

Smart Lighting System

EEE/INSTR F241 – Microprocessor Programming & Interfacing

BITS- Pilani Goa Campus



By batch no. 65

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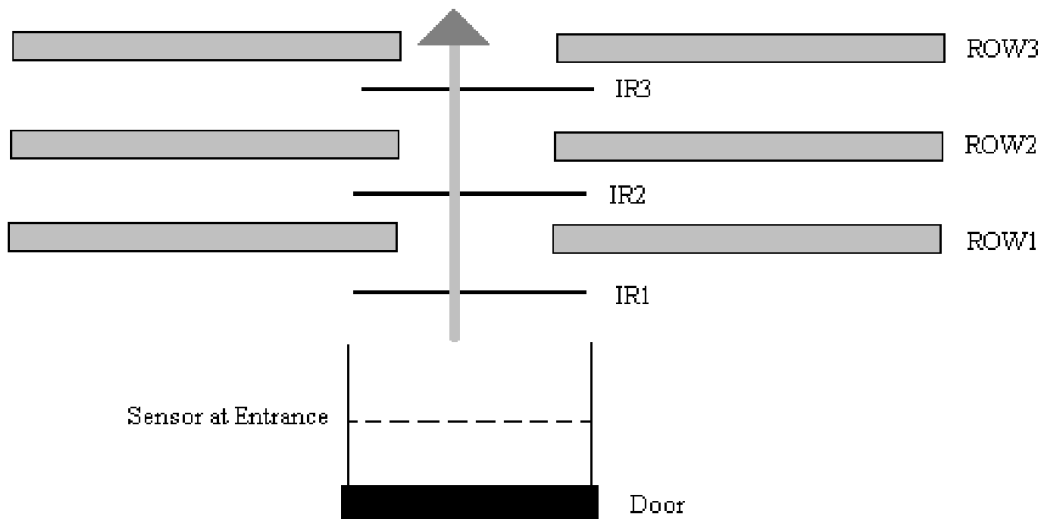
2014A3PS196G

Chirag Ranawat

2014A3PS759G

P14. System to be designed Smart Lighting System Description:

This is a lighting system for a conference room. As the seats get filled the light should be turned on. The rows are filled from row1 onwards. There are 4 lights per row. As each row begins to get filled the lights get turned on. As each row empties completely the light gets turned off. You can assume there are at least 5 rows. Entry to the auditorium is restricted to a certain point of time. Exit can be at any point of time.



Specifications:

1. There is an IR proximity sensor present at the gate (Master sensor) and at every row.
2. When a person passes through the sensor the sensor gives a logic 1.
3. The sensor is connected to the 8259 chip which raises an interrupt.
4. The output of 8255A chip is connected to a voltage amplifier which amplifies the voltage from 5V to 12V.
5. The voltage amplifier is connected to a DC relay.
6. The DC relay is connected to 4 tube lights connected in parallel and a 230V AC Power supply.
7. Every time a person comes in the room and sits in a particular row, the lights corresponding to that row must be turned on automatically.

Assumptions made:

1. There is only one gate, through which both Entry and Exit occur.
2. Entry is limited to the first 10 mins.
3. Exit is allowed any time after the first 10 mins.
4. When the people enter the room, they will occupy the rows in the order row1,row2, row3 and so on.
5. The maximum number of people which can sit in one row is 10.
6. When people will be leaving the room, any person from any row may stand and go out of the room.
7. Only one person can exit from his seat from any of the rows, at a particular time.
8. When a person would be coming inside the room, he would simply come and sit and while leaving he would just stand up and go out, i.e., any person will not be making any transitions between rows inside the room.

Components Used and quantity:

1. Microprocessor 8086 -1
2. Decoder 74LS138 -1
3. Programmable Peripheral Interface 8255A -1
4. Sensor - KC7783R PIR Module-6
5. DC Relay RJ1S-CD-12 -5
6. Octal Latch 74LS373 - 3
7. Bidirectional Buffer 74LS245 -2
8. Unidirectional Buffer 74LS244 - 1
9. Clock generator 8284A -1
10. ROM 2716 -4
11. RAM 6116 -2
12. AND 7408 - 2 ICs
13. OR 7432 - 1 IC
14. NOT 7404 -1 IC
15. Led Tube Light LED48T8SM-276-XPW-001WF-4 per row-20 in total
16. Voltage Amplifiers-5
17. 5V Battery (For Vcc)

Memory Interfacing: (Using I/O mapped I/O)

ROM chip used: 2716 (2K)

8K ROM divided in two parts:

ROM 1: 00000h - 00FFFh

ROM2: FF000h - FFFFFh

RAM chip used: 6116(2K)

4K RAM: 02000h - 02FFFh

I/O Interfacing: (Using I/O mapped I/O)

Mapping of 8255:

Port A: 00h

Port B: 02h

Port C: 04h

Control Register: 06h

Mapping of 8253:

Counter 0: 08h

Counter 1: 0Ah

Counter 2: 0Ch

Control Register: 0Eh

Mapping of 8259:

Address 0: 10h

Address 1: 12h

6. Hardware Circuit:

1. Memory Interfacing:

MEMORY INTERFACING

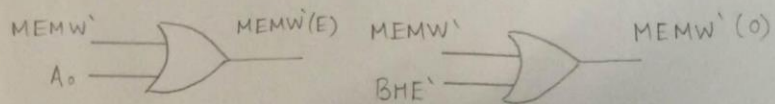
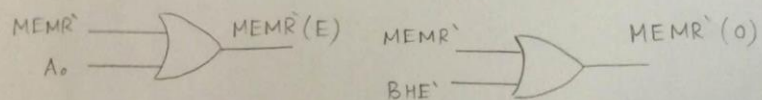
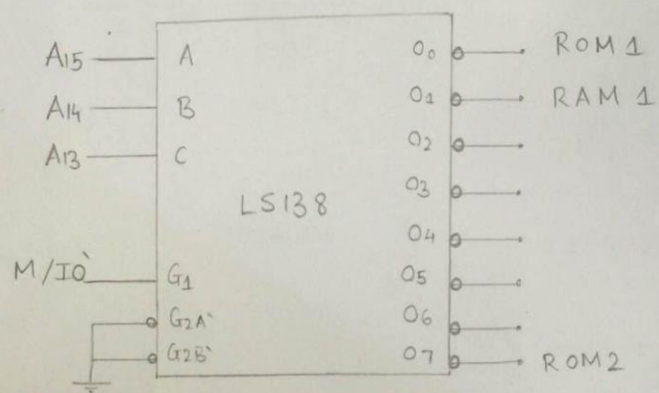
ROM - 8K - 4 chips of 2K - 2716 (2K chip)

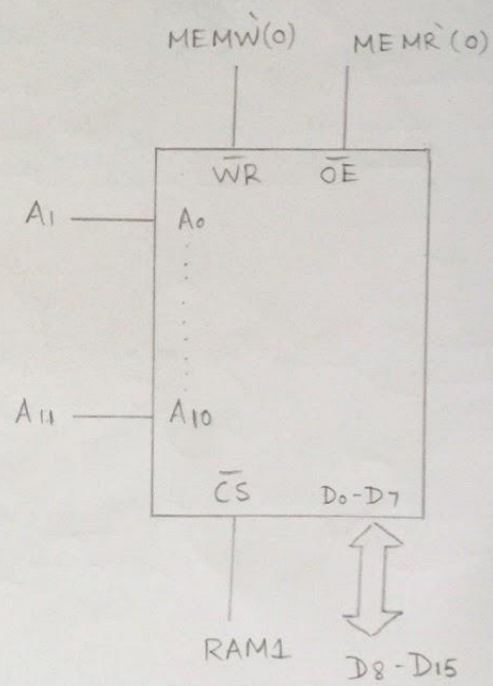
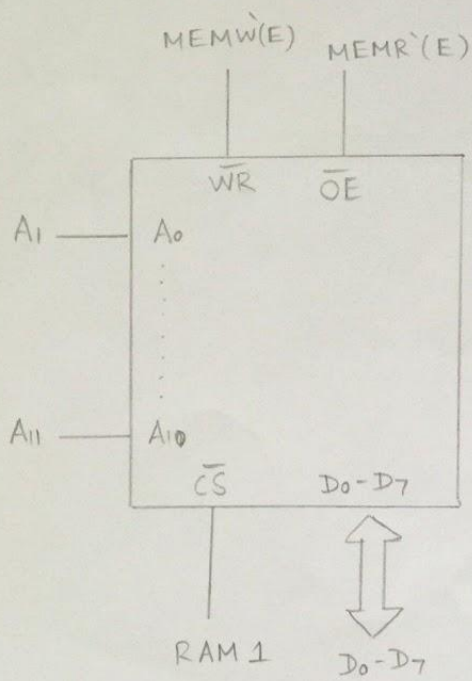
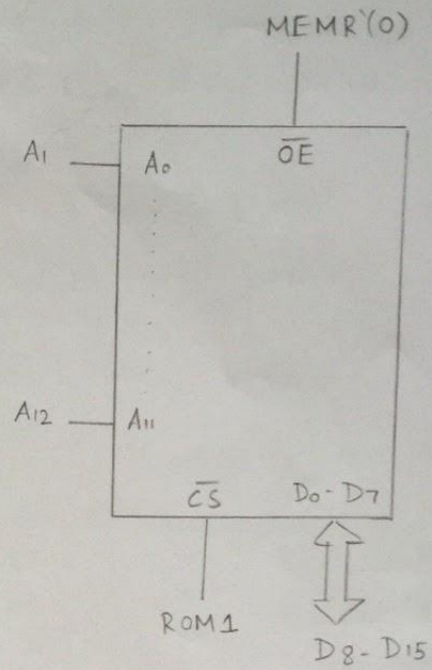
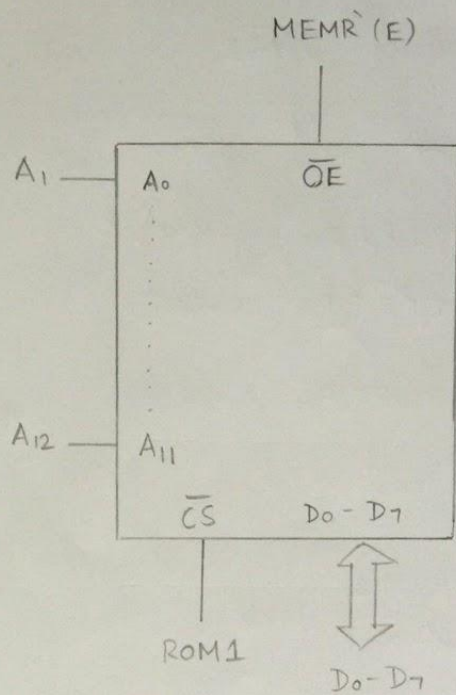
RAM - 4K - 2 chips of 2K - 6116 (2K chip)

ROM 1 \rightarrow 0000_H - 00FF_H (4K)

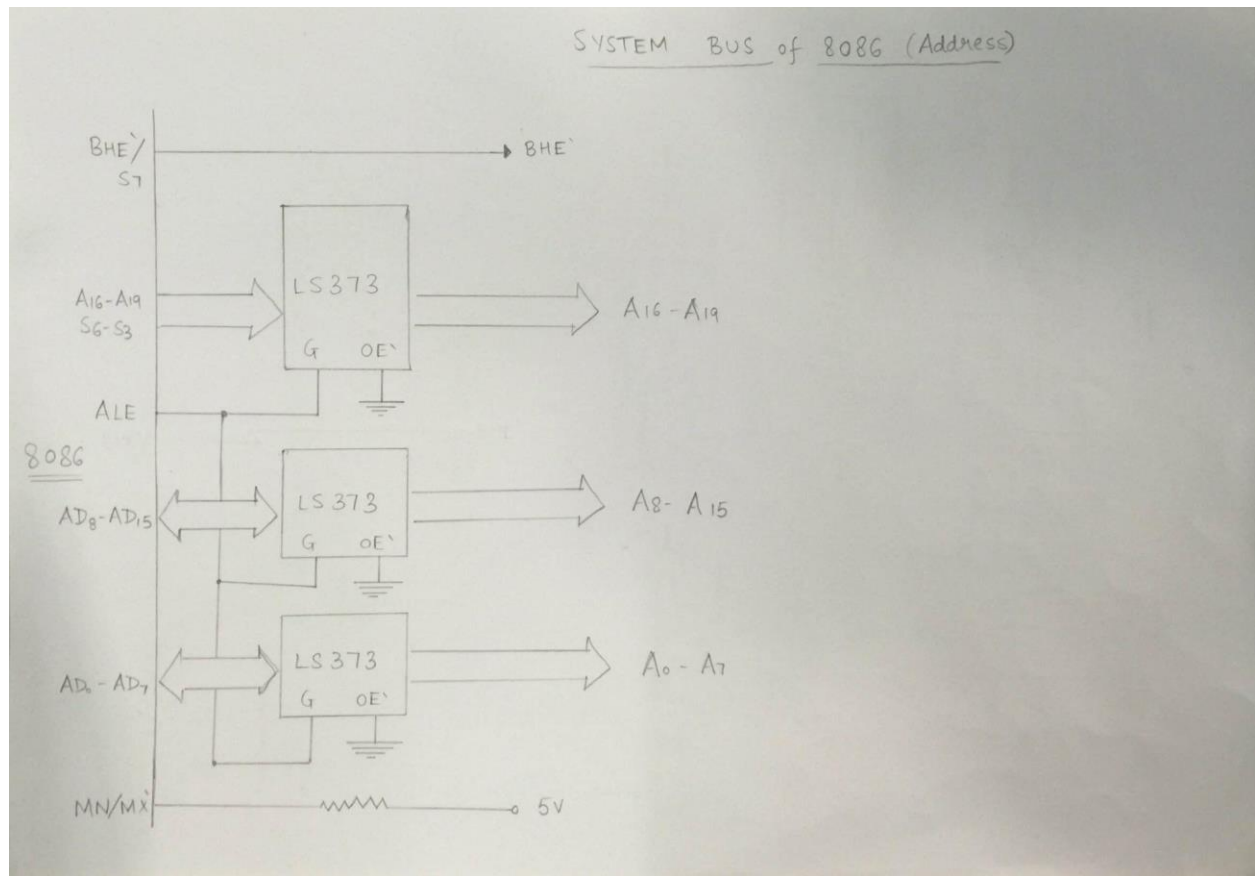
ROM 2 \rightarrow FF00_H - FFFF_H (4K)

RAM 1 \rightarrow 0200_H - 02FF_H (4K)

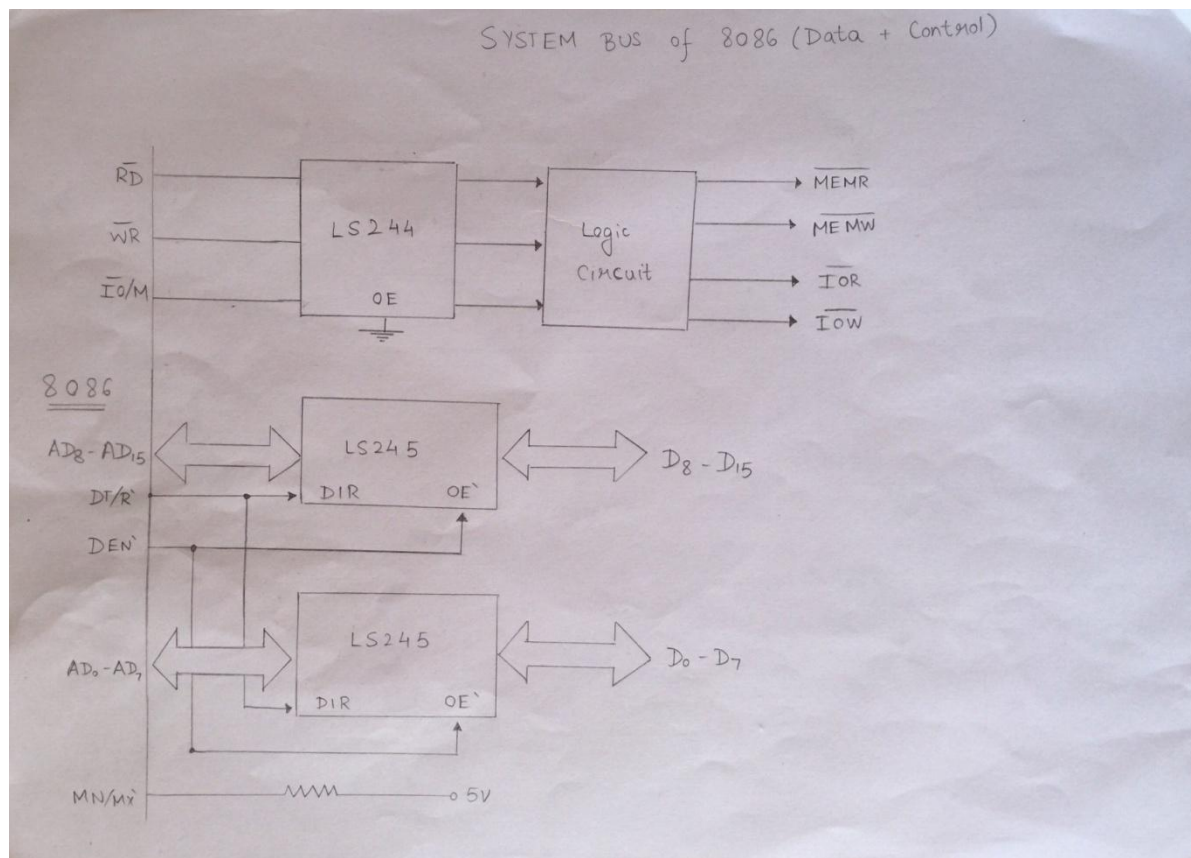




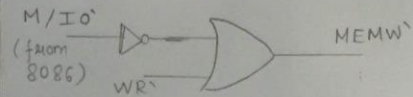
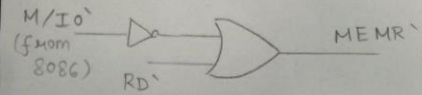
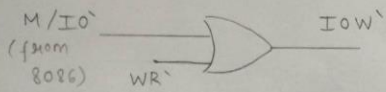
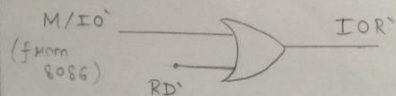
2. 8086 System bus: (Address)



3. System Bus of 8086: (Data and Control)



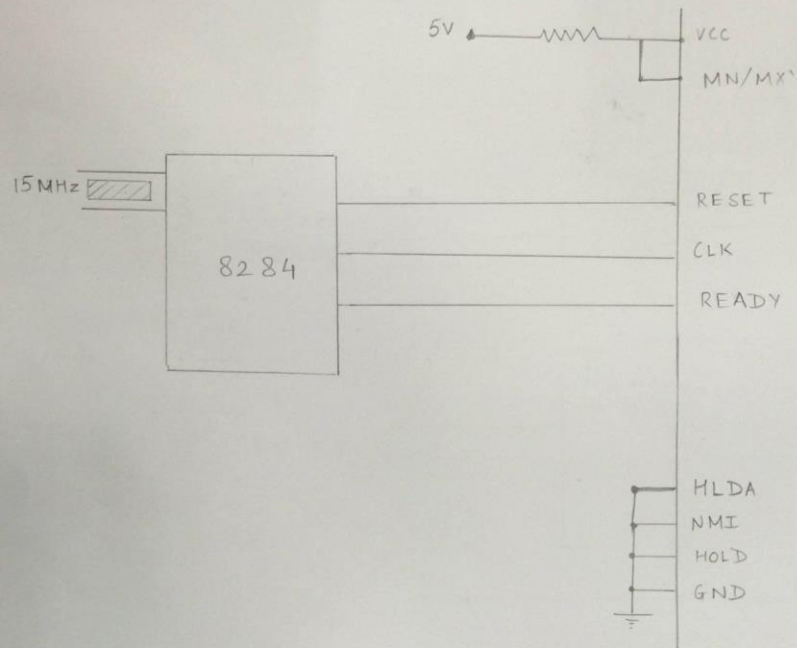
Logic circuit



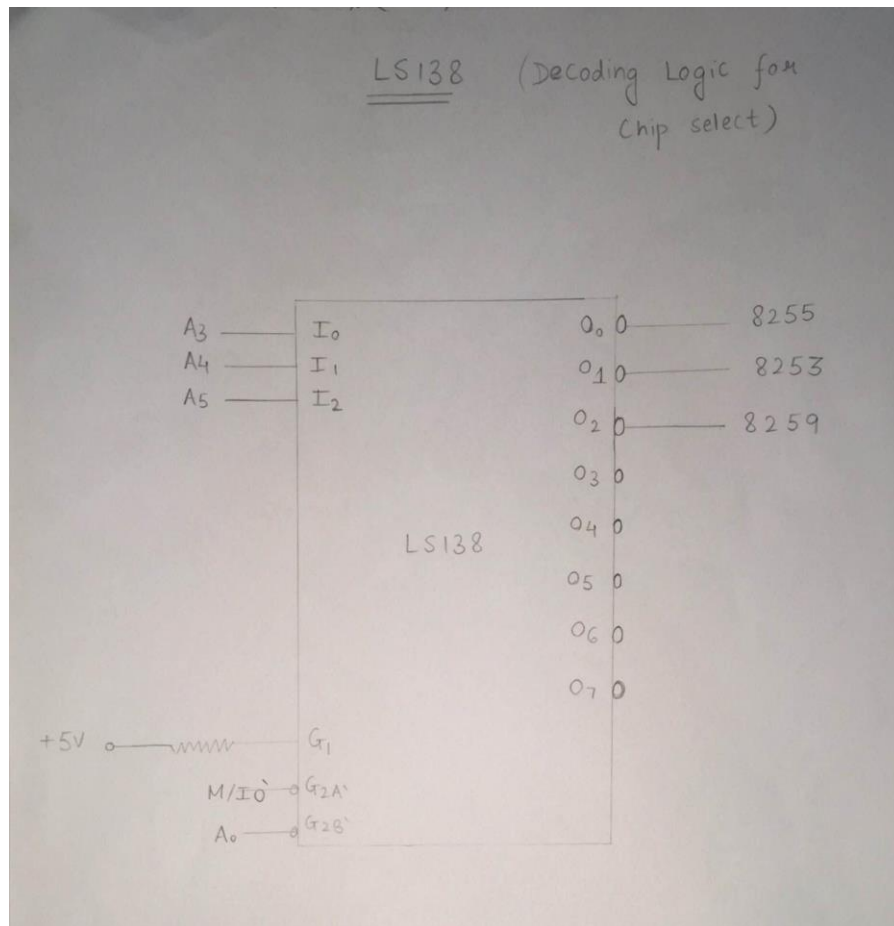
$M/I\bar{O}$	RD	WR	Bus cycle
1	0	1	$MEMR$
1	1	0	$MEMW$
0	0	1	IOR
0	1	0	IOW

4. 8086 Inputs:

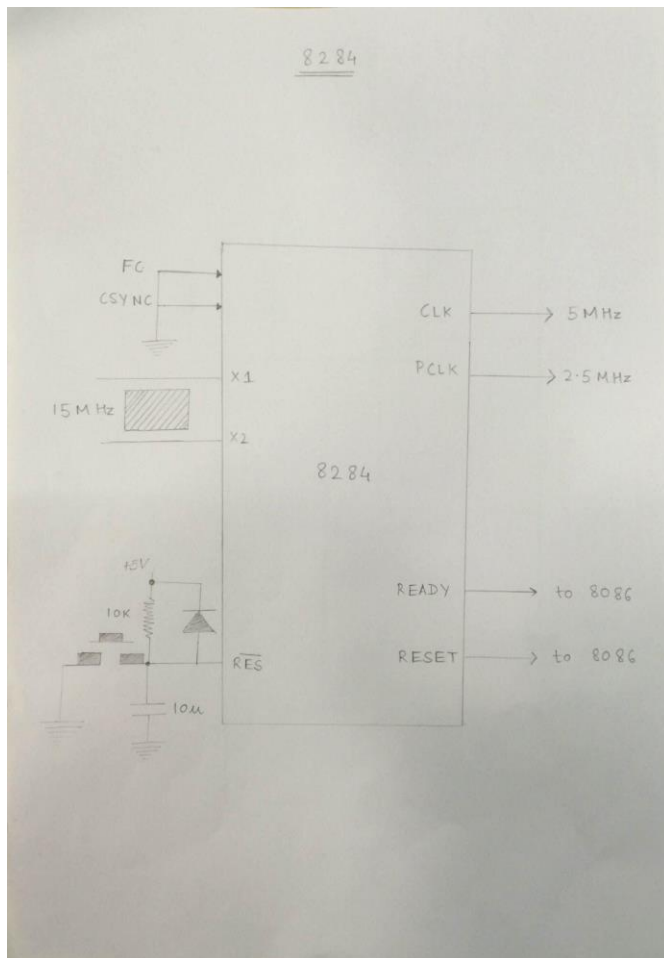
8086 Inputs



5. LS138 : (Chip Select Decoding Logic)

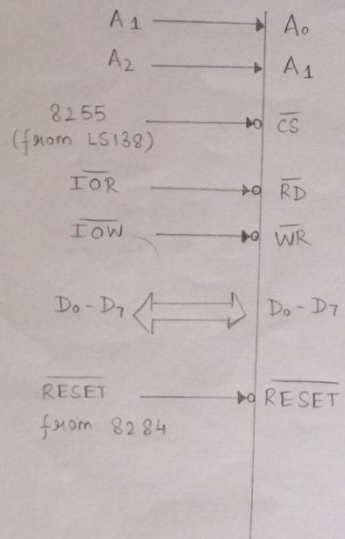


6. 8284: (Clock Generator)

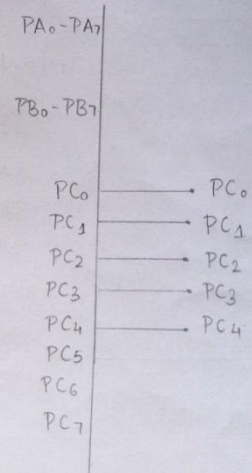


7. 8255:

8255

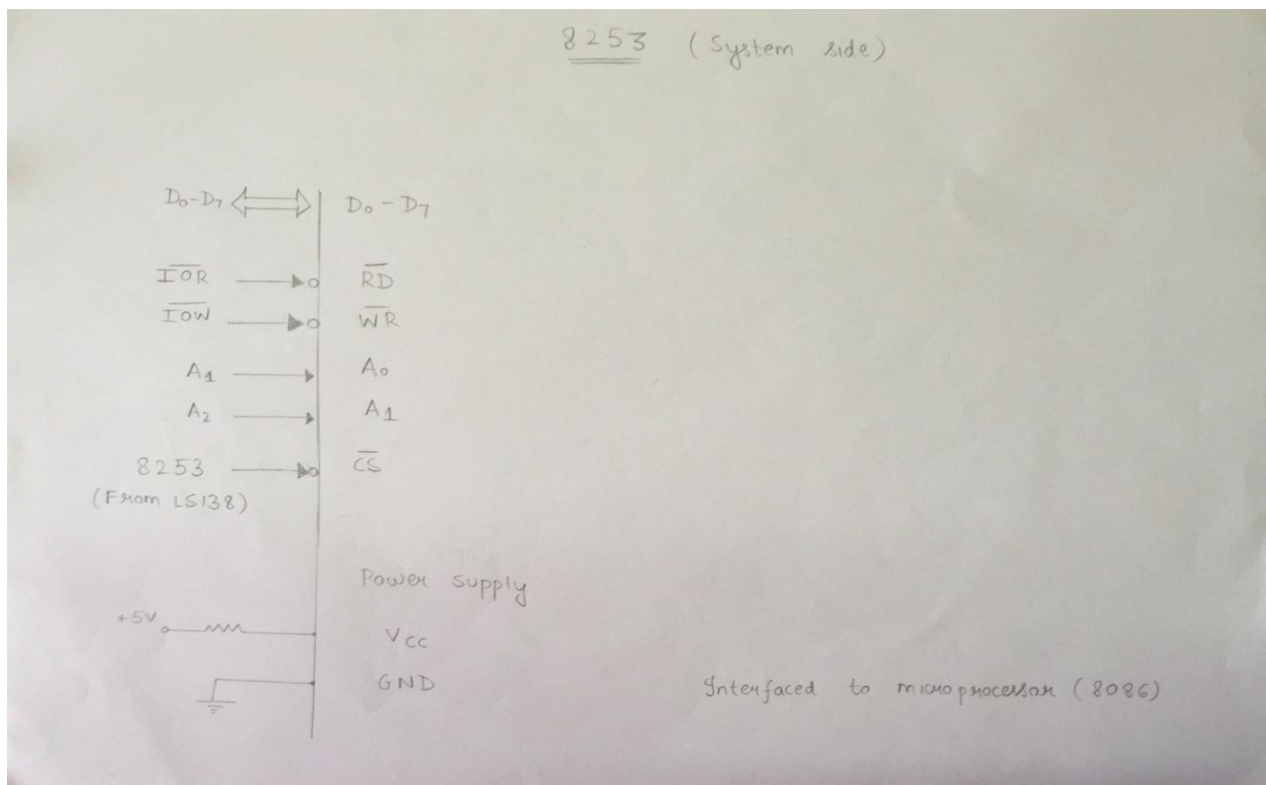
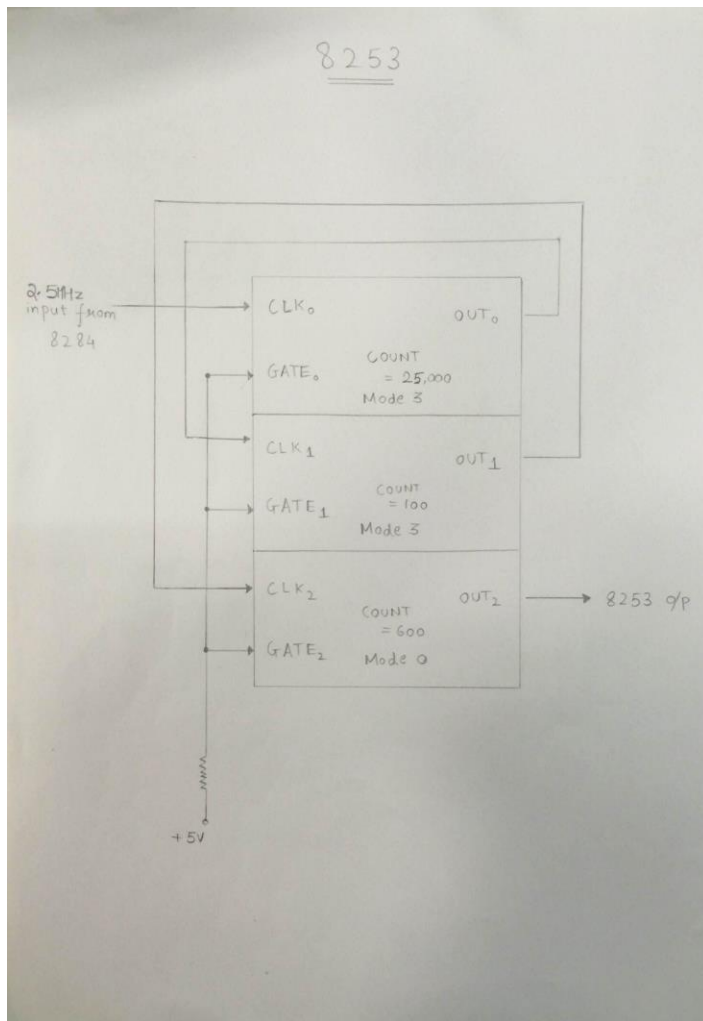


Interfaced with microprocessors (8086)

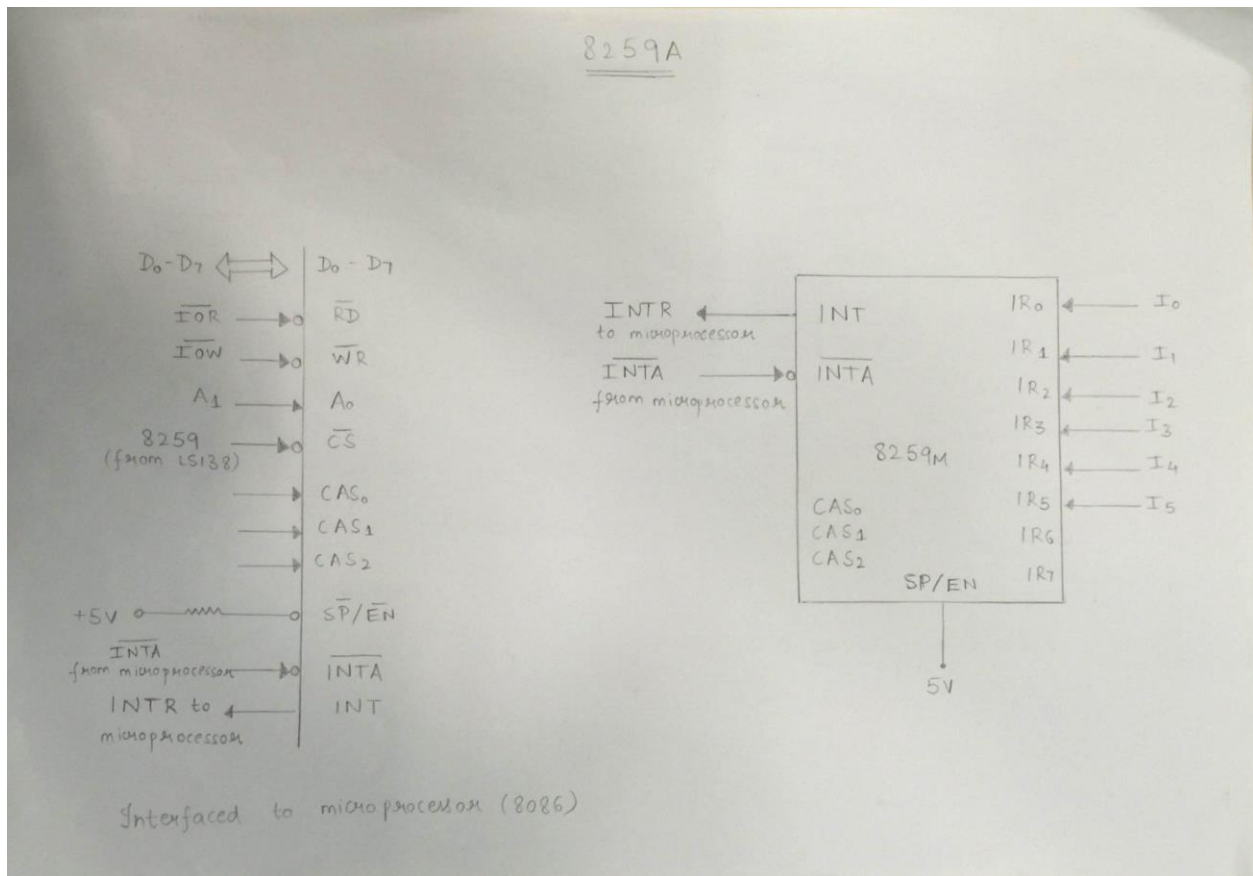


interfaced with voltage amplifier

8. 8253:



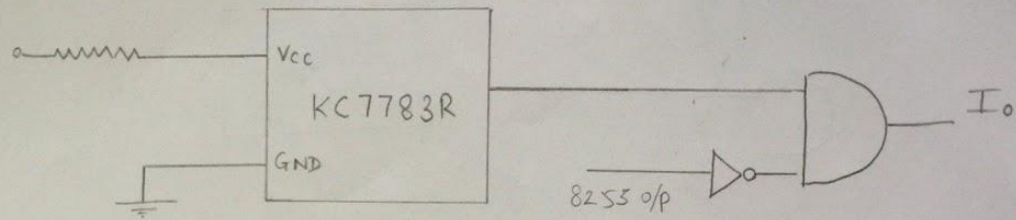
9. 8259A:



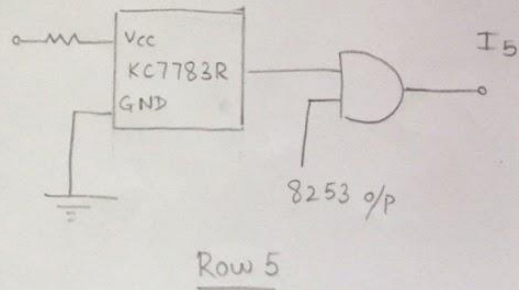
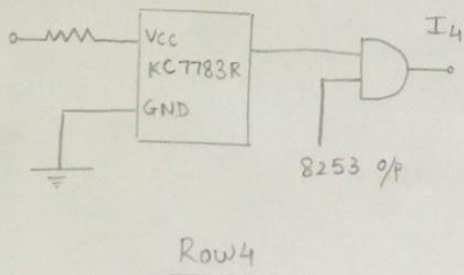
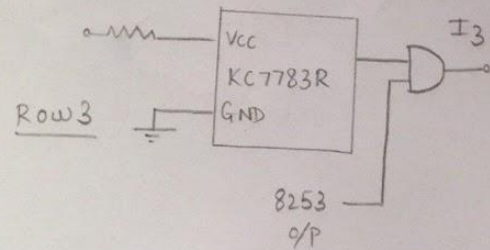
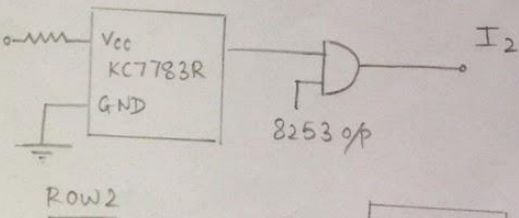
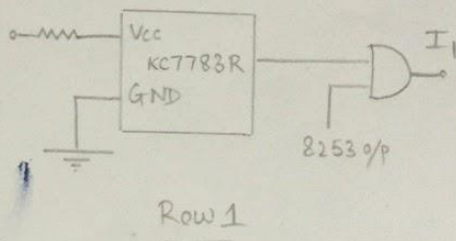
10. Sensors:

Sensors (KC7783R)

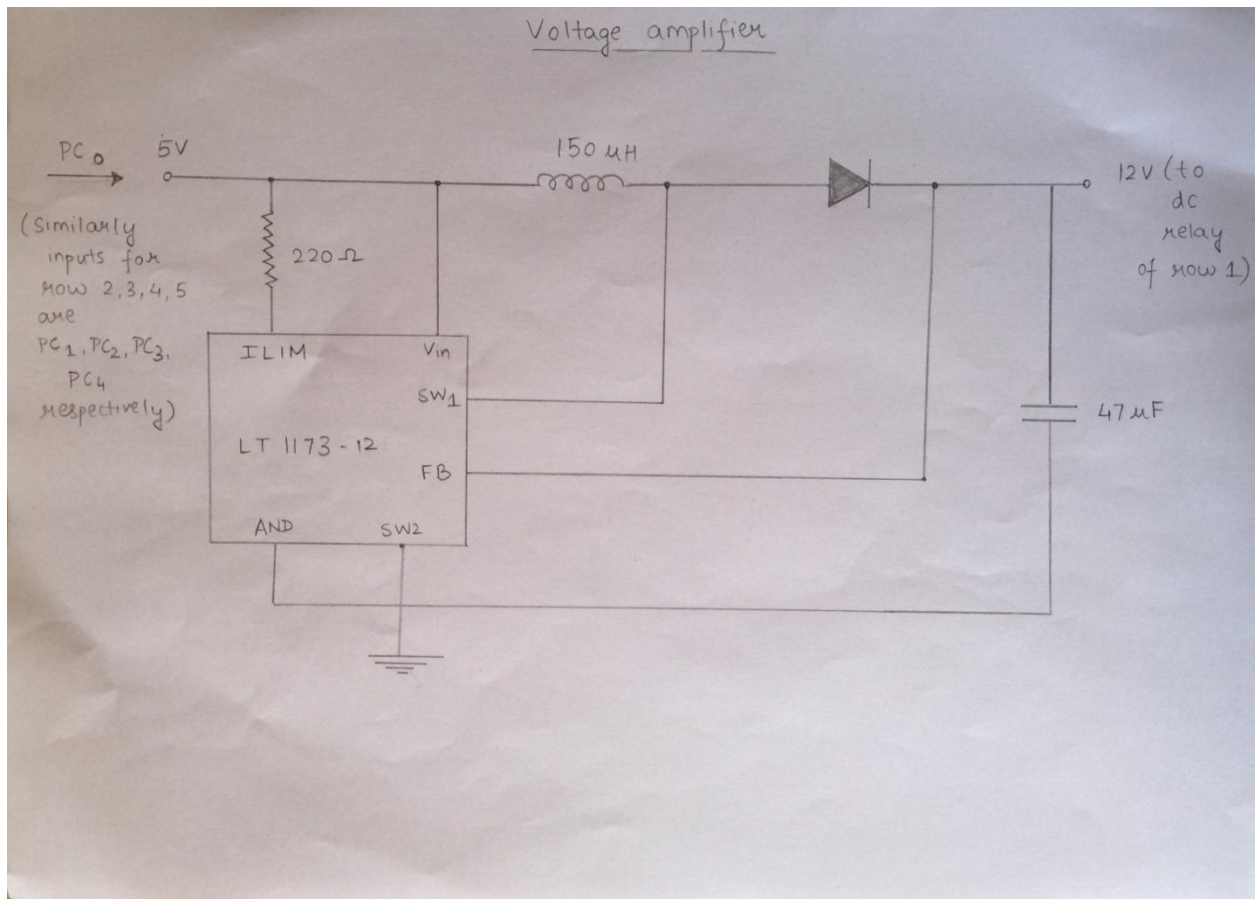
Master sensor:



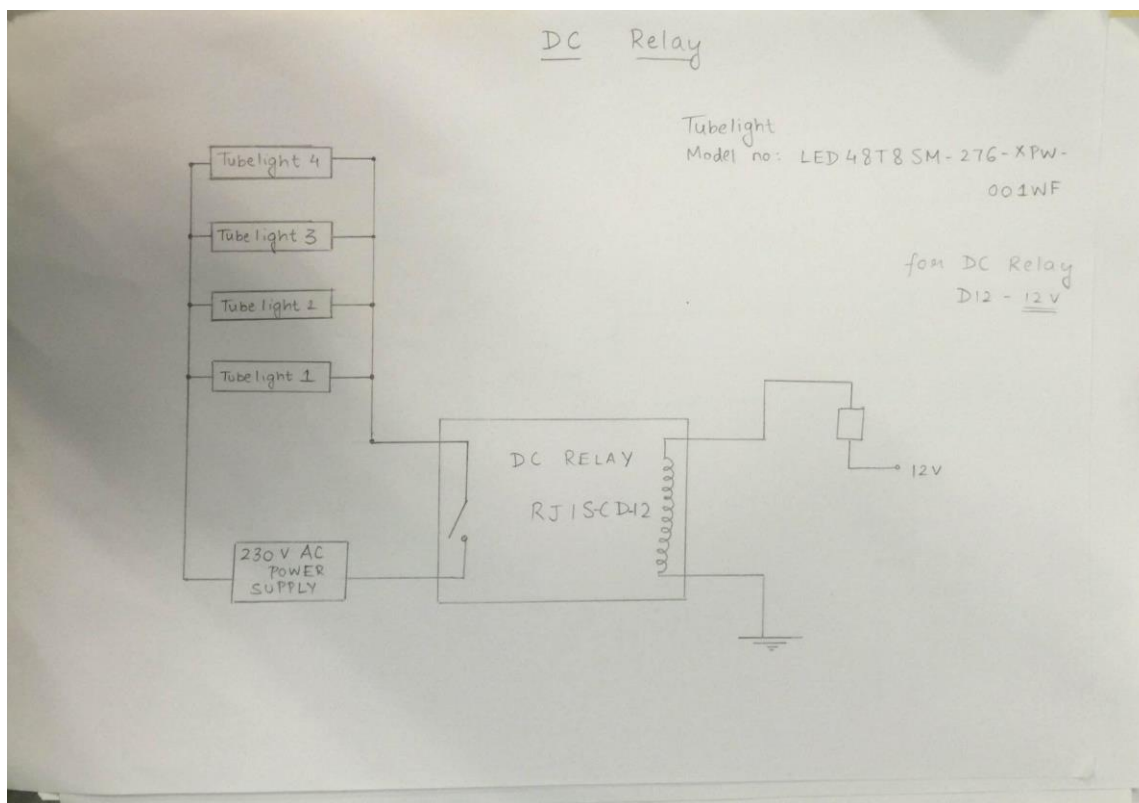
Entry point sensor



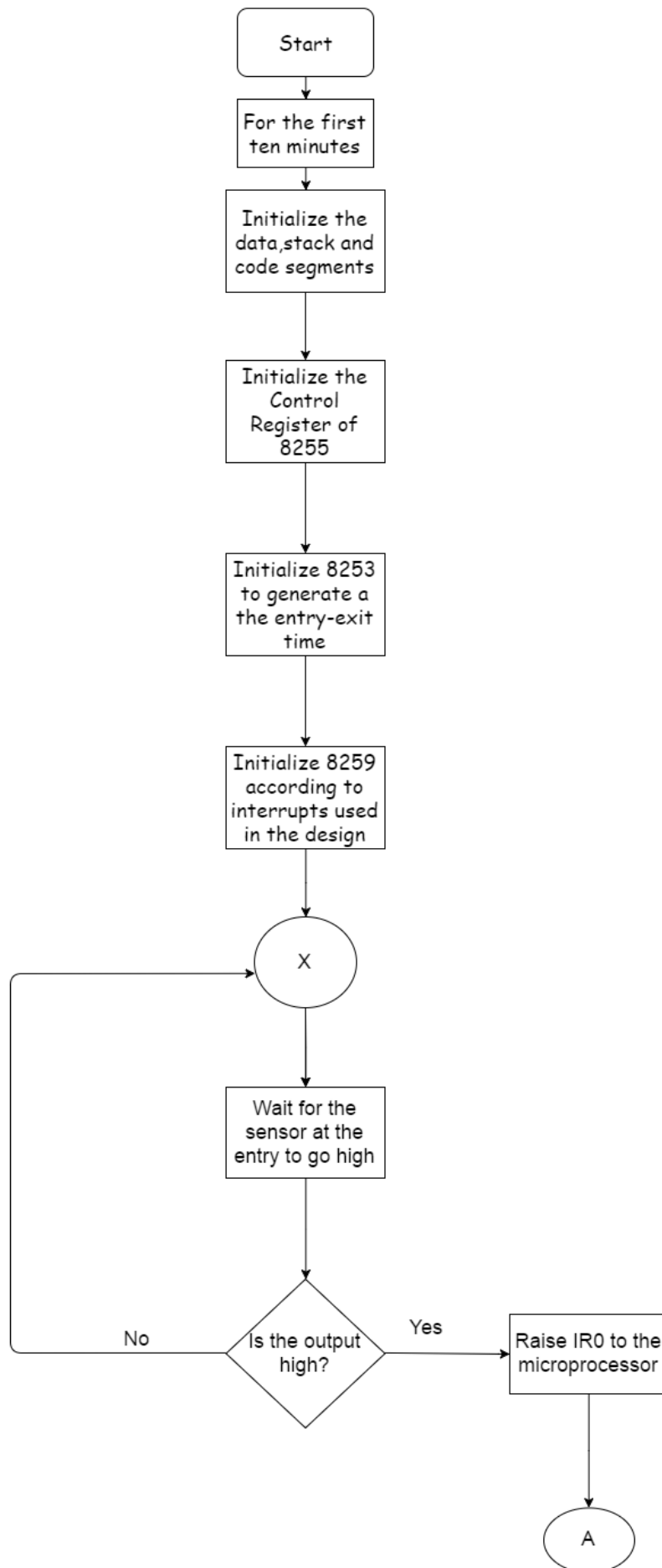
11. Voltage Amplifiers:

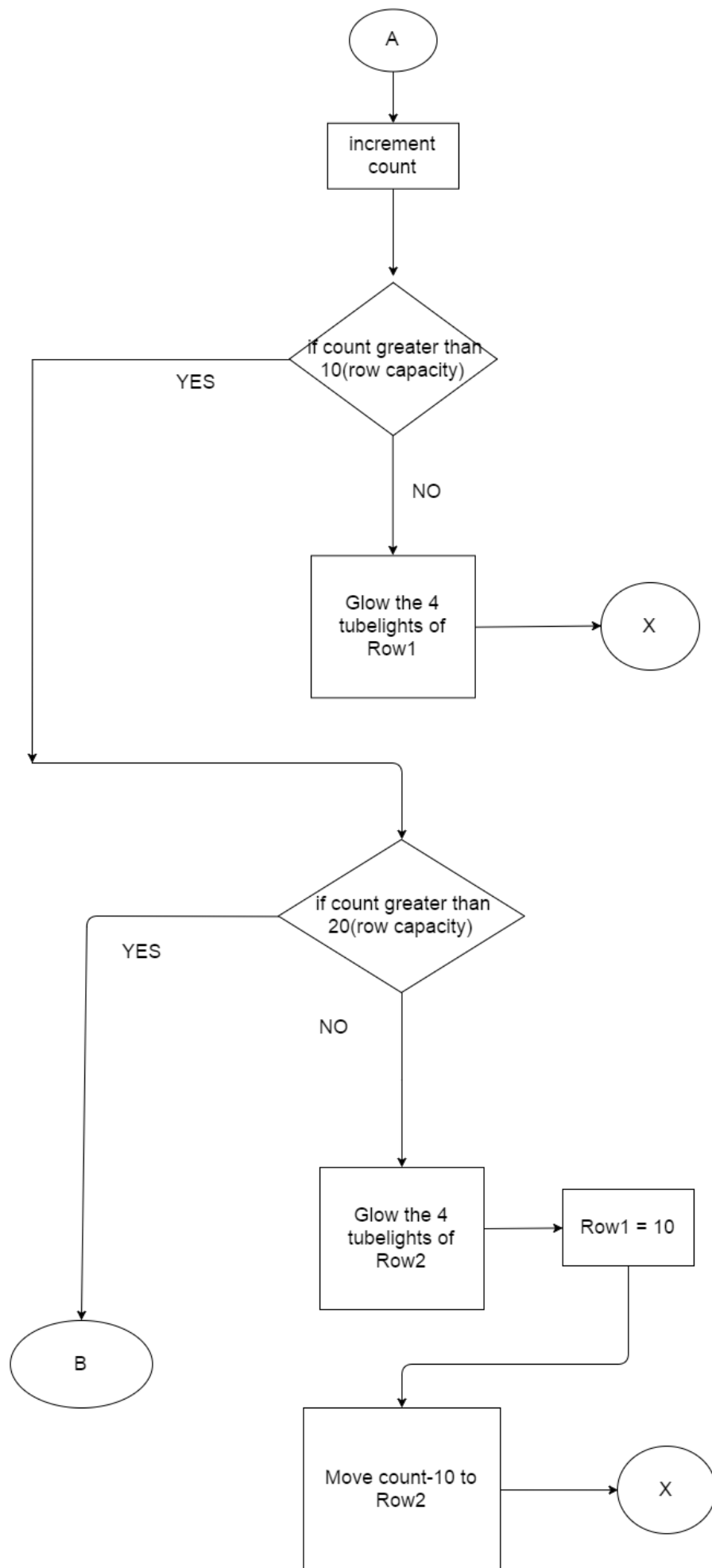


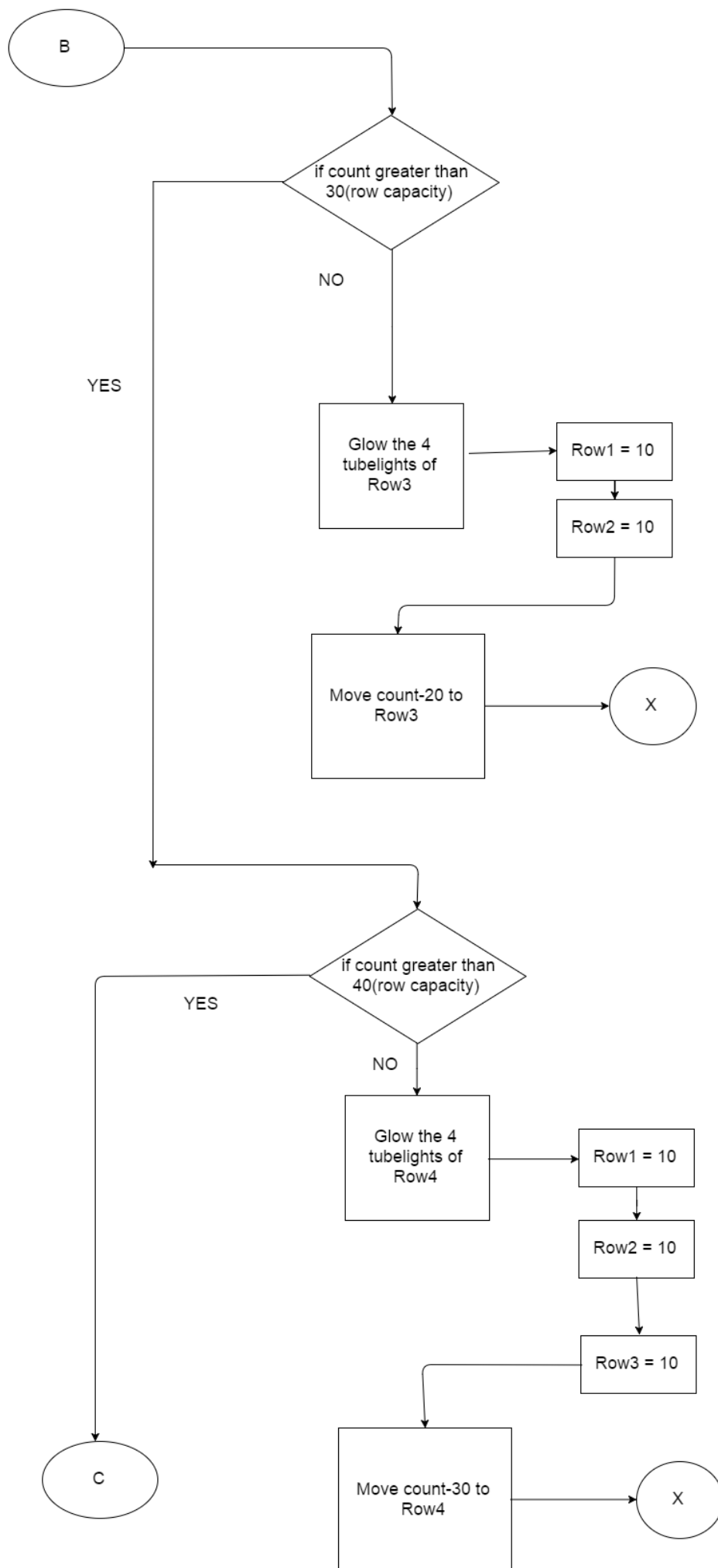
12. DC Relay:

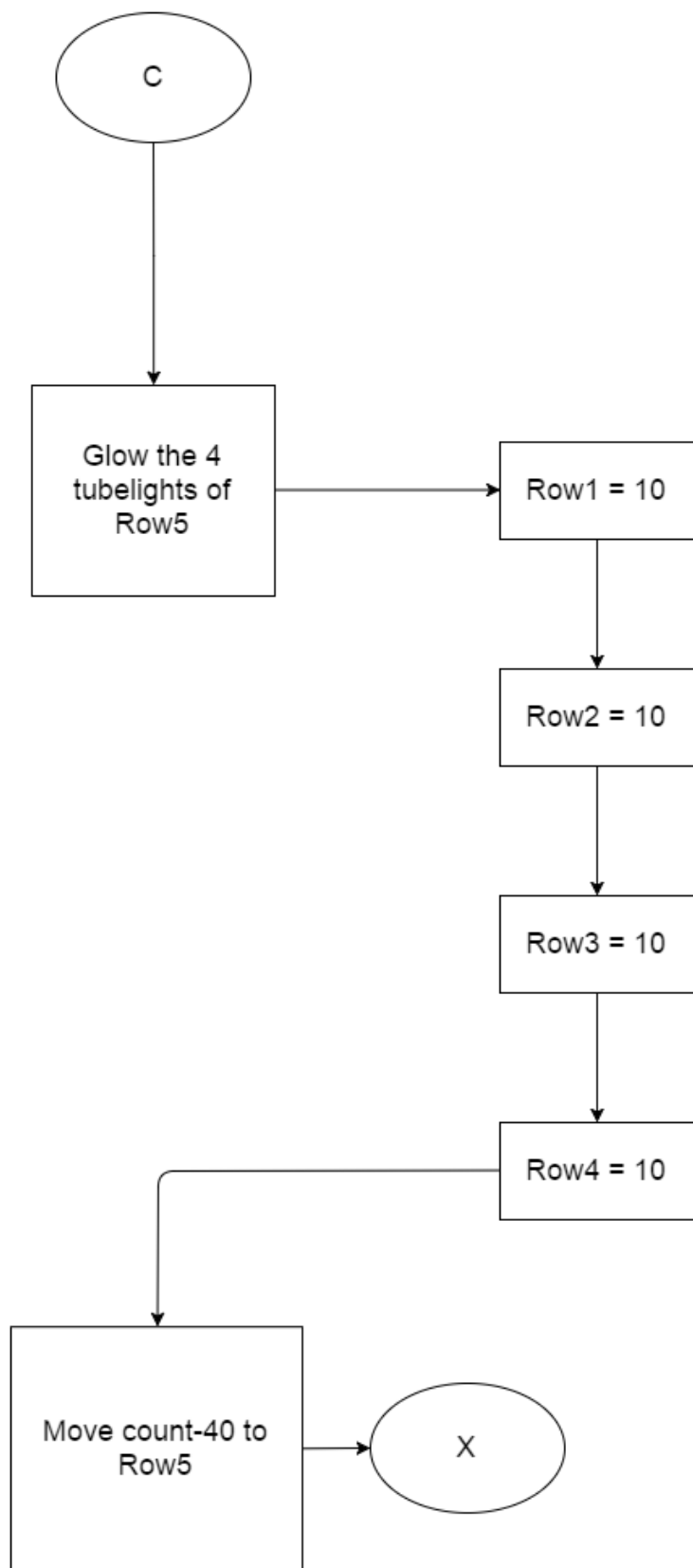


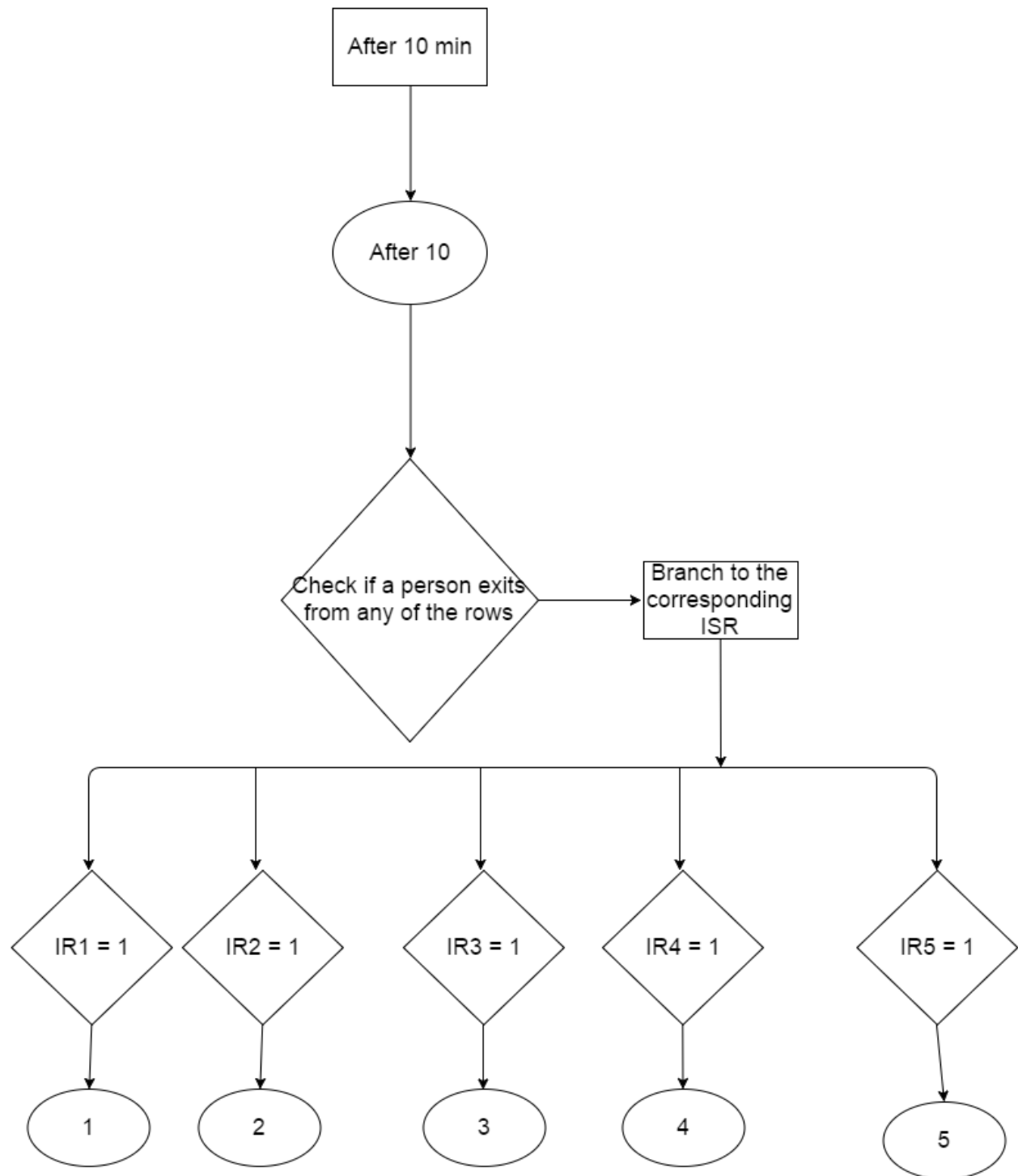
Software Flow-chart:

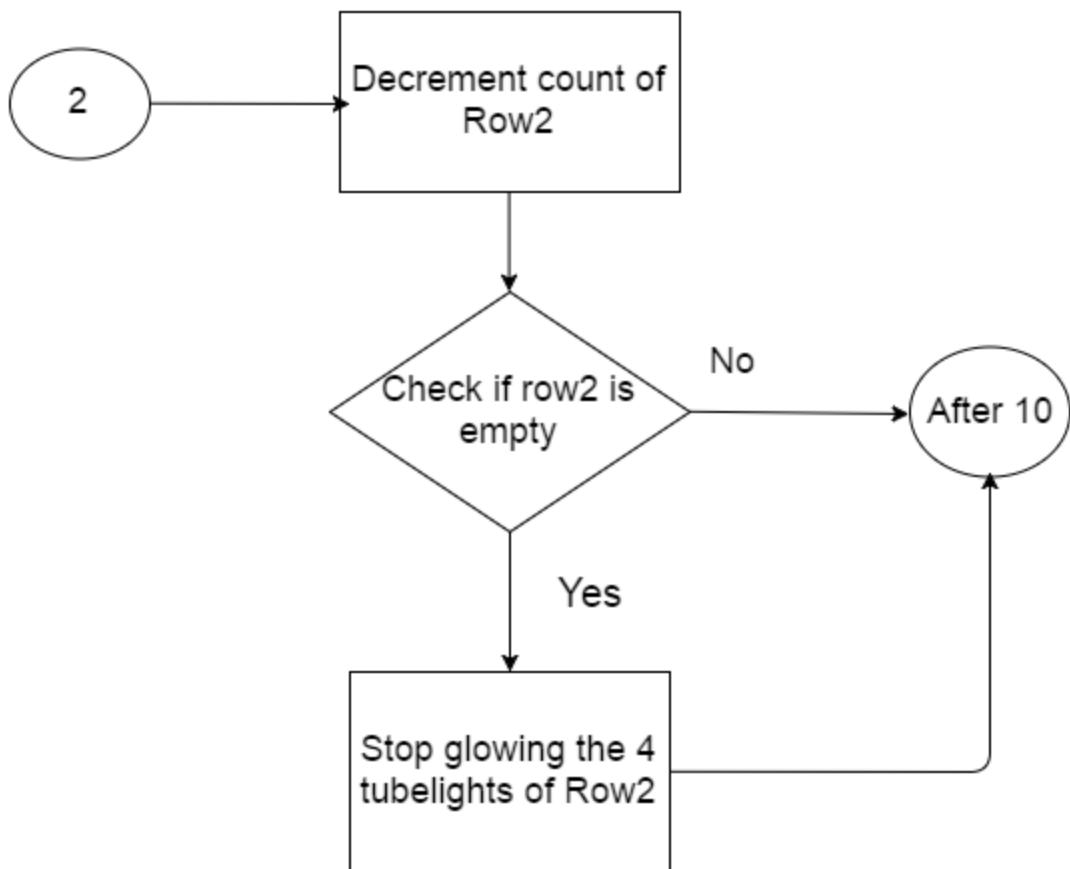
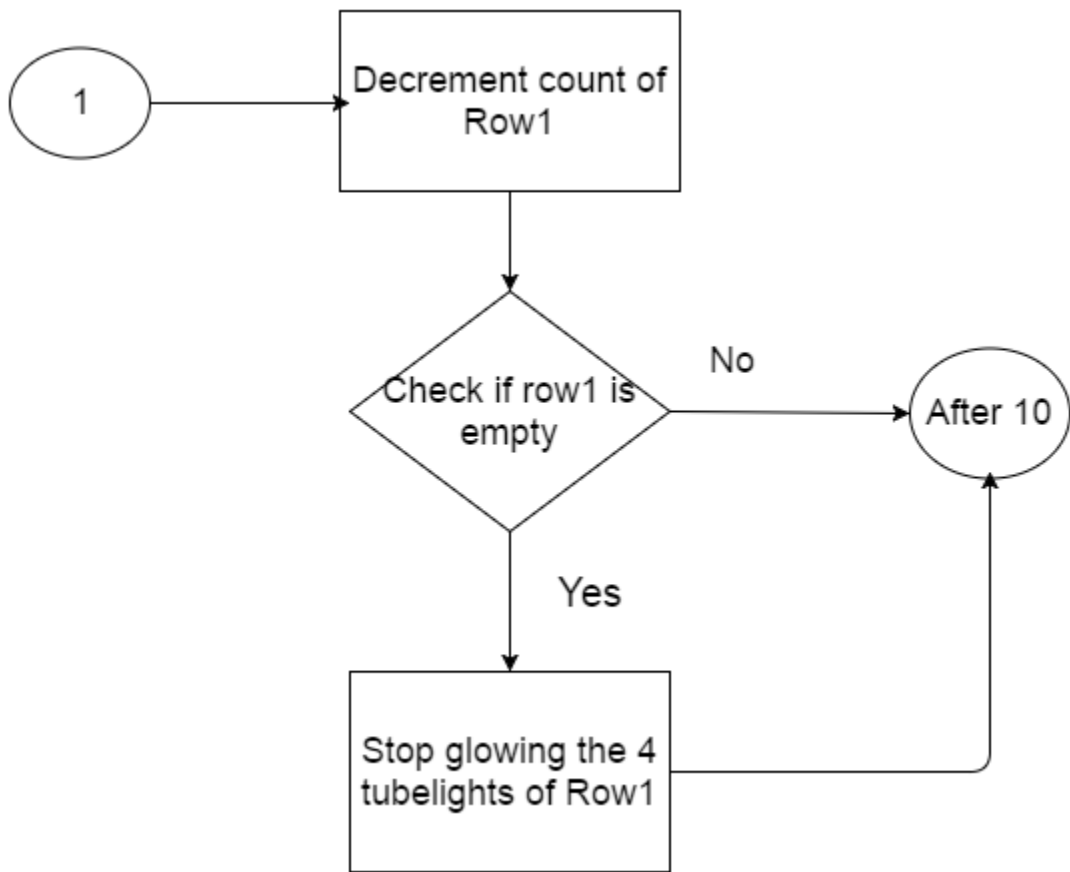


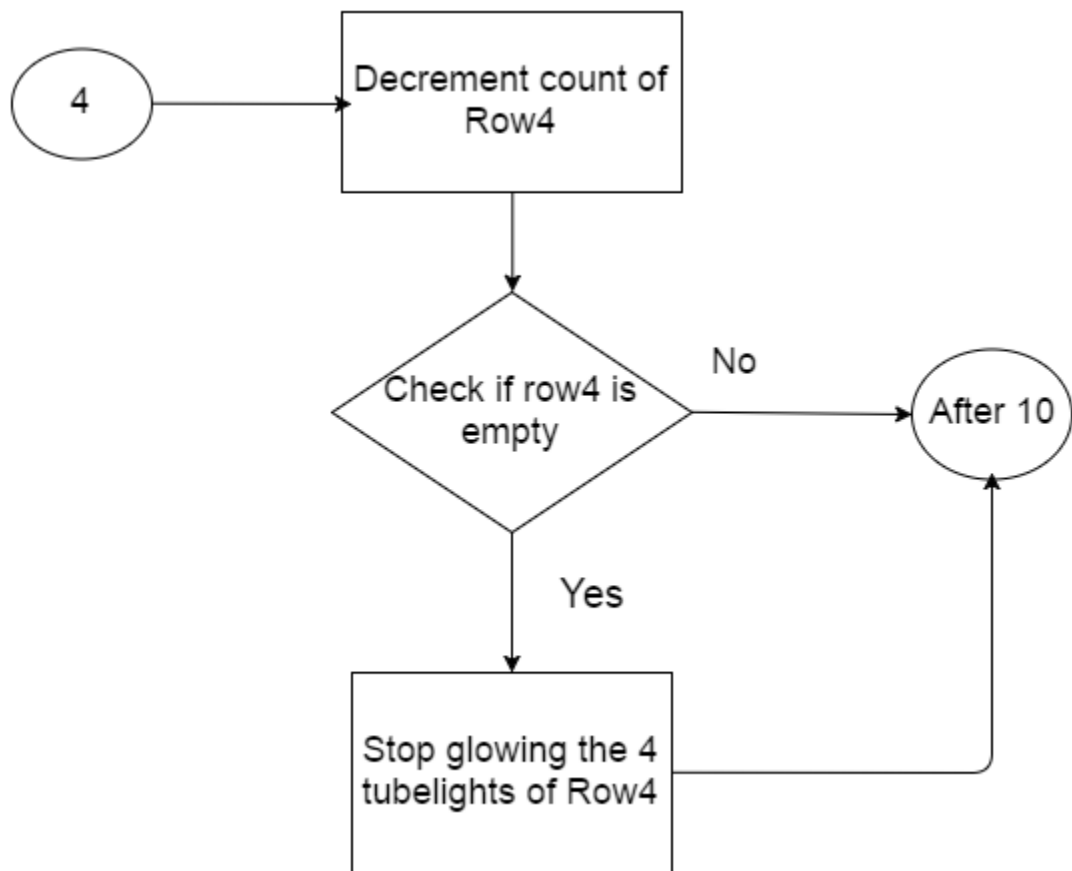
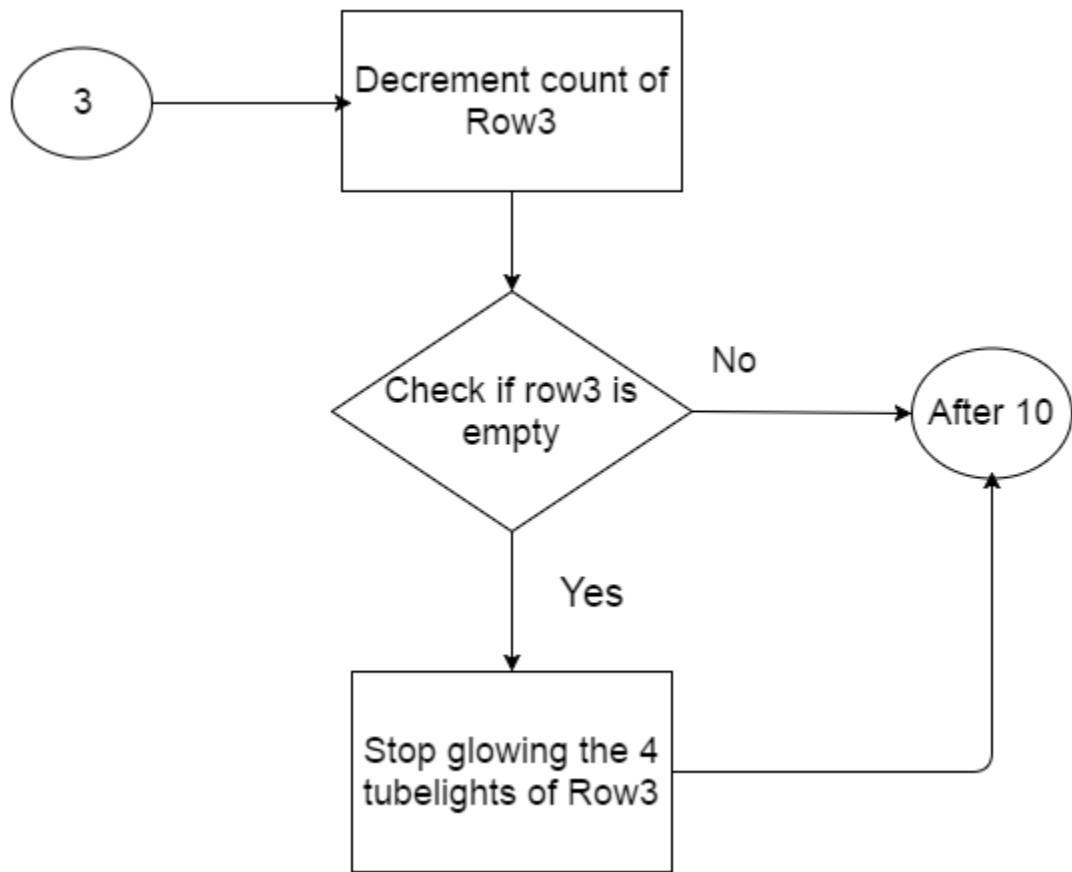


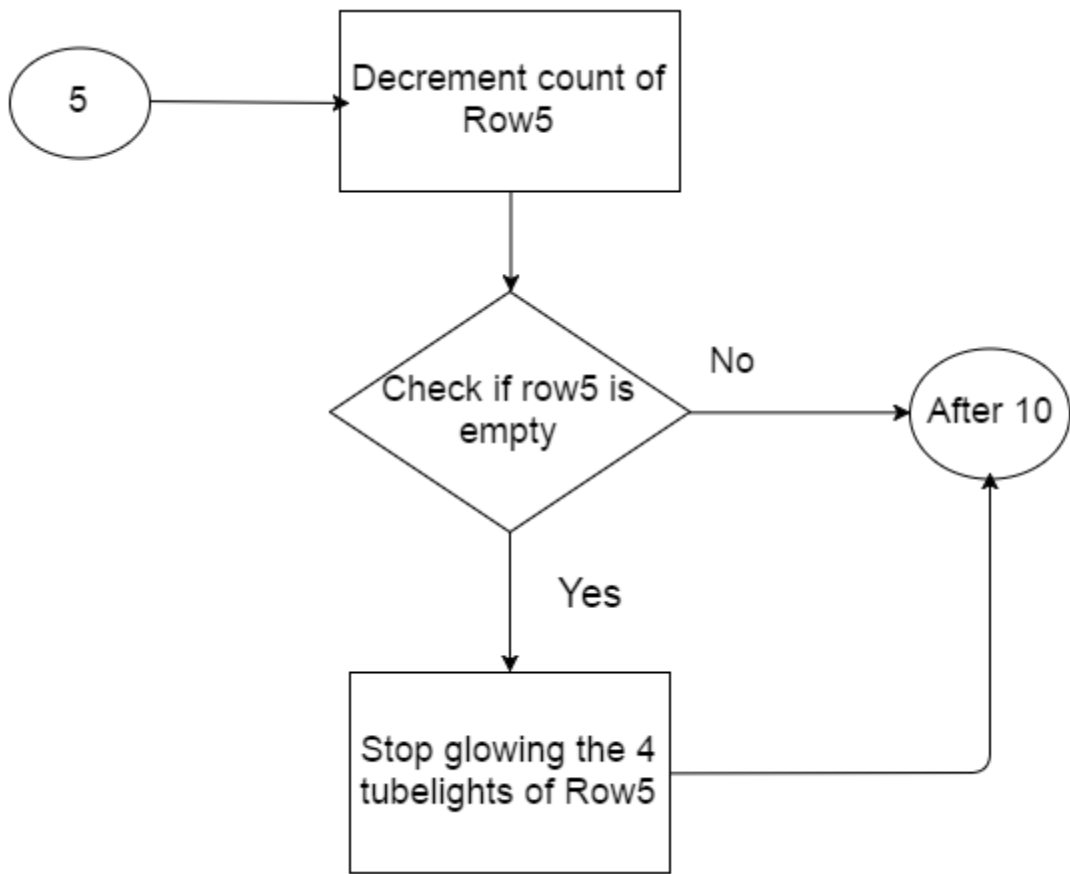












Code:

Attached in the zip file in Code Folder.

Name: finalex.asm

Design:

Attached in the zip file in Design Folder.

Name: finalex.dsn

References:

2016 Powerpoint Lecture Slides ,Anupama K.R. , EdX Course - Microprocessor Programming and Interfacing , viewed 22nd April, 2016.

www.alldatasheet.com , viewed 22nd April 2016.

www.datasheetarchive.com , viewed 22nd April 2016.