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Section: 05 .

1) $-22-16 = -22+(-16)$.

In 2's complement it will be:

$-22 = -(010110)_2 = (101010)_{2's}$ [Reset Inverting 1 with 0 and add 1]

$-16 = -(010000)_2 = (110000)_{2's}$.

∴ 2's complement = ⊖

$$\begin{array}{r} 101010 \\ + 110000 \\ \hline (1011010)_{2's} \end{array}$$

Here we get 1 as overflow bit in the

7th position. It is to be omitted

Ans: 011010 , Overflow .

2) Given:

$$F(a,b,c,d) = \sum_m (8, 9, 11, 12, 13, 15)$$

$$= AB'c'D' + AB'c'D + AB'cD + ABc'D'$$
$$+ ABc'D + ABcD$$

$$= AB'c'(D'+D) + AB'cD + ABc'D' + ABc'D$$
$$+ ABcD$$

$$= AB'c' + AB'cD + ABc'D' + ABc'D + ABcD$$

$$= AB'(D+c') + ABc'D' + ABc'D + ABcD$$

$$= AB'(D+c') + ABc'(D'+D) + ABcD$$

$$= AB'(D+c') + ABc' + ABcD$$
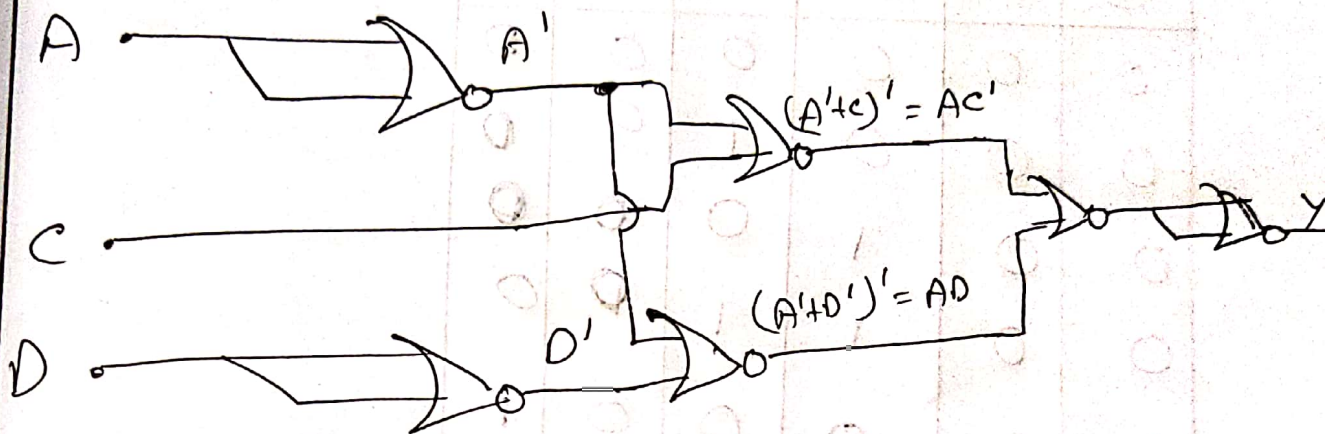
$$= AB'(D+c') + AB(cD+c')$$

$$= AB'(D+c') + AB(D+c')$$

$$= A(B+B')(D+c')$$

$$= AD + Ac'$$

$$\therefore Y = AD + Ac'$$

P.T.O →

The simplified eq. is implemented with
NOR Gates as follows :-

A $\longrightarrow$ A'

$(A'+c)' = Ac'$

C

$(A'+D')' = AD$

D $\longrightarrow$ D'

Y

3) The truth table is as follows:-

A	L	D	E	C	B
0	0	0	0	0	0
0	0	—	0	0	0
0	0	0	—	0	0
0	0	—	—	0	0
—	0	0	0	—	0
—	0	—	0	—	0
—	0	0	—	—	0
0	—	—	—	—	0
0	—	0	0	0	—
0	0	0	0	0	—
0	—	—	—	0	—
0	0	0	—	0	—
0	—	—	0	—	—
0	0	0	0	—	—
0	0	—	—	—	—
0	—	—	—	—	—

For LED : Kmap.

∴ Groups → 8,9 → AB'c' .

11,15 → ACD .

$$Y_L = AB'c' + ACD .$$

For Ambient Light : Kmap.

∴ Groups → 4,5,6,7 → A'B

$$Y_A = A'B .$$