	0	0	0	0	0	0	0

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