

## Microprocessor and its Applications Tutorials

1. *What is multiplexing and what is its advantage? How the address and data lines are demultiplexed in 8085?*

Multiplexing is transferring different information at different well defined times through same lines. A group of such lines is called multiplexed bus. The advantage of multiplexing is that fewer pins are required for microprocessors to communicate with outside world.

The low order address and data lines of 8085 are demultiplexed using an external 8-bit D-Latch (74LS373) and the ALE signal of 8085, as shown in fig.

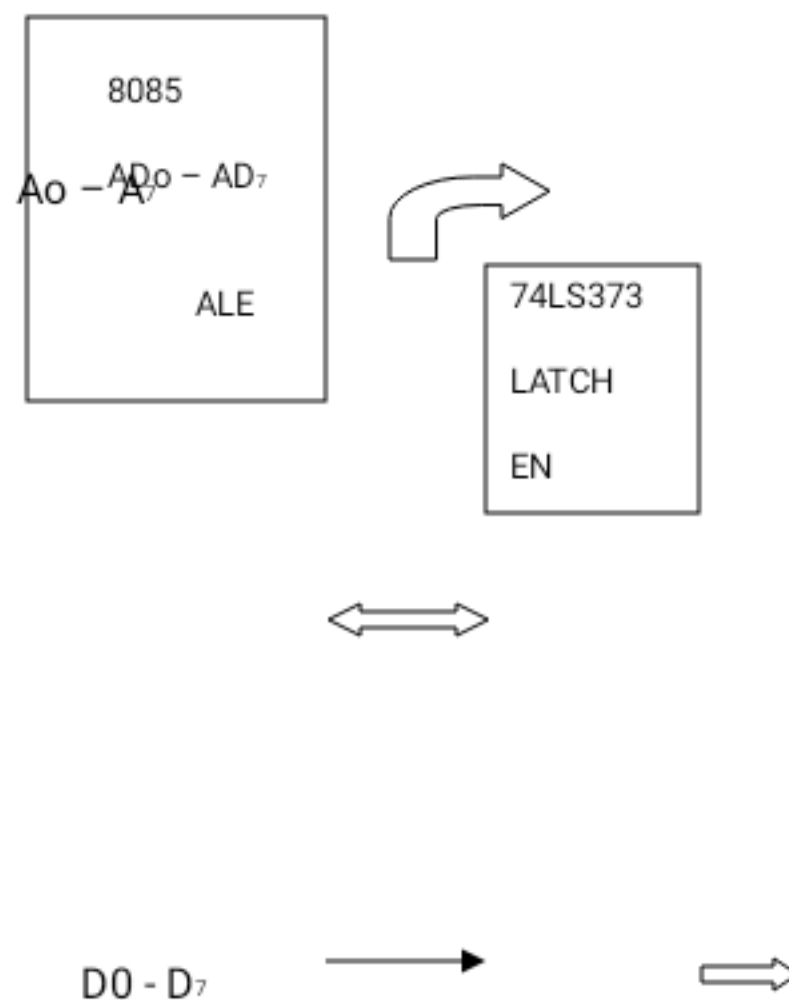


Fig : Demultiplexing of address and data lines in 8085 processor

At the beginning of every machine cycle, ALE is asserted high and then low. Also the low byte of address is given out through ADo -AD7 lines. Since the ALE is connected to Enable of Latch, when ALE is asserted high and then low the addresses are latched into the output lines of the latch. Now the lines ADo -AD7 are free for data transfer.

## 2. List the Software and Hardware interrupts of 8085 ?

Software interrupts :

RST 0, RSTI, RST 2,  
RST 3, RST 4, RST 5,  
RST 6 and RST 7.

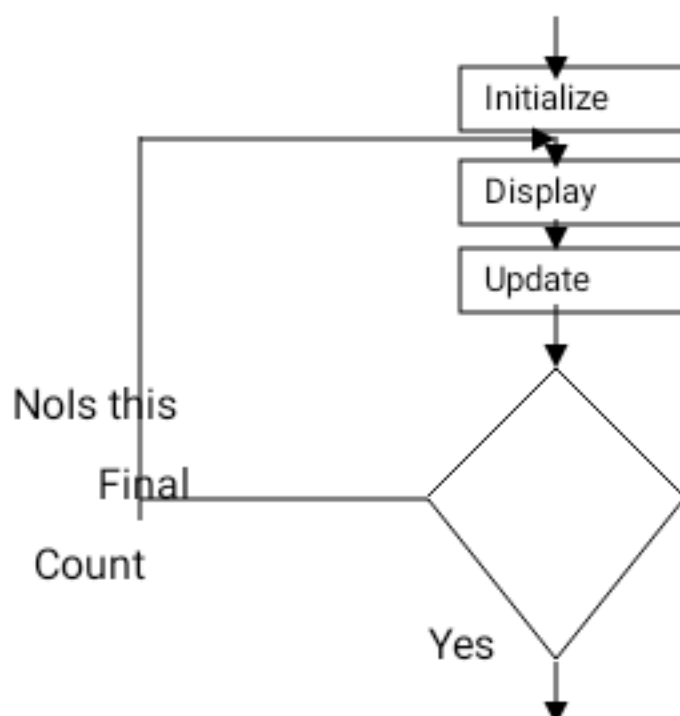
Hardware interrupts:

TRAP, RST 7.5, RST 6.5,  
RST 5.5 and INTR.

## 3. Write 8085 assembly language instructions to store the contents of the flag register in memory location 2000H.

```
PUSH PSW  
POP B  
MOV A,C  
STA 2000H.  
HLT
```

## 4. Draw the flow chart of a counter.



5. Write an 8085 program to generate a time delay of 0.4sec given crystal frequency 5MHZ.

Operating frequency =  $5/2 = 2.5\text{MHZ}$ .  
Time for one T-state =  $1/2.5\text{MHZ} = 0.4(\text{sec})$ .  
Number of T-states required = Required Time/Time for 1T-state  
=  $0.4\text{sec}/0.4(\text{sec})$   
=  $1 \times 10^6$   
Delay program:  
LXI B,COUNT  
Loop : DCX B  
MOV A,C  
ORA B  
JNZ Loop  
 $1 \times 10^6 = 10 + (\text{count} - 1) \times 24 + 21$   
count =  $41666_{10}$   
=  $A2C2H$ .

6. Explain the contents of the accumulator after the execution of the following program segments:

MOV A,#3CH  
MOV R4,#66H  
ANL A,R4

A 3C →

R4 → 66

A → 24

7. State the function of RS1 and RS0 bits in the flag register of intel 8051 microcontroller?

RS1 , RS0 – Register bank select bits

RS1	RS0	Bank Selection
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0	0	Bank 0
0	1	Bank 1
1	0	Bank 2
1	1	Bank 3

*8. Write a program using 8051 assembly language to change the data 55H stored in the lower byte of the data pointer register to AAH using rotate instruction.*

```

MOV DPL,#55H
MOV A, DPL
RL A
Label :SJMP label

```

*9. Give the alternate functions for the port pins of port3?*

RD	WR	T1	T0	INT1	INT0	TXD	RXD
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RD – Read data control output.  
WR – Write data control output.  
T1 – Timer / Counter1 external input or test pin.  
T0 – Timer / Counter0 external input or test pin.  
INT1- Interrupt 1 input pin.  
INT 0 – Interrupt 0 input pin.  
TXD – Transmit data pin for serial port in UART mode.  
RXD - Receive data pin for serial port in UART mode.

*10. Name the five interrupt sources of 8051?.*

The interrupts are:

			Vector address
• External interrupt 0	: IE0	:	0003H
• Timer interrupt 0	: TF0	:	000BH
• External interrupt 1	: IE1	:	0013H
• Timer Interrupt 1	: TF1	:	001BH
• Serial Interrupt			
	Receive interrupt : RI	:	0023H
	Transmit interrupt: TI	:	0023H

11. Write a program to load accumulator A, DPH and DPL with 30H.

```
MOV A,#30
MOV DPH,A
MOV DPL,A
```

12. Write a program to subtract the contents of R1 of Bank0 from the contents of R0 of Bank2.

```
MOV PSW,#10
MOV A,R0
MOV PSW,#00
SUBB A,R1
```

13. In 8086 processor the code segment contains 4000H and instruction pointer contains 9F20H. Find the memory location addressed by the processor.

Segment address → 4000 → 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Shifted to left by 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0  
four bits +

Offset address → 1 0 0 1 1 1 1 1 0 0 1 0 0 0 0 0

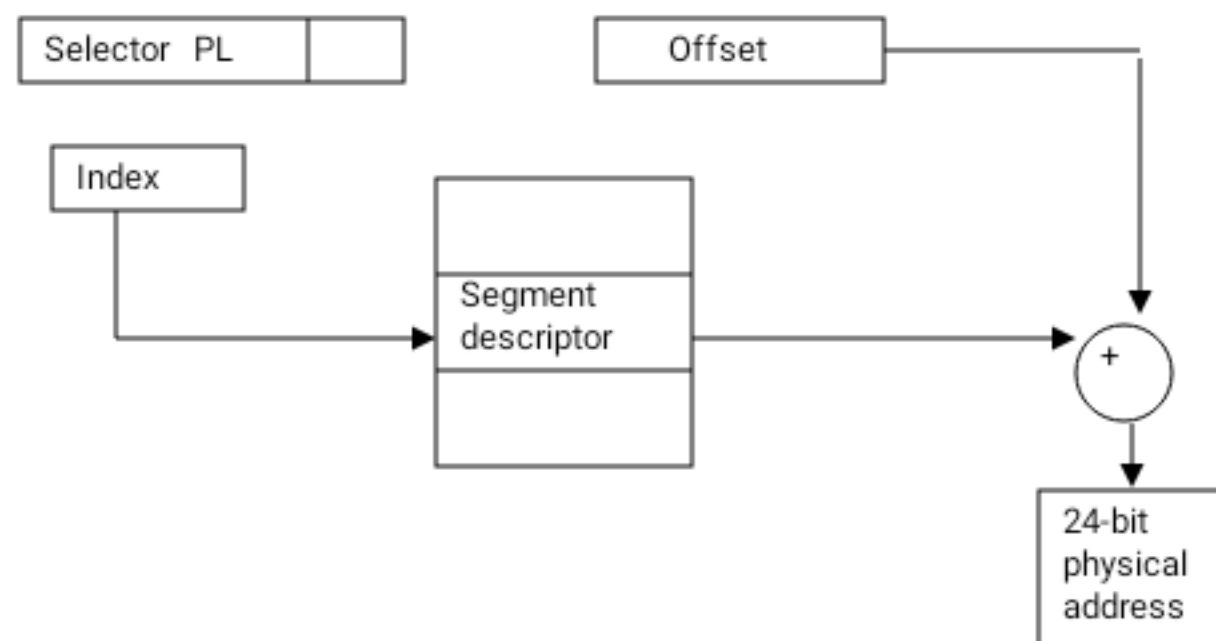
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0 1 0 0 1 0 0 1 1 1 1 1 0 0 1 0 0 0 0 0

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Physical address 49F20H →

14. Show how the virtual to physical address translation takes place in 80286.

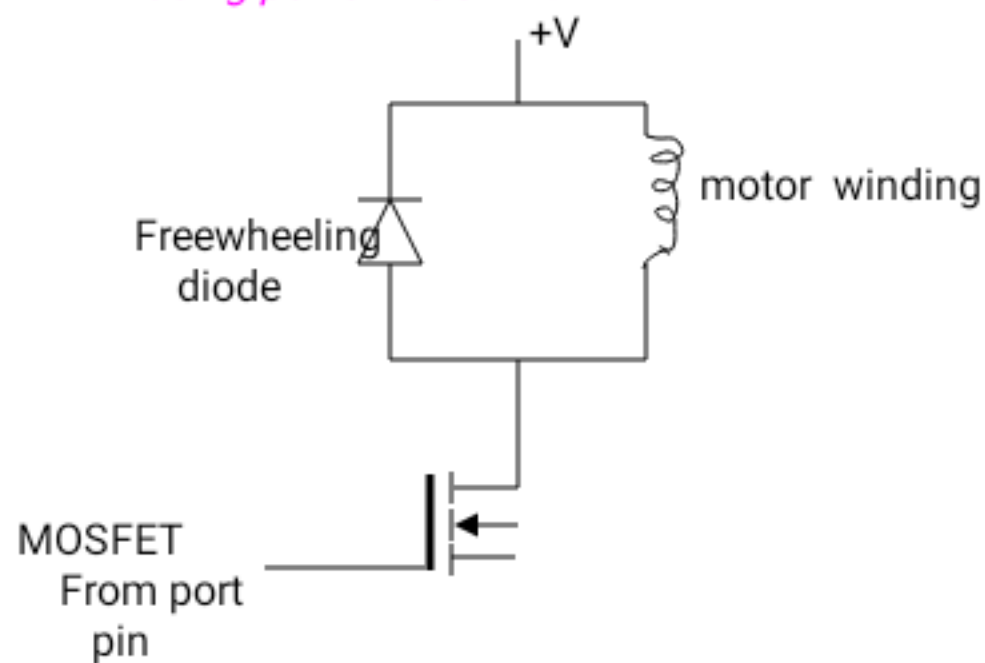


15. Give the contents of the flag register after execution of following addition.

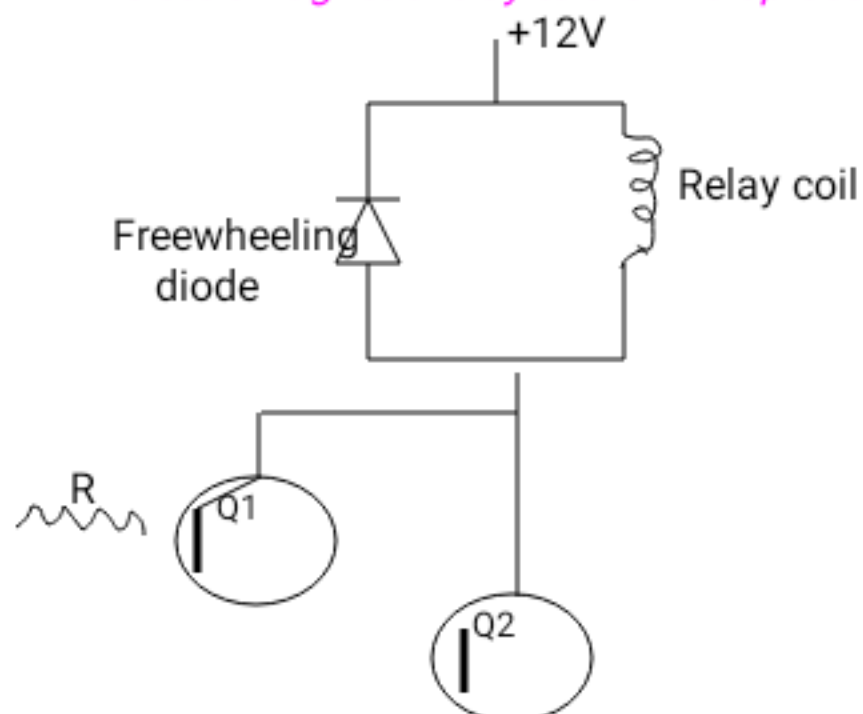
$$\begin{array}{r}
 \phantom{0000} + \phantom{0000} 0110 \ 0101 \ 1101 \ 0001 \\
 \phantom{0000} 0010 \ 0011 \ 0101 \ 1001 \\
 \hline
 1000 \ 1001 \ 0010 \ 1010 \\
 \hline
 \end{array}$$

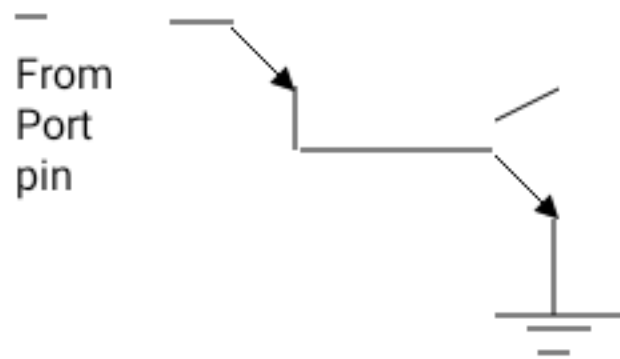
SF = 1, ZF = 0, PF = 1, CF = 0, AF = 0, OF=1.

16. Draw a circuit to interface a stepper motor winding to a microprocessor port bit using power MOSFET.



17. Draw the circuit using darlington pair transistor to interface a 12 volt electromagnetic relay to the microprocessor?





*18. What are the various elements of process control system?*

Elements of process control systems are:

- i) Signal Converter.
- ii) Actuator.
- iii) Final control element.
- iv) Process.

*19 .Draw the circuit for driving seven segment LED display.*

