American International University – Bangladesh
Faculty of Engineering – Electrical & Electronics Engineering
Final-Term Assignment – Summer 2021

Course: DIGITAL LOGIC AND CIRCUITS

Total Marks: 30

Sec: H Assignment: OBE Assignment

Submission Deadline: 8/14/2021

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ID:	**19-40856-2**		

Only 4 people are allowed in a queue with maintaining 3 feet distance in fornt of a small room in this vaccination centre. Since, each applicant has a digital taken with a senson, the 4 applicants upon entering the room would each set off an input of high (1), when anyone stay behind, the senson would give off a low input for them (0) and when more than 2 inputs are detected to be high (1), the alarm wold go off which would be represented by (1) high. If there are 4 people $2^6 = 16$ different possibities can exist which will be outlined by a table bellow from

the table. We will dnaw a k-map and find the sop expnession and illustrated the system by cMos logic.

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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

K-map

AB \ CD	00	01	10	11
00	0 [0]	0 [1]	0 [3]	0 [2]
01	0 [4]	0 [5]	1 [7]	0 [6]
10	0 [12]	1 [13]	1 [15]	1 [14]
11	0 [8]	0 [9]	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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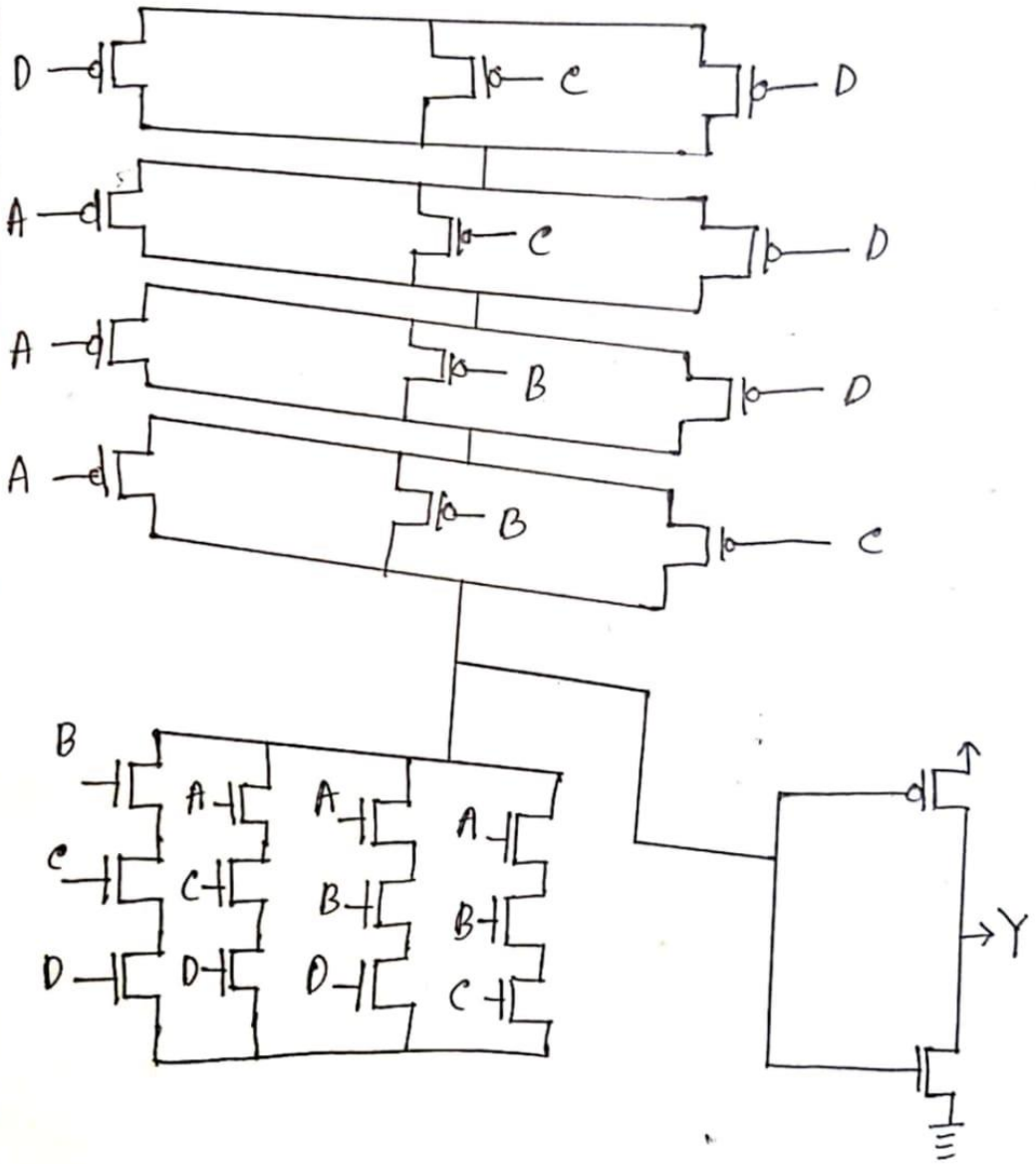
$$Y = \overline{\overline{BCD} + ACD + ABD + ABC}$$



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Answer to the question No: (ii)

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

$\therefore C = 4; O = 0; V = 8; I = 5; D = 6$

$\therefore M = 4 + 0 + 8 + 5 + 6$

$= 23$

And also given

duty cycle = N %

and $N = 100 - M$

$= 100 - 23$

$= 77$

$\therefore$ duty cycle, $N = 77\%$

M5 = 235 HZ ∠ 250 HZ

235HZ ∠ 250 HZ therefore,

frequency, f = 400 HZ

N = 77%

C = 50 MF

We know that,

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

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

∴ Time High and Time Low :

$$T_H = 0.77 \times 0.0025 = 1.925 ms$$

$$T_L = 0.23 \times 0.0025 = 0.575 ms$$

∴ $T_H = 1.925$ ms $T_L = 0.575$ ms

Value of R_2:

$$T_L = 0.693 R_2 C$$

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

$$= \frac{0.575 \times 10^{-3}}{(0.693 \times 50 \times 10^{-6})}$$

$$= 16.595\ \Omega$$

Value of R_1:

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

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

$$\Rightarrow (R_1 + R_2) = \frac{1.925 \times 10^{-3}}{0.693 \times 50 \times 10^{-6}}$$

$$\Rightarrow R_1 = (55.56 - 16.595)\Omega$$

$$= 38.965\ \Omega$$

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