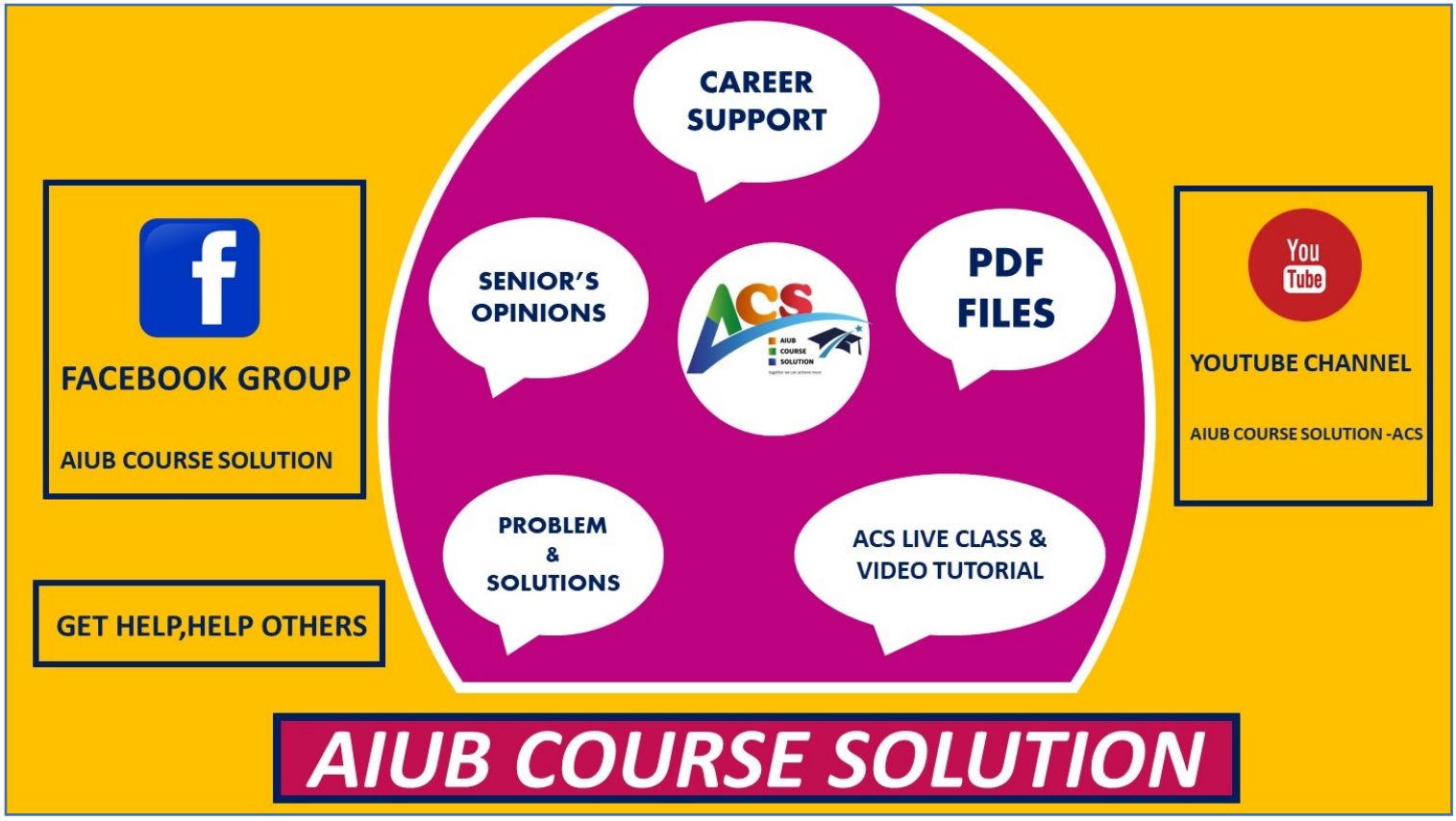

TOGETHER WE CAN ACHIEVE MORE

COURSE NAME: Digital Logic and Circuits

CHAPTER: Final Term OBE Assignment Fall 2020-21

SOLVED BY

NAME: MD. SAMIN ANJUM

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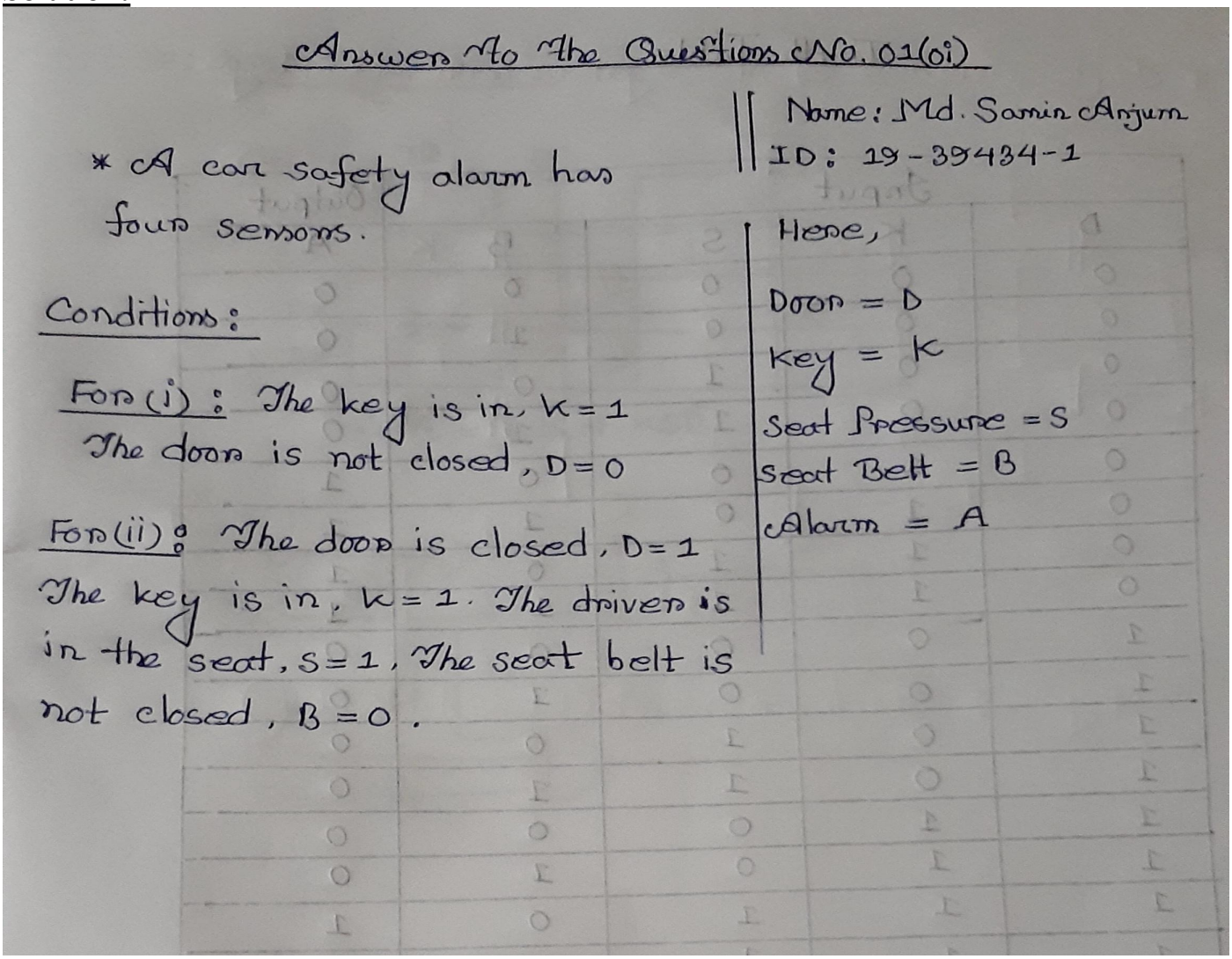
A car safety alarm has four input sensors – **door (D)**, **key in (K)**, **seat pressure (S)**, and **seat belt (B)**. Your job is to design the **alarm (A)** which will turn on and will sound for **XX** milli-seconds for the following conditions -
– The key is in, and the door is not closed, or
– The door is closed, the key is in, the driver is in the seat, and the seat belt is not closed.
i. Design the digital system which will trigger the alarm and implement the system with CMOS logic.
ii. Design the timer circuit which will activate the timer for **XX** milli-seconds.
Direction:
• The numbers **XX** are the last two digits of the middle part of your ID (12-345**XX**-2) (In case, the last two digits of your ID is less than 10, then add 10 with the number before using it to solve the problem.)
• Also, Assume capacitor $C_1 = 10\ \mu F$

Solution:



Truth Table

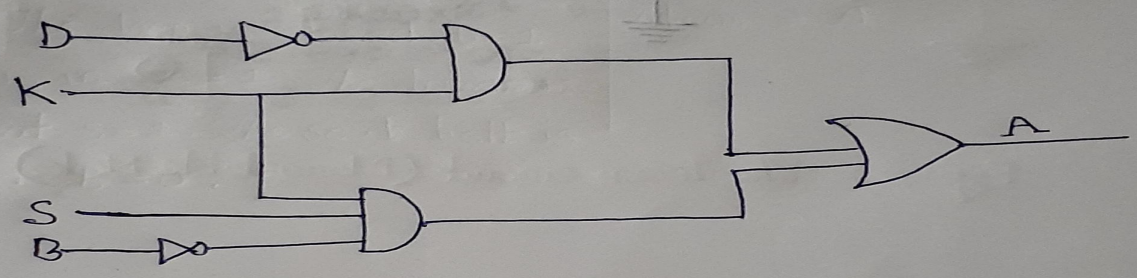
Input				Output
D	K	S	B	A
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

* Karnaugh Map:

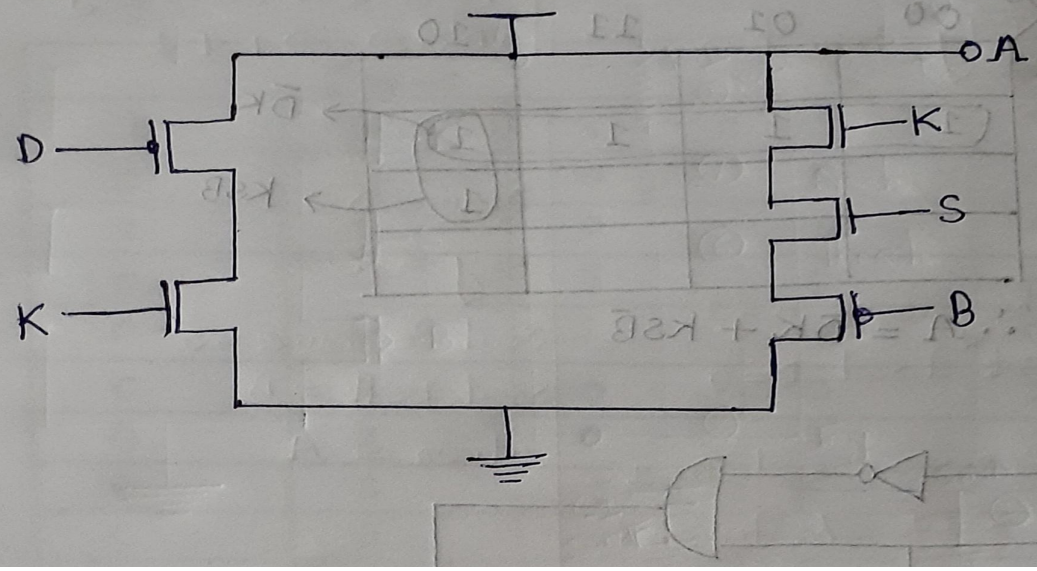
DK \ SB	00	01	11	10	
00					
01	1	1	1	1	$\bar{D}K$
11				1	$KS\bar{B}$
10					

$\therefore A = \bar{D}K + KS\bar{B}$

Now,



* Implementation of the system with CMOS Logic:



Answer to the Questions No. 02(ii)

ID: 19-39434-1

We know,
The width of the pulse is for Monostable Mode.

Here,
XX ms = 34 ms
$\therefore T_w = 34$ ms
$C_1 = 10\ \mu F$

For now, $T_w = 1.1 R_1 C_1$

$$\Rightarrow R_1 = \frac{T_w}{1.1 C_1}$$

$$= \frac{34 \times 10^{-3}}{1.1 \times 10 \times 10^{-6}}$$

$$= 3.09 \times 10^{3}\ \Omega$$

$\therefore R_1 = 3.09\ K\Omega$

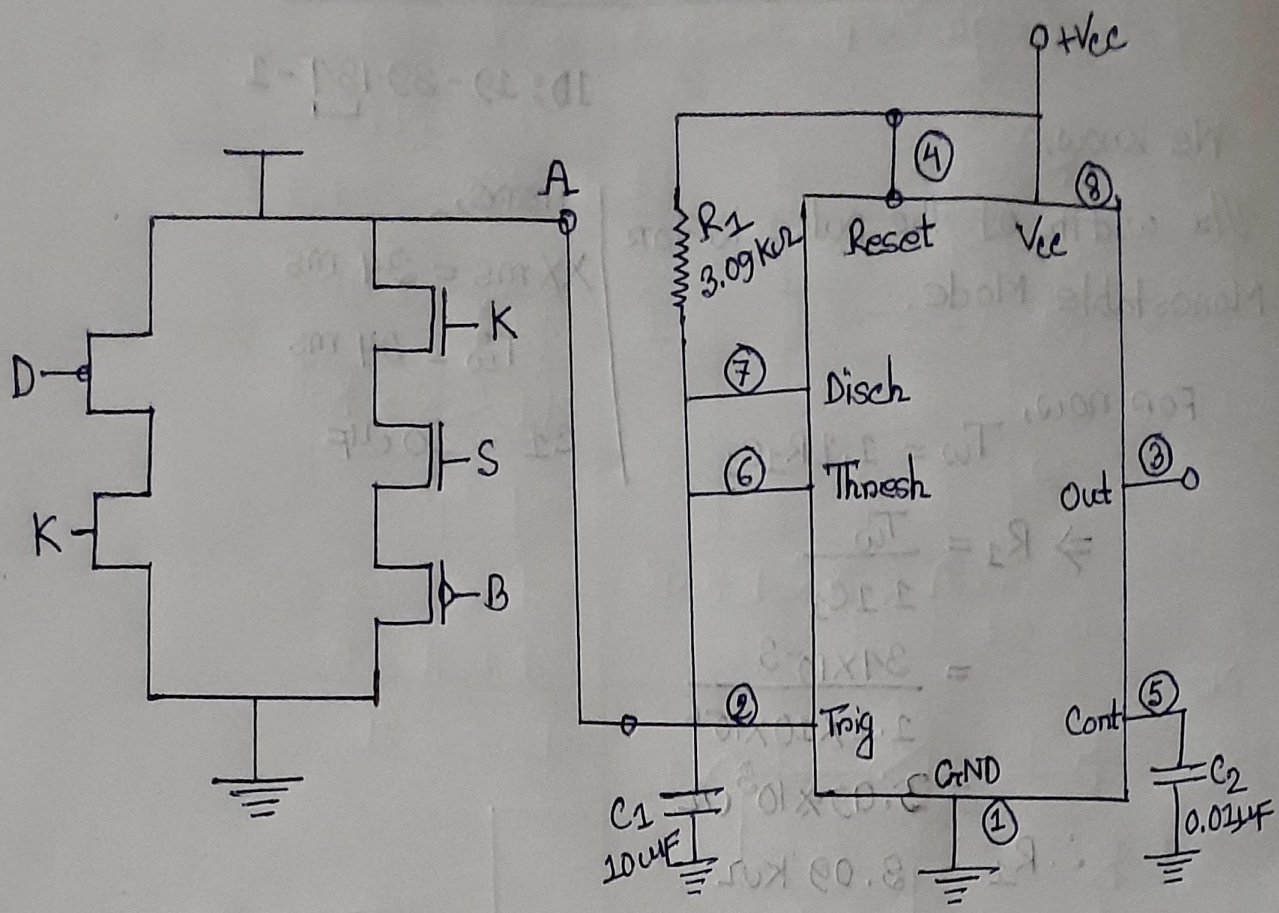


Figure : The timer circuit (Monostable Mode)