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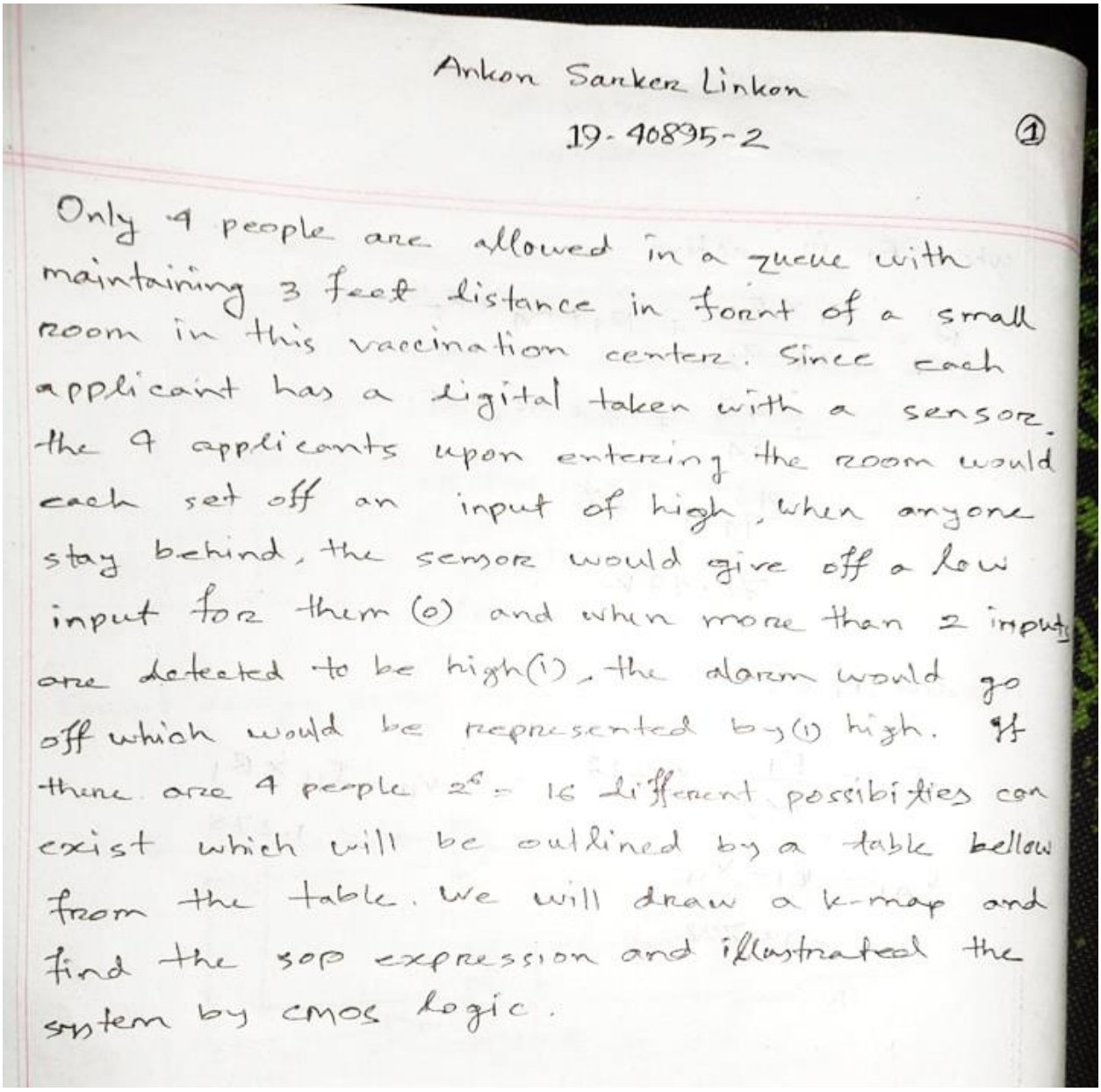
SEC:B



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Only 4 people are allowed in a queue with maintaining 3 feet distance in fornt of a small room in this vaccination center. Since each applicaint has a digital taken with a sensor. the 4 applicants upon entering the room would each set off an input of high, when anyone stay behind, the sensor would give off a low input for them (0) and when more than 2 inputs are detected to be high(1), the alarm would go off which would be represented by(1) high. If there are 4 people 2^4 = 16 different possibilities can exist which will be outlined by a table bellow from the table. We will draw a k-map and find the sop expression and illustrated the system by cmos logic.

For 4 people, We consider A, B, C, D.

NO	A	B	C	D	Y
0	0	0	0	0	0
1	0	0	0	1	0
2	0	0	1	0	0
3	0	0	1	1	0
4	0	1	0	0	0
5	0	1	0	1	0
6	0	1	1	0	0
7	0	1	1	1	1
8	1	0	0	0	0
9	1	0	0	1	0
10	1	0	1	0	0
11	1	0	1	1	1
12	1	1	0	0	0
13	1	1	0	1	1
14	1	1	1	0	1
15	1	1	1	1	1

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(2)

AB \ CD	00	01	10	11
00	0 [0]	0 [1]	0 [3]	0 [2]
01	0 [9]	0 [5]	1 [7]	0 [6]
10	0 [12]	1 [13]	1 [15]	1 [14]
11	0 [8]	0 [4]	1 [11]	0 [10]

Now grouping.

(13, 15) = ABD

(15, 11) = ACD

(7, 15) = BCD

(15, 14) = ABC

SOP from = ABD + BCD + ACD + ABC

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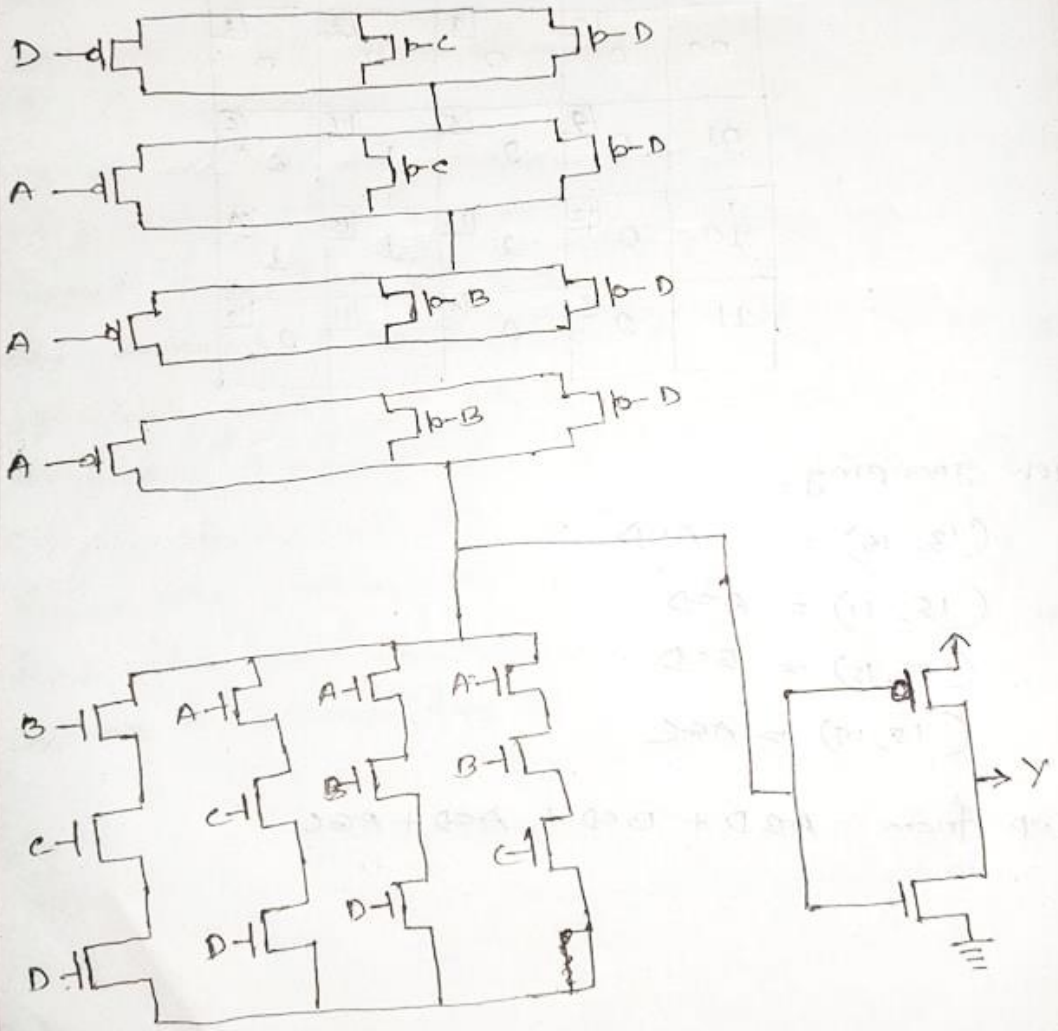
$$Y = \overline{BCD + ACD + ABD + ABC}$$



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Ans to the Ques no(i;)

given, $M = C + O + V + I + D$

$\therefore C = 4, \; O = 0 \; ; \; V = 8 \; ; \; I = 9 ; \; D = 5$

$M = 4 + 0 + 8 + 9 + 5$

$= 26$

and also given

duty cycle = N%.

and $N = 100 - M$

$= 100 - 26$

$= 74$

$\therefore$ duty cycle, $N = 74\%$.

$M5 = 235 \text{ Hz} > 250 \text{ Hz}$

$235 \text{ Hz} \gg < 250 \text{ Hz}$ therefore

frequency, $F = 400 \text{ Hz}$

$N = 74\%$.

$C = 50 \mu F$

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(5)

We know that,

$$T = \frac{1}{f}$$

$$= \frac{1}{400} = 0.0025$$

∴ Time high and time low.

$$T_H = 0.74 \times 0.0025 = 1.85 \text{ ms}$$

$$T_L = 0.26 \times 0.0025 = 0.65 \text{ ms}$$

∴ $T_H = 1.85$ ms , $T_L = 0.65$ ms

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Value of R_2:

$$T_L = 0.693 R_2 C$$

$$\Rightarrow R_2 = \frac{T_L}{0.693 \times C}$$

$$= \frac{0.65 \times 10^{-3}}{(0.693 \times 56 \times 10^{-6})}$$

$$= 18.76\ \Omega$$

Value of R_1.

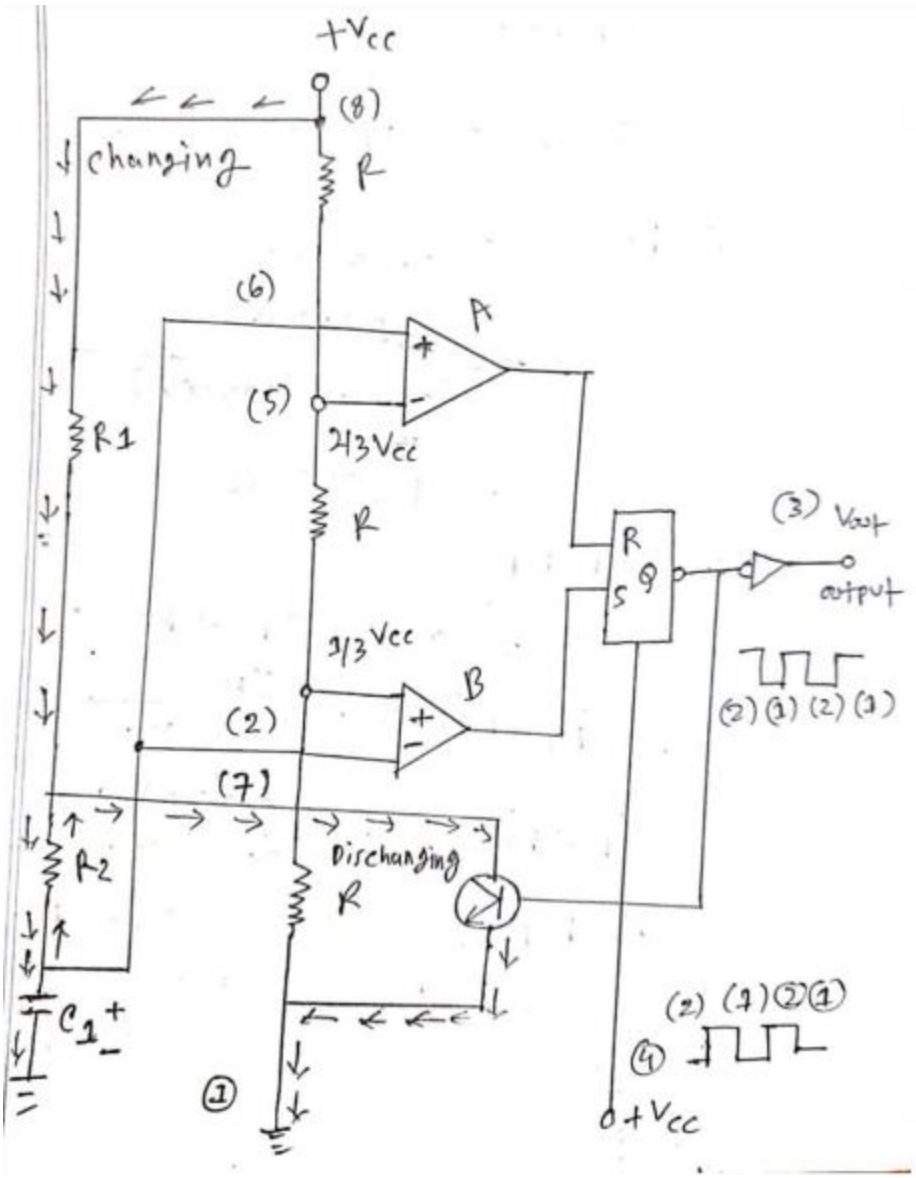
$$T_H = 0.693 (R_1 + R_2) C$$

$$\Rightarrow (R_1 + R_2) = \frac{T_H}{0.693 \times C}$$

$$\Rightarrow (R_1 + R_2) = \frac{1.85 \times 10^{-3}}{0.693 \times 50 \times 10^{-6}}$$

$$\Rightarrow R_1 = (53.39 - 18.76)\ \Omega$$

$$= 34.63\ \Omega$$


+Vcc
(8)
changing
R
(6)
A
+
-
(5)
2/3Vcc
R1
R
(3) Vout
R
S
Q
output
1/3Vcc
B
+
-
(2)
(2) (1) (2) (1)
(7)
R2
Discharging
R
C1
+
-
(2) (1) (2) (1)
(4)
(1)
0
+Vcc