

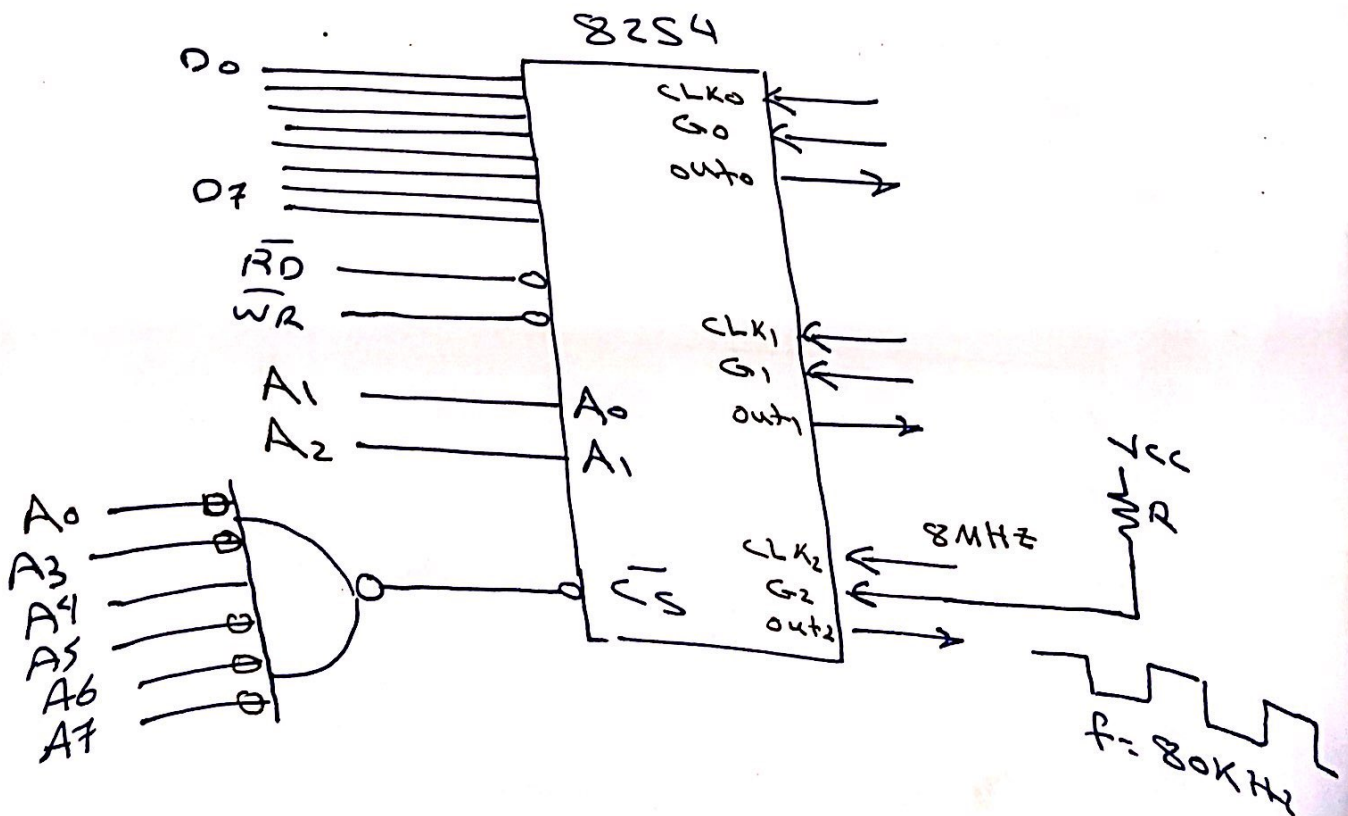
Q1 interface an 8254 to function at I/O Port addresses XX10H, XX12H, XX14H and XX16H, and write the Software that Program Counter 2 to generate an 80KHz square wave if the CLK input to counter is 8 MHz

8421

ans

		A ₁₅ A ₁₄ A ₁₃ A ₁₂	A ₁₁ A ₁₀ A ₉ A ₈	A ₇ A ₆ A ₅ A ₄	A ₃ A ₂ A ₁ A ₀
Counter 0	XX10H	X X X X	X X X X	0 0 0 1	0 0 0 0
Counter 1	XX12H	X X X X	X X X X	0 0 0 1	0 0 1 0
Counter 2	XX14H	X X X X	X X X X	0 0 0 1	0 1 0 0
Control	XX16H	X X X X	X X X X	0 0 0 1	0 1 1 0

∴ Square wave ∴ G₂=1



$$\text{Count} = \frac{f_{in}}{f_{out}} = \frac{8 \text{ MHz}}{80 \text{ KHz}} = \frac{8000 \cancel{\text{K}}}{80 \cancel{\text{K}}}$$

Count = 100

SC ₁	SC ₀	RW ₁	RW ₀	M ₂	M ₁	M ₀	BCD
-----------------	-----------------	-----------------	-----------------	----------------	----------------	----------------	-----

Control = 10010110 = 96H

```
MOV AL, 96H
OUT 16H, AL

MOV AL, 100H
OUT 14H, AL

HLT
```

$\Delta = \dot{\psi} \times b$

```
if count > 255
```

RW, RW.

two byte

[illegible]

Q13 By using 8254 PPS Program Counter
for generating 10KHz square wave if
The count 1000Bcd find the frequency
input and Design the circuit with
start address 60H, then write the
required instruction?

ans

$$f_{out} = 10 \text{ KHz}$$

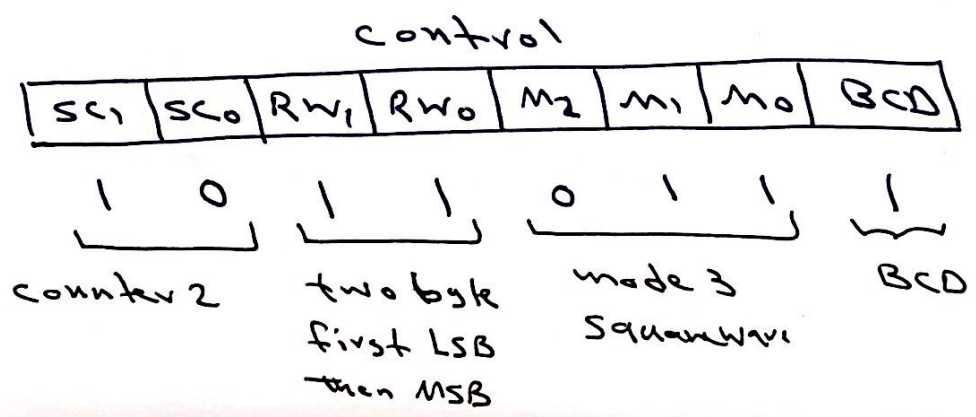
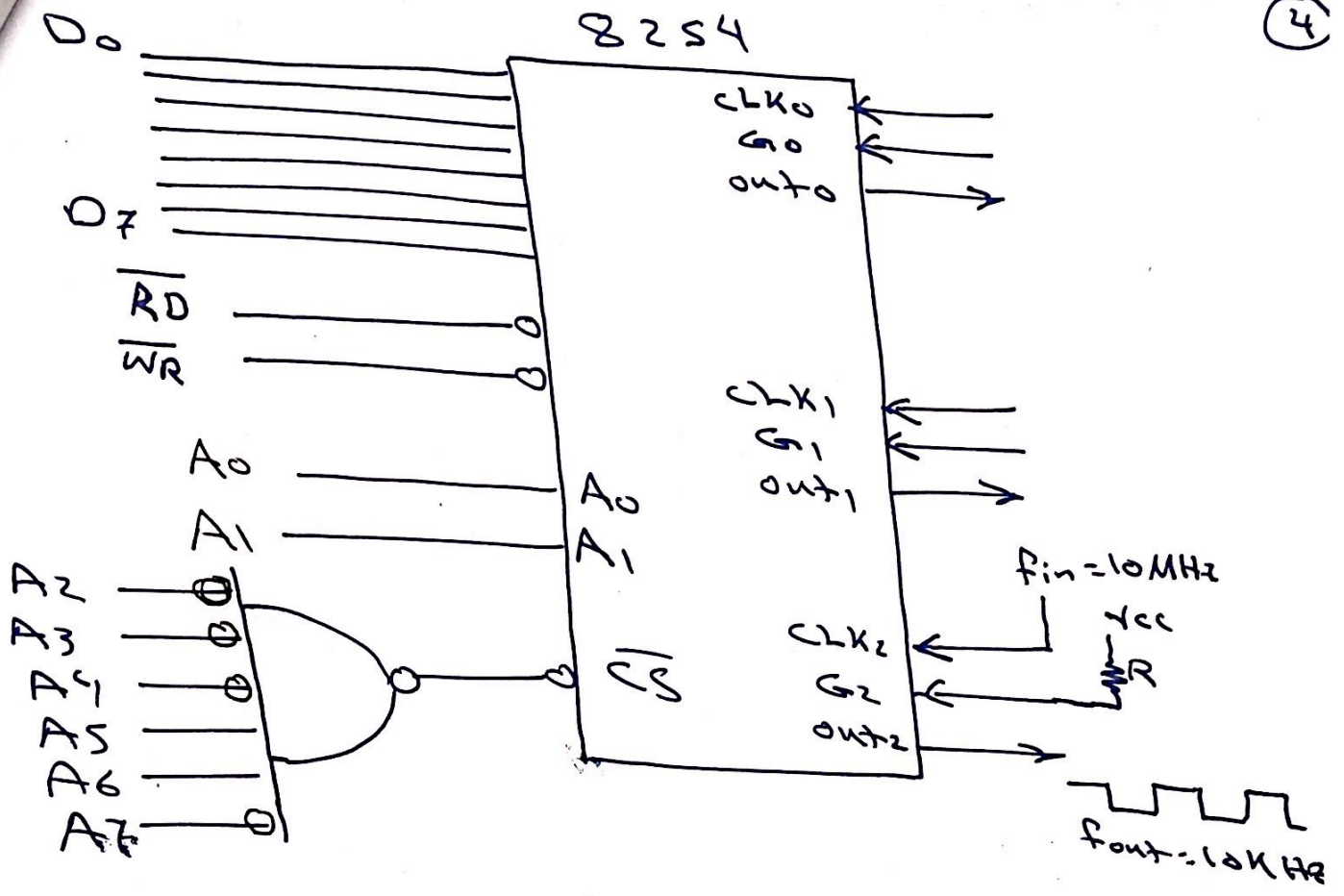
$$\text{count} = N = (1000)_{BCD}$$

$$\text{count} = \frac{f_{input}}{f_{out}}$$

$$\begin{aligned} f_{input} &= \text{count} \times f_{out} \\ &= N \times f_{out} \\ &= 1000 \times 10 \text{ KHz} \\ &= 10 \text{ MHz} \end{aligned}$$

∴ start address 60H

		A ₇ A ₆ A ₅ A ₄	A ₃ A ₂ A ₁ A ₀
Counter 0	60H	0 1 1 0	0 0 0 0
Counter 1	61H	0 1 1 0	0 0 0 1
Counter 2	62H	0 1 1 0	0 0 1 0
Control	63H	0 1 1 0	0 0 1 1



∴ control is $\underbrace{1011}_B \underbrace{0111}_7 = B7H$

count = $(\underline{10} \underline{00})_{BCD}$

↓ ↓
 MSB LSB

⑤

MOV AL, B7H

OUT 63H, AL

MOV AL, 00

OUT 62H, AL

MOV AL, 10

OUT 62H, AL

HLT



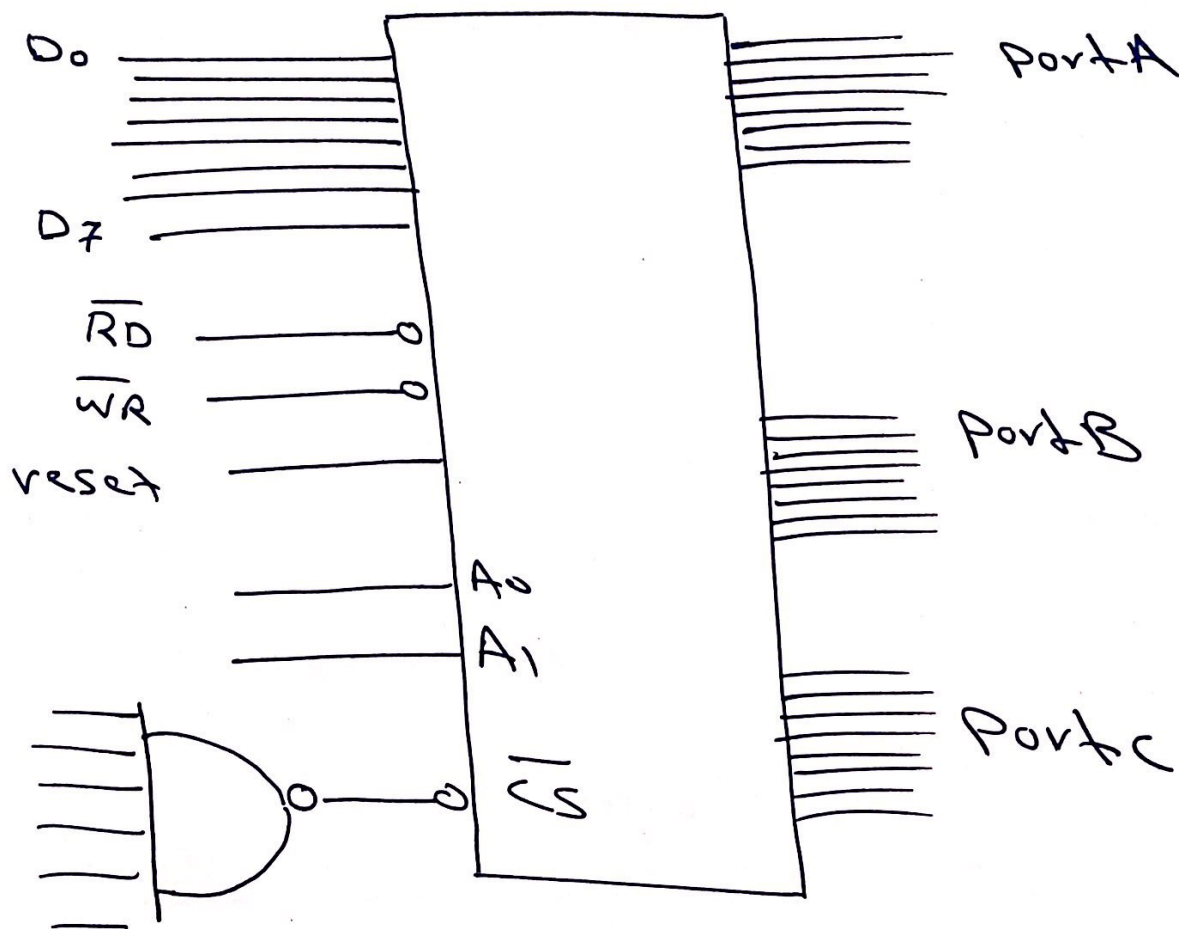
Note

if rate generator continuous Puls

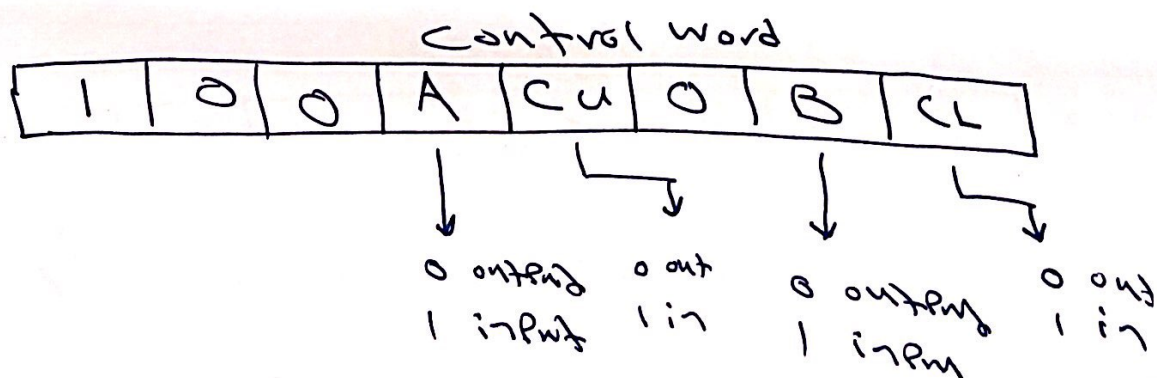
∴ Continuous Pulses ∴ mode 2

8255 PPI

6



	A ₁	A ₀
Port A	0	0
Port B	0	1
Port C	1	0
Control	1	1



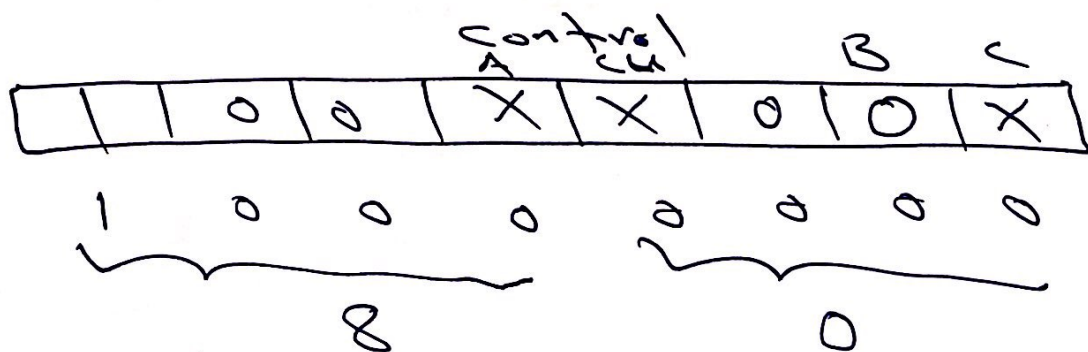
Q2 Stepper motor interface with 8255 PPI (7)
answer the following

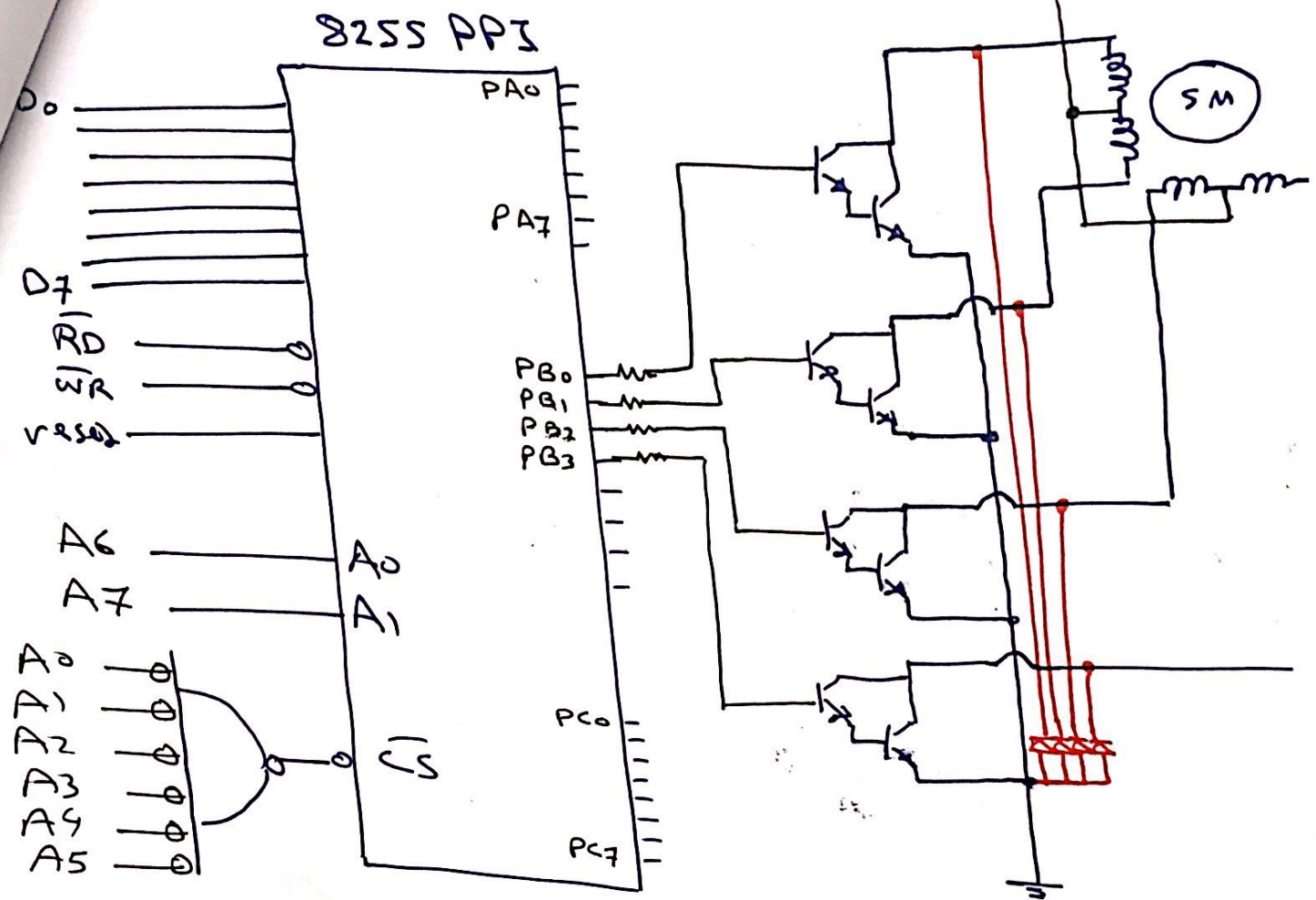
- ① Find Port address if A_5-A_0 connected to chipselect pin.
- ② Design the interfacing circuit if the motor interfaced with Port B
- ③ Write the required instruction for rotating motor counter clockwise if $NT=100$, motor speed = 12 RPM and CPU frequency = 1 MHz

ans

		$A_7 A_6$	$A_5 A_4$	$A_3 A_2 A_1 A_0$
Port A	00	1 0	0 0	0 0 0 0
Port B	40	1 0	1 0	0 0 0 0
Port C	80	1 0	1 0	0 0 0 0
Control	C0	1 1	1 0	0 0 0 0

Stepper motor output on Port B





no. of teeth = $NT = 100$

motor speed = 12 R.P.M

$$\frac{12}{60} = \frac{1}{5} \text{ rotation/sec}$$

$\therefore 5 \text{ sec for each rotation}$

$$\frac{5 \text{ sec}}{NT} = \frac{5 \text{ sec}}{100} = 0.05 \text{ sec}$$

$\therefore \text{CLK } 1 \text{ MHz}$

$$\text{Period} = \frac{1}{f} = \frac{1}{1 \text{ M}} = 1 \mu\text{sec}$$

loop need 17 clock

$$\therefore \text{loop need } 17 \times 1 \mu = 17 \mu\text{sec}$$

$$\frac{0.05 \text{ sec}}{17 \mu\text{sec}} = \frac{0.05}{17 \times 10^{-6}} = 2941.17 \approx 2941$$

$$\frac{360^\circ}{100} = 3.6^\circ$$

$$\frac{360^\circ}{3.6^\circ} = 100$$

MOV AL, 80H

OUT COH, AL

MOV BL, 100

MOV AL, 33H

back: OUT 40H, AL

ROL AL, 1

MOV CX, 2941

self: loop self

DEC BL

JNZ back

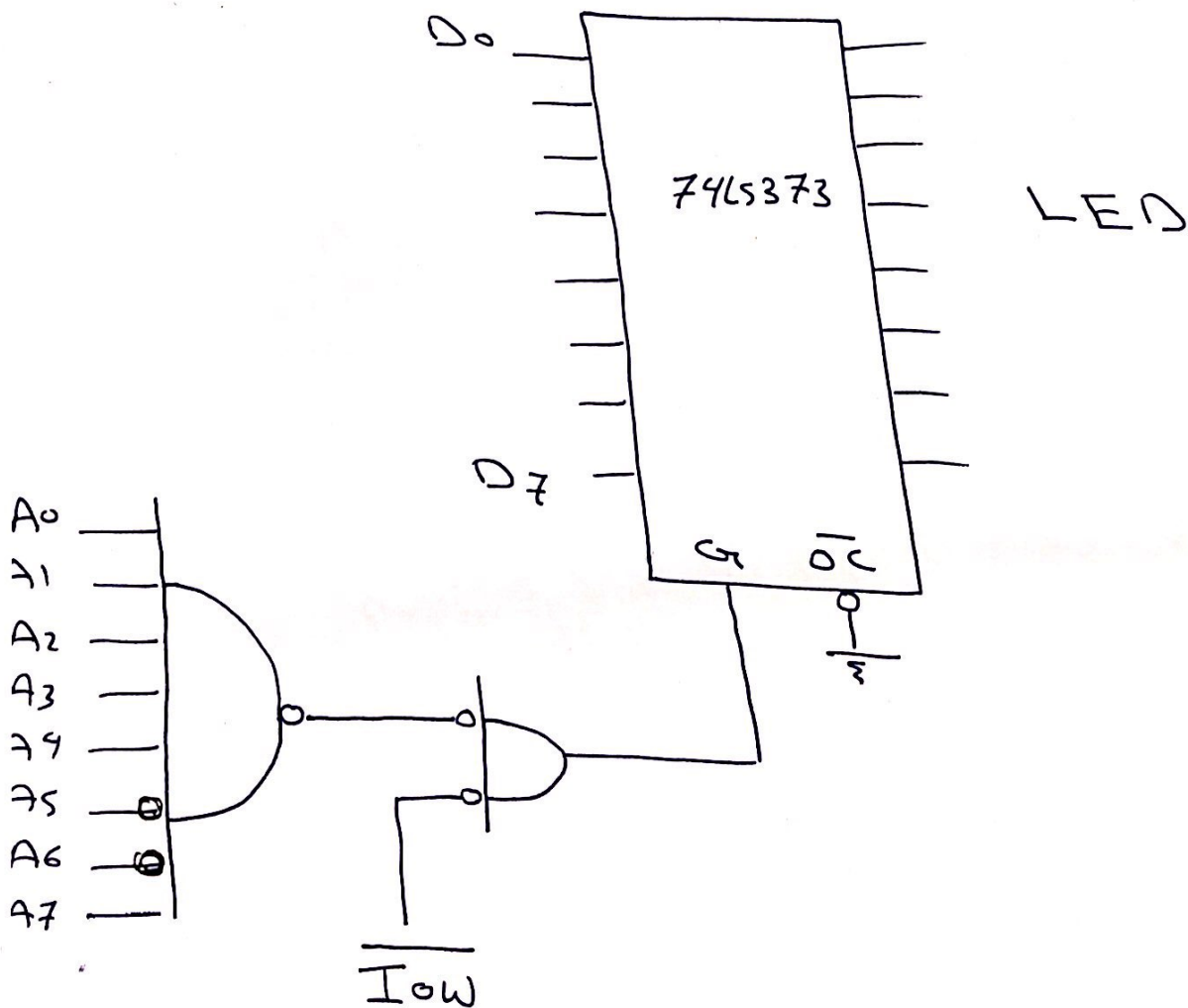
HLT

Q₃ Show The Design of
OUT 9F₁₆ AL
by using 74LS373

ans

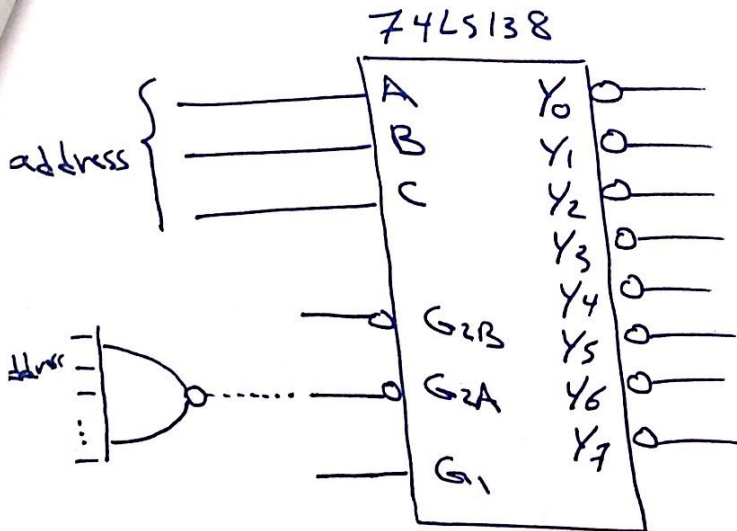
∴ Port no. 9F

A₇ A₆ A₅ A₄ A₃ A₂ A₁ A₀
1 0 0 1 1 1 1 1

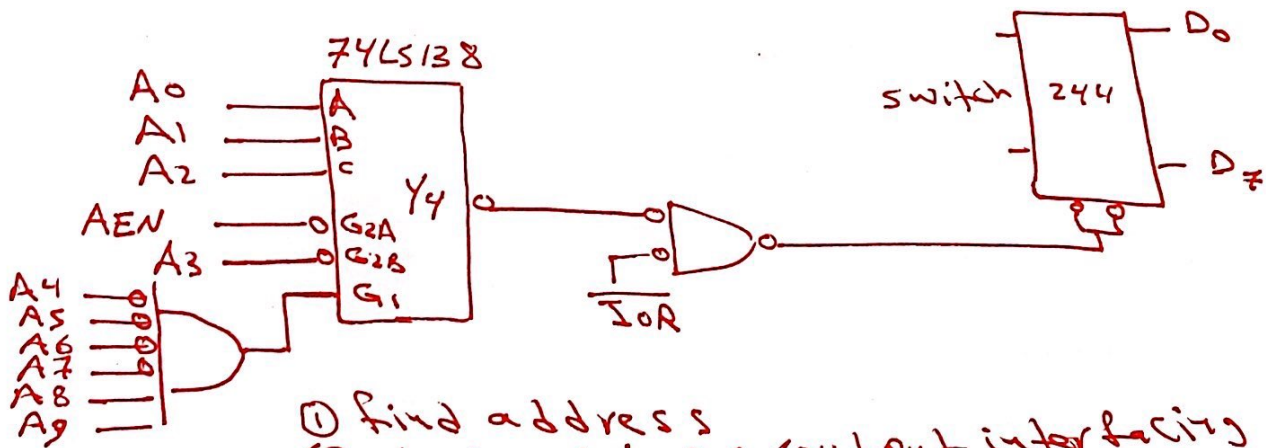


* decoder (3x8) Decoder 74LS138

(2)



Ex



- ① find address
- ② type of input/output interfacing
- ③ write instruction to read Data from its Port

ans = Y_4
C B A
A2 A1 A0
1 0 0

A3 = 0

A ₉ A ₈	A ₇ A ₆ A ₅ A ₄	A ₃ A ₂ A ₁ A ₀
1 1	0 0 0 0	0 1 0 0
3	0	4

① address is 304H

② ∴ switch ∴ IOR ∴ 244 ∴ input Port interfacing

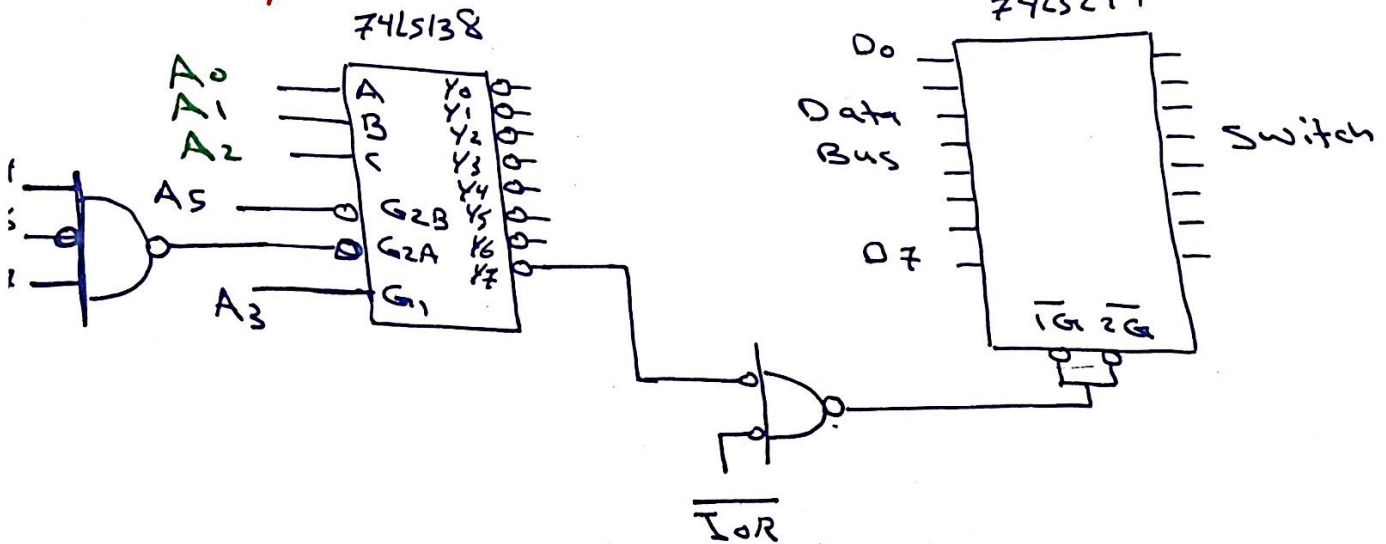
③ MOV DX, 304H
IN AL, DX

if port no. is 30H
IN AL, 30H

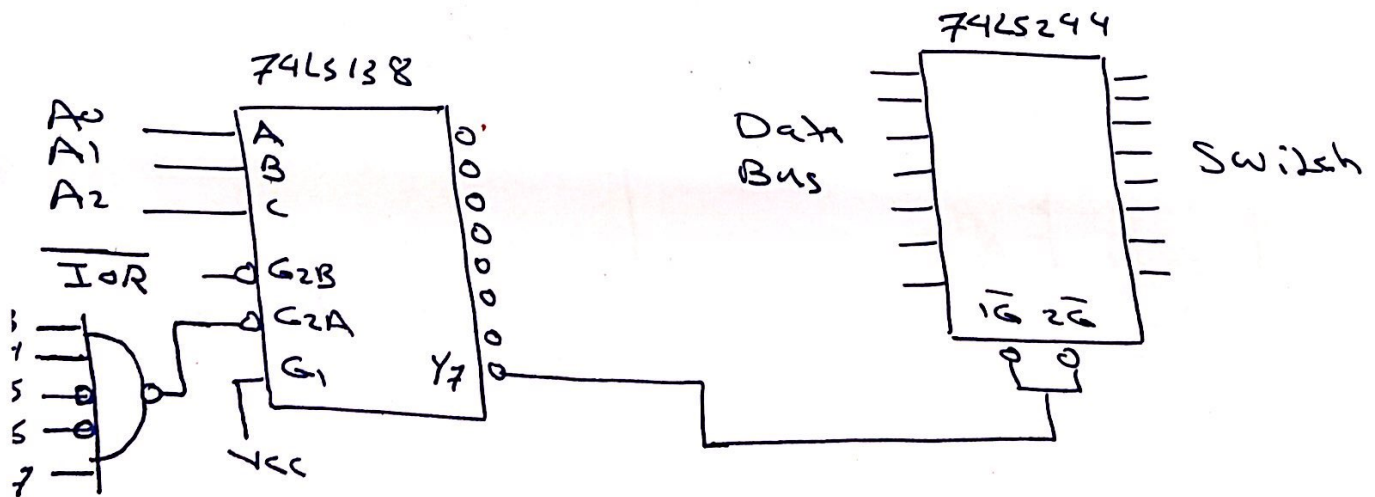
Q1 show the design of (IN AL, 9F) by using 74LS244, decoder, and NAND gate

ans
 $A_2 A_1 A_0$
 $1 \ 1 \ 1 \rightarrow Y_7$
 $\therefore$ Port no. 9FH

$A_7 A_6 A_5 A_4$ $A_3 A_2 A_1 A_0$
 $1 \ 0 \ 0 \ 1$ $1 \ 1 \ 1 \ 1$



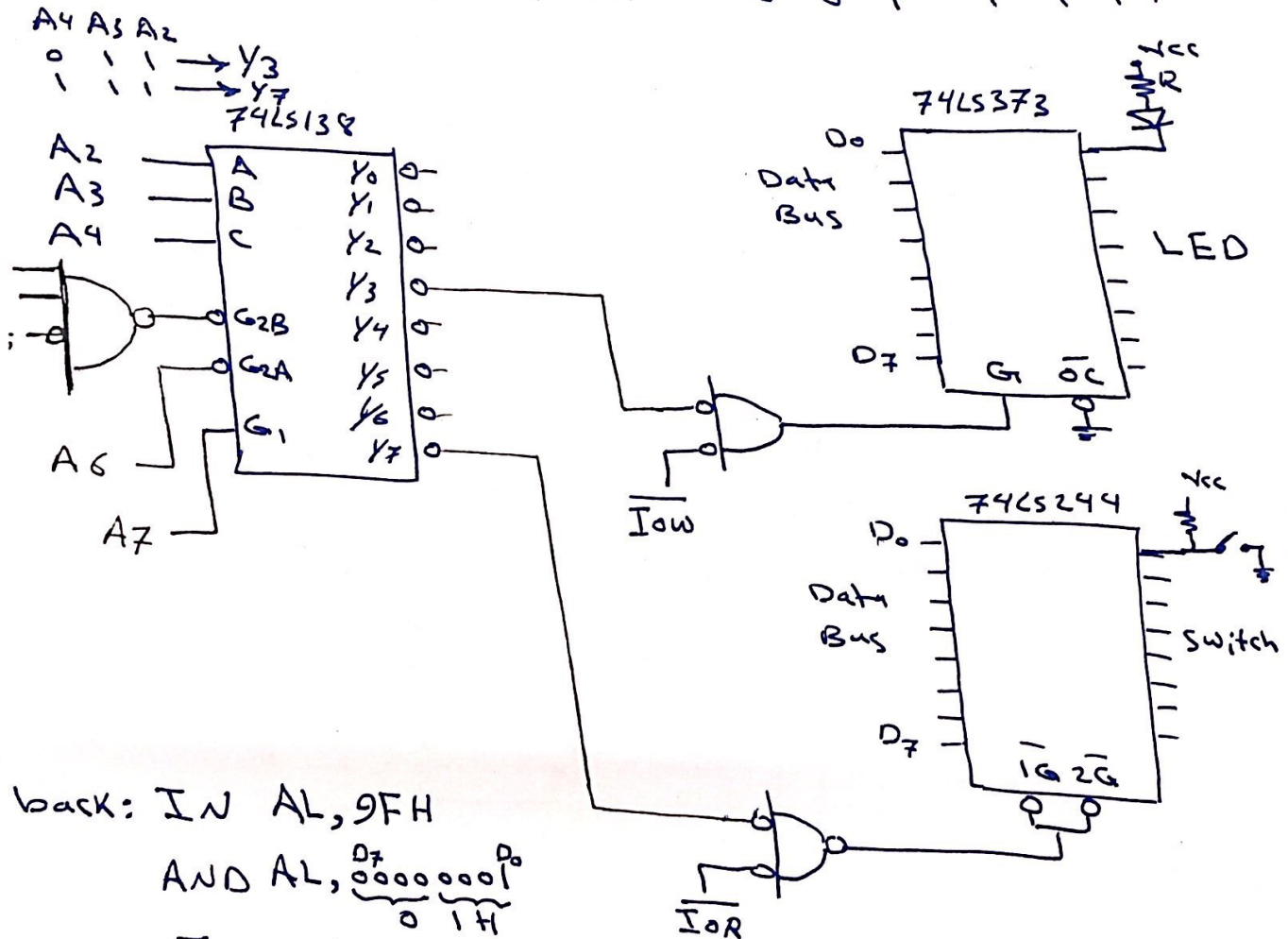
مشارك حل اخر



Q3 Design led blink controlled by switch by using decoder and NAND gate interfacing circuit with Port addressing (8FH and 9FH) then write the required instructions?

ans =

	A ₇	A ₆	A ₅	A ₄	A ₃	A ₂	A ₁	A ₀
led output Port 8FH	1	0	0	0	1	1	1	1
Switch input Port 9FH	1	0	0	1	1	1	1	1



```
back: IN AL, 9FH
      AND AL, 00000001
      JNZ back
```

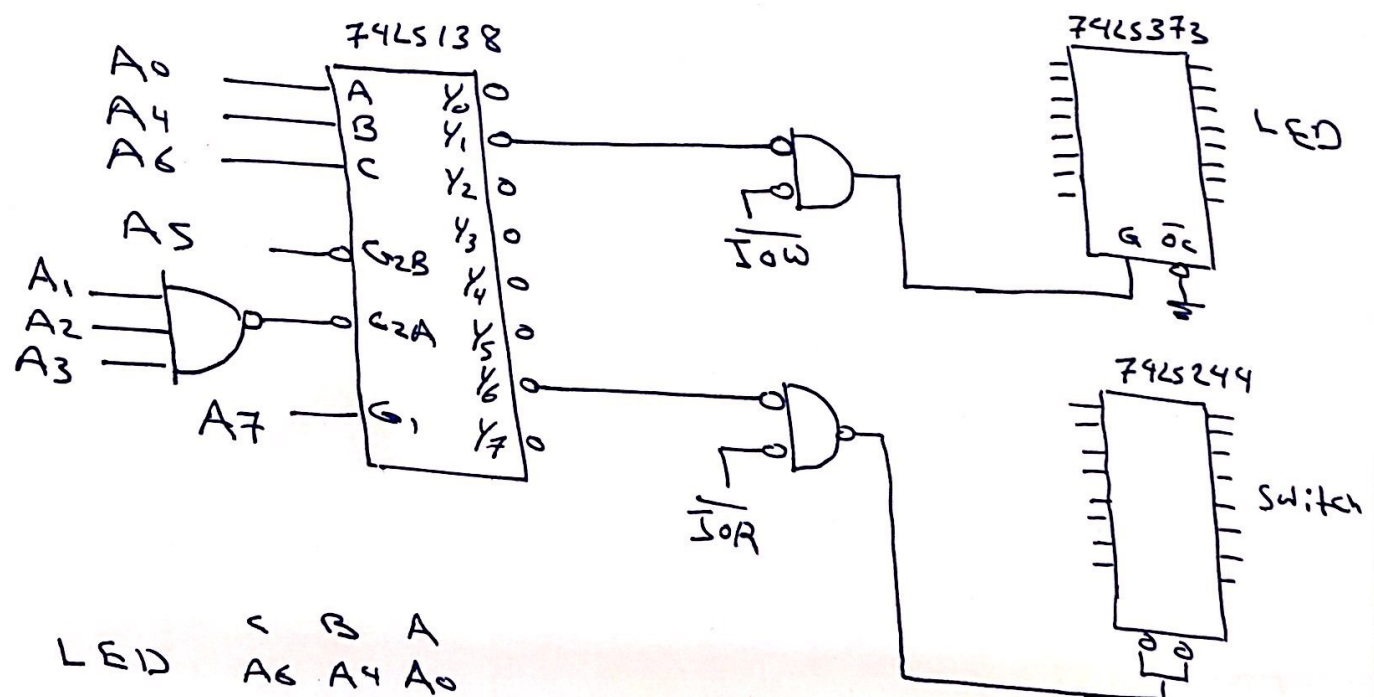
```
AGAIN: MOV AL, 01H
        OUT 8FH, AL
        MOV AL, 00H
        OUT 8FH, AL
        JMP AGAIN
```

Note

if Port address (8FH and DEH) using decoder, NAND

ans

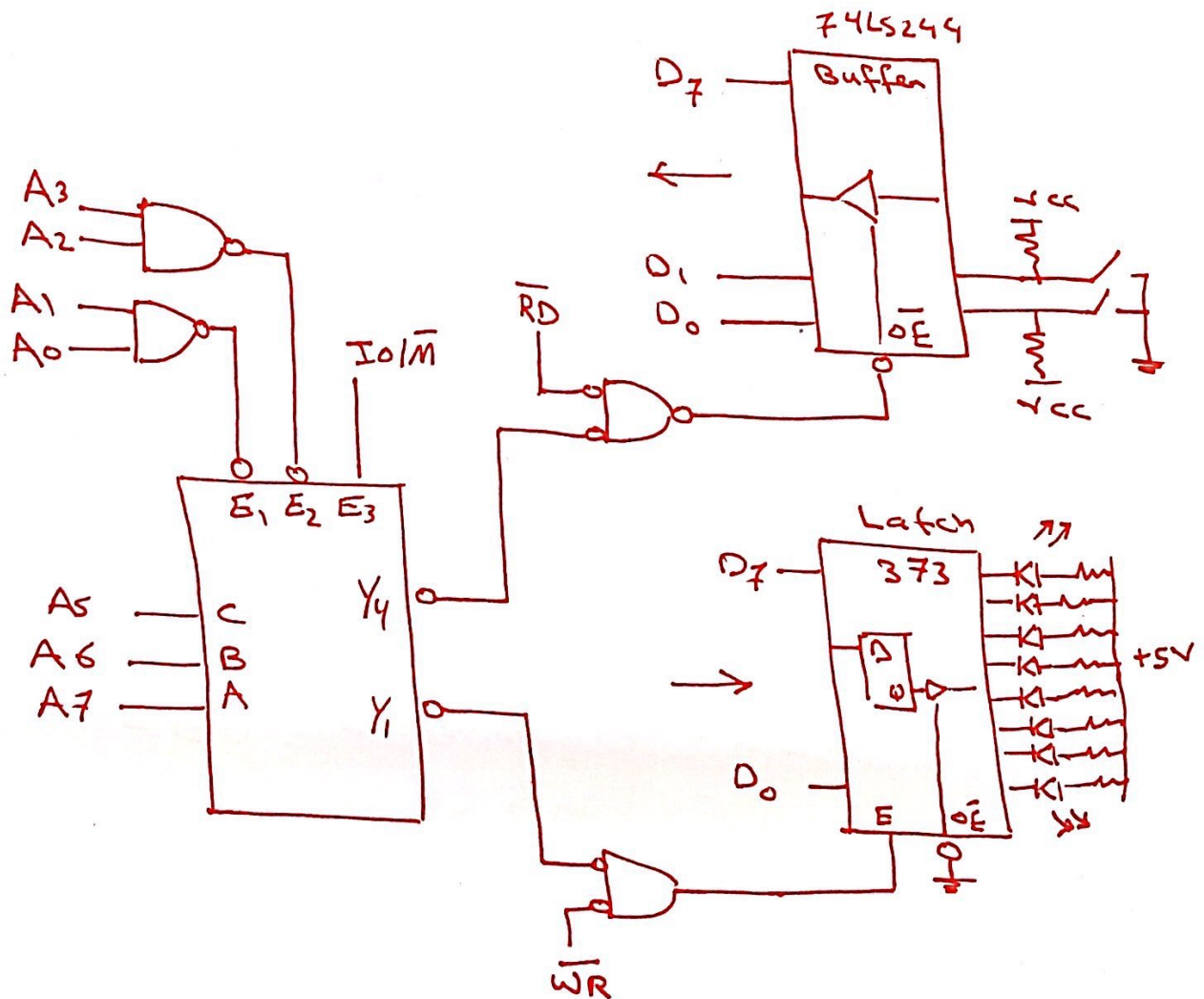
		A ₇	A ₆	A ₅	A ₄	A ₃	A ₂	A ₁	A ₀
LED Output	8FH	1	0	0	0	1	1	1	1
Switch Input	DEH	1	1	0	1	1	1	1	0



LED	C	B	A	
	A ₆	A ₄	A ₀	
	0	0	1	→ Y ₁
	4	2	1	→
Switch	1	1	0	→ Y ₆
	4	2	1	→

⑥

- 1 - identify the address of input and output ports?
- 2 - write the instructions for reading data if both switches are on then turn all LEDs



ans

C	B	A	
A5	A6	A7	
1	0	0	$\rightarrow Y_4$ Switch
0	0	1	$\rightarrow Y_1$ LED

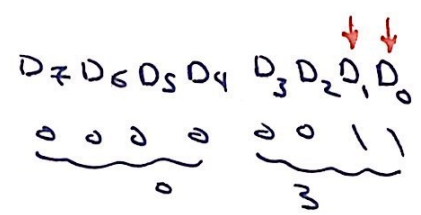
A_7	A_6	A_5	A_4	A_3	A_2	A_1	A_0
0	0	1	X	1	1	1	1
1	0	0	X	1	1	1	1

address of input 001x 1111
2F or 3F

address of output 100x 1111
8F or 9F

```

(2) back: IN AL, 2FH
        AND AL, 03H
        JNZ back
        mov AL, 00H
        OUT 8FH, AL
        HLT
    
```



انت بالامتحان
اختار اي كلمة
مثل NEXT
مثل LI
وممكن

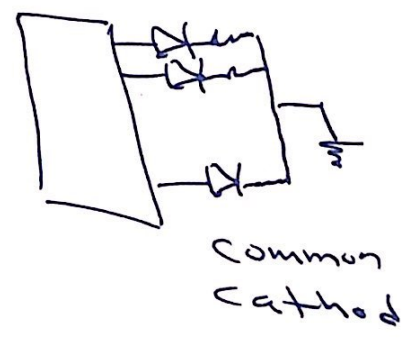
∴ LED common ANODE
0 → ON
1 → off

note

```

mov AL, FFH
OUT 8FH, AL
HLT
    
```

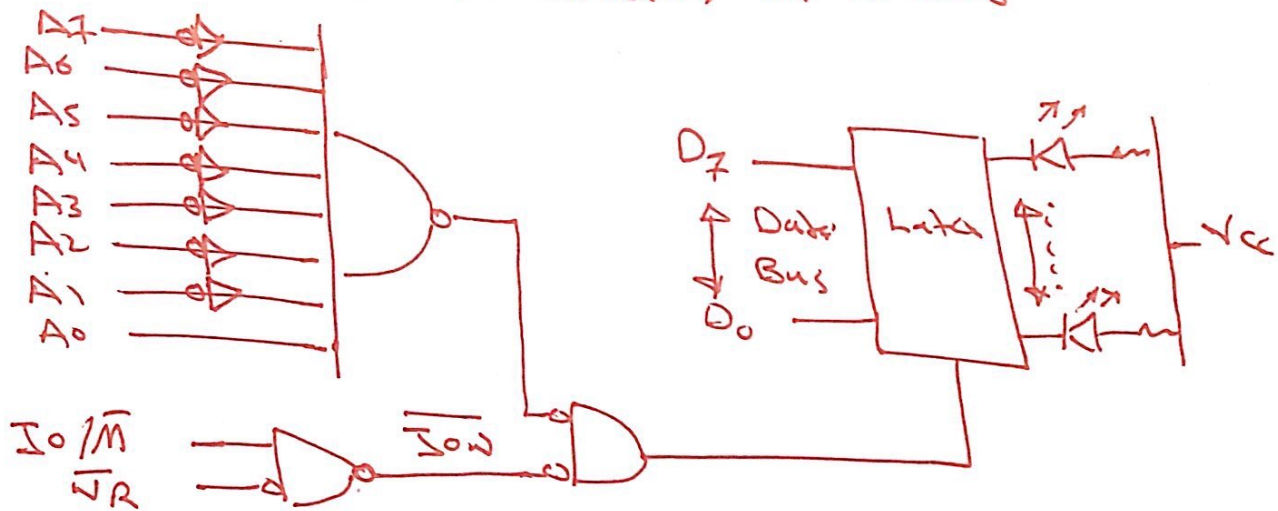
0 → off
1 → ON



2019/2020

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Q5 A find the address of interfacing circuit in fig (1) Then write the instruction to Display all LEDs



ans

A7	A6	A5	A4	A3	A2	A1	A0
0	0	0	0	0	0	0	1
0				1			

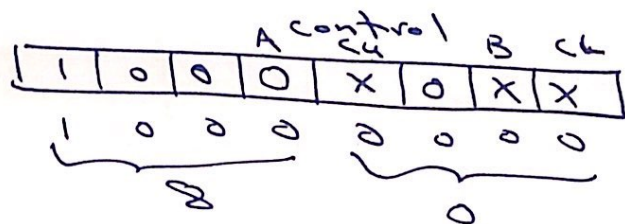
∴ Port address is 01H

```

MOV AL, 00H
OUT 01H, AL
HLT
    
```

अन

		A7	A6	A5	A4	A3	A2	A1	A0
Port A	00H	0	0	0	0	0	0	0	0
Port B	02H	0	0	0	0	0	0	1	0
Port C	04H	0	0	0	0	0	1	0	0
Control	06H	0	0	0	0	0	1	1	0



```

MOV AL, 80H
OUT 06H, AL

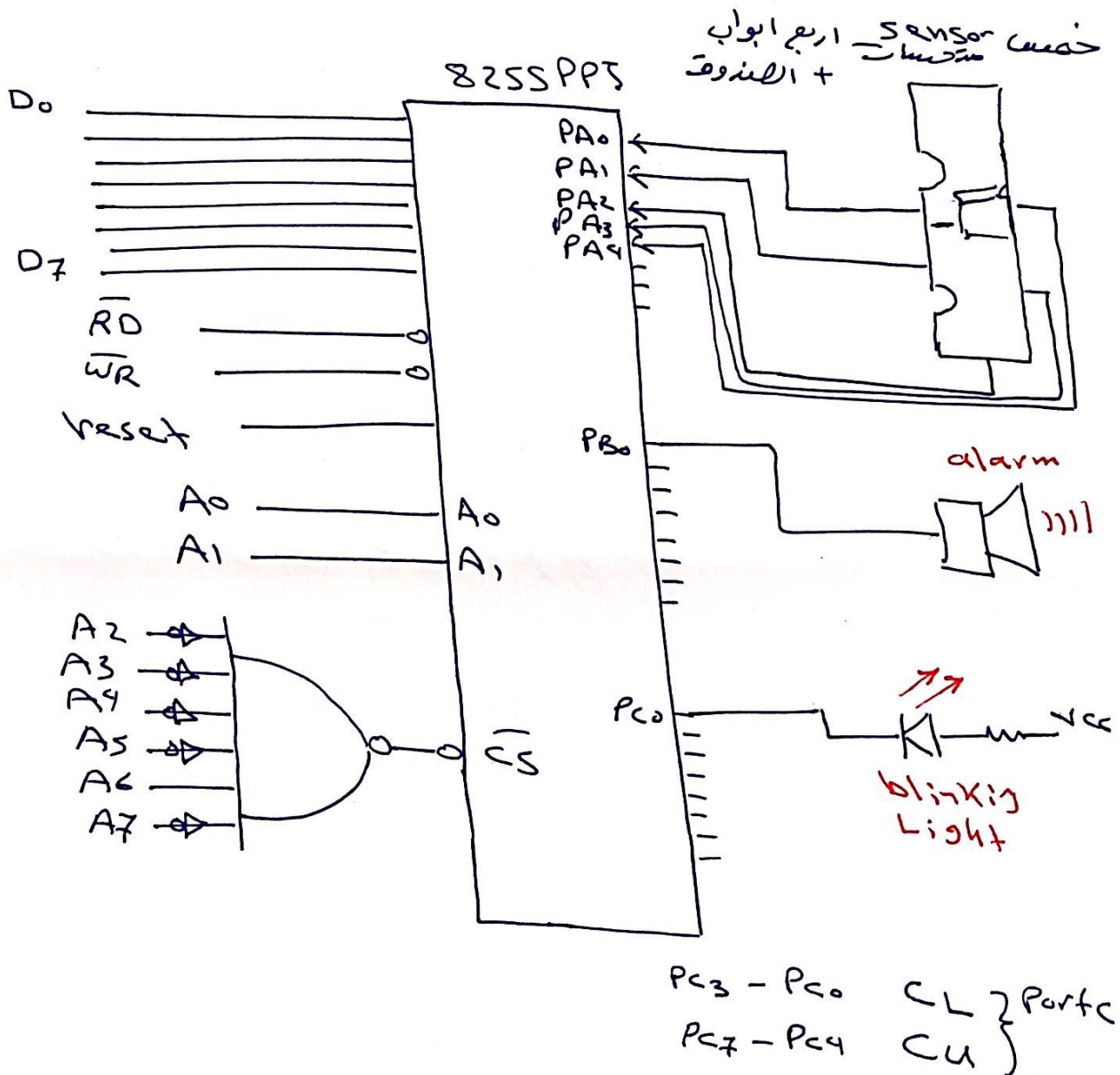
AGAIN: MOV CL, 10
MOV AL, 0
      *: OUT 00H, AL
        INC AL
        DEC CL
        JNZ *
        JMP AGAIN
        HLT

```

Q1 By using 8255 PPT design an interfacing circuit for car security and alarm indicator and light blinking. use start address 40H. then write the required instructions?

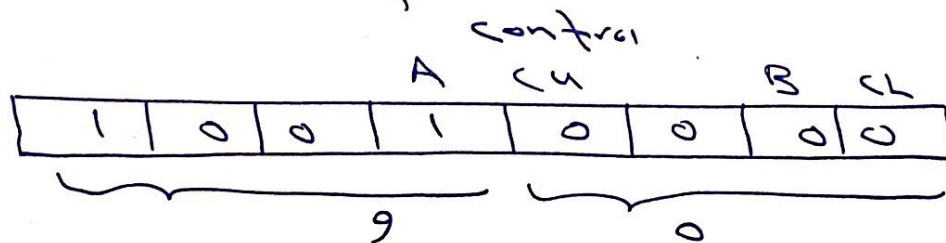
ans

Port	Port A	A7	A6	A5	A4	A3	A2	A1	A0
Port A	40H	0	1	0	0	0	0	0	0
Port B	41H	0	1	0	0	0	0	0	1
Port C	42H	0	1	0	0	0	0	1	0
Control	43H	0	1	0	0	0	0	1	1



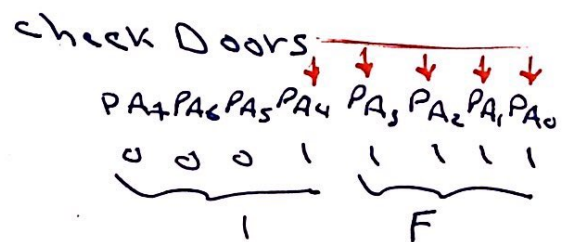
Port A input
Port B output
Port C output

(11)



MOV AL, 90H
OUT 43H, AL

check: IN AL, 40H
AND AL, 1FH
JZ check



MOV AL, 01H
OUT 41H, AL } turn on Alarm

AGAIN: MOV AL, 00H
OUT 42H, AL
MOV AL, 01H
OUT 42H, AL
JMP AGAIN
HL

} blinking
Light

8259 interrupt

* four initial control word ICW

ICW₁ → A₀ = 0

ICW₂, ICW₃, ICW₄ → A₀ = 1

Ex find the address for ICW₁ - ICW₄ if chip select is activated by

$A_7 - A_1 = 0010011$

ans =

A ₇	A ₆	A ₅	A ₄	A ₃	A ₂	A ₁	A ₀	
0	0	1	0	0	1	1	0	→ 26H
0	0	1	0	0	1	1	1	→ 27H

ICW₁ port is 26H

ICW₂, ICW₃, ICW₄ port is 27H

* ICW₁

A ₀	D ₇	D ₆	D ₅	D ₄	D ₃	D ₂	D ₁	D ₀
0	0	0	0	1	LTIM	0	SNGL	IC ₄

1 : level trig input
0 : edge trig input

0 no ICW₄ needed
1 ICW₄ needed
1 single 8259
0 cascade mode
8259 اکثرين

* Γ_{CW2}

A.0

هنا حسب السوان يمثل عنوان ال Vector
 40H 30H
 41H 31H
 ومكذا

* $\rightarrow \omega_3$

for master Device

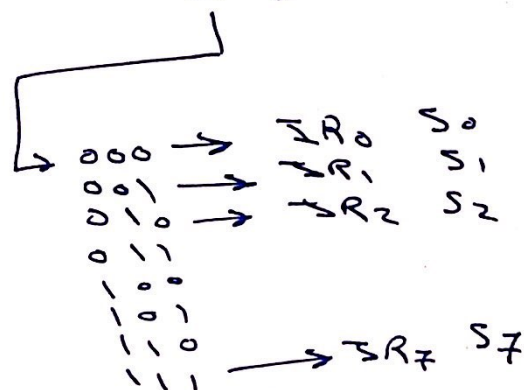
s_7	s_6	s_5	s_4	s_3	s_2	s_1	s_0
-------	-------	-------	-------	-------	-------	-------	-------

میتل بان، slave مربوط به master

0 no slave
1 slave

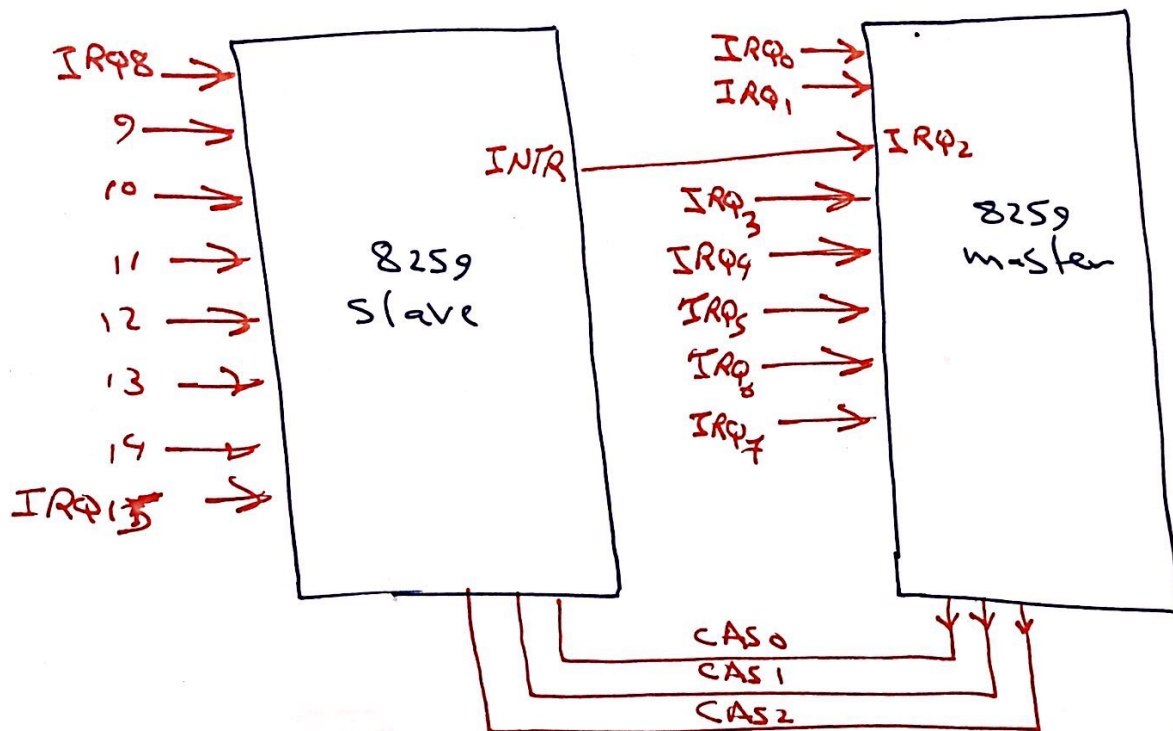
for Slave Device

0 0 1 0 0 ID_2 IO_1 IO_0



Note

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ICW3 master

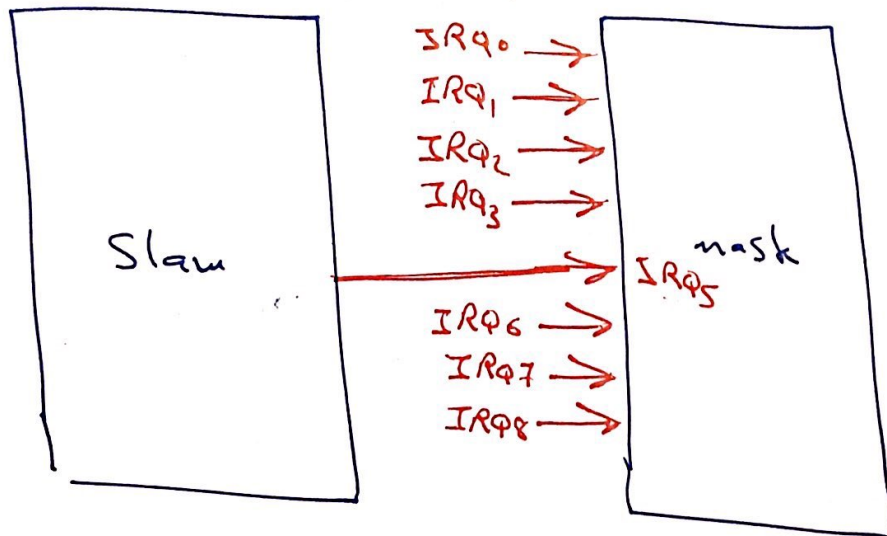
S ₇	S ₆	S ₅	S ₄	S ₃	S ₂	S ₁	S ₀
0	0	0	0	0	1	0	0
0				4			

slave

					ID ₂	ID ₁	ID ₀
0	0	0	0	0	0	1	0
0				2			

Ex

15



SW3

mask for

S_7	S_6	S_5	S_4	S_3	S_2	S_1	S_0
0	0	1	0	0	0	0	0
2				0			

Slave

S_7	S_6	S_5	S_4	S_3	S_2	S_1	S_0
0	0	0	0	0	1	0	1
0				5			

The diagram illustrates the interrupt architecture for a Pentium system. It features three 8259 interrupt controllers:

- 8259 SLAVE:** Receives IRQ8 through IRQ15. Its INTR output is connected to the IRQ0 input of the Master 8259. Its SP/EN pin is connected to CAS0, CAS1, and CAS2.
- 8259 MASTER:** Receives IRQ1 through IRQ7. Its INTR output is connected to the INTR input of the Pentium processor. Its SP/EN pin is connected to Vcc.
- Pentium:** Features an INTR input connected to the Master 8259 and an NMI input connected to a parity check circuit.

The parity check circuit consists of an AND gate with two inputs: "System board Parity check" and "I/O channel parity check (expansion slot)". The output of this AND gate is connected to the NMI input of the Pentium processor.

let 20H & 21H address master
let 40H & 41H address slave

MOV AL, 18H

OUT 20H, AL

OUT 40H, AL

MOV AL, 70H

OUT 21H, AL

} SCW₂ master

MOV AL, 10H

OUT 41H, AL

} SCW₂ slave

MOV AL, 04H

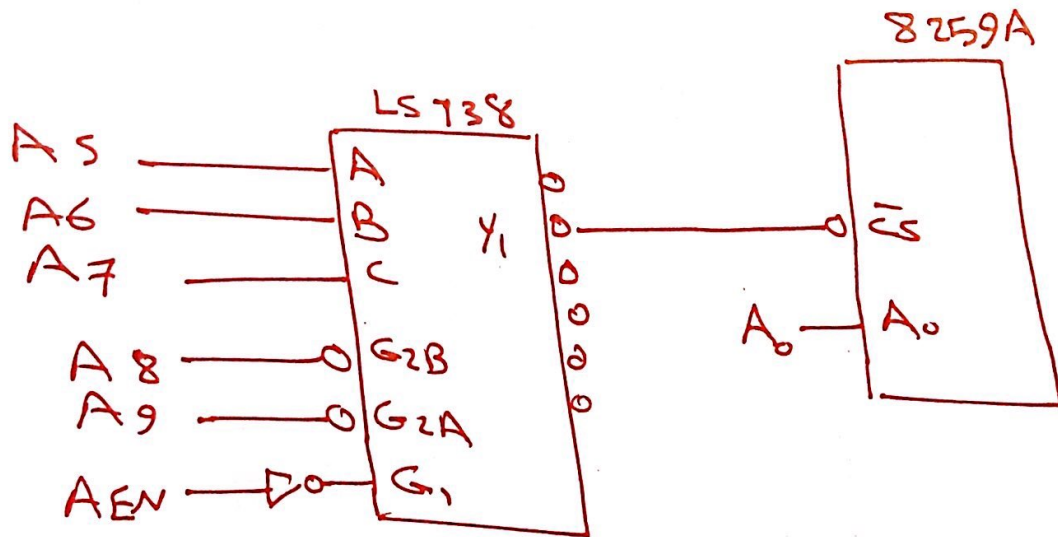
OUT 21H, AL

MOV AL, 02H

OUT 41H, AL

HLT

Q Find address Port for 8259



ans

$$Y_1 = \begin{matrix} C & B & A \\ A_7 & A_6 & A_5 \\ 0 & 0 & 1 \end{matrix}$$

$$A_8 = 0$$

$$A_9 = 0$$

$$\begin{array}{ccc} A_9 A_8 & A_7 A_6 A_5 A_4 & A_3 A_2 A_1 A_0 \\ 00 & 001X & XXX0 \\ 00 & 001X & XXX1 \end{array}$$

$$\therefore \begin{array}{ccc} A_9 A_8 & A_7 A_6 A_5 A_4 & A_3 A_2 A_1 A_0 \\ 20H & 00 & 0010 & 0000 \\ 21H & 00 & 0010 & 0001 \end{array}$$

$$\therefore 20H \rightarrow ICW_1$$

$$21H \rightarrow ICW_2, ICW_3, ICW_4$$