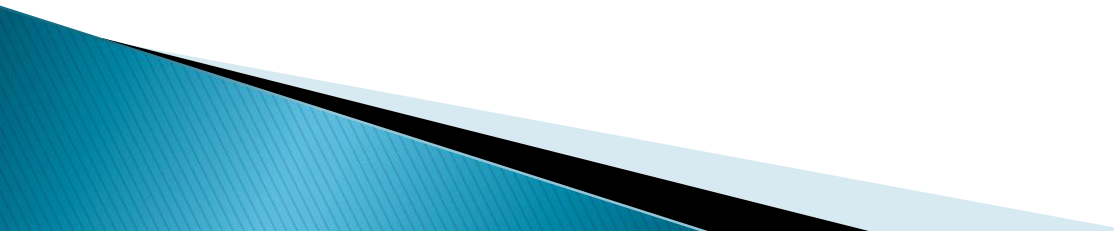# MICROCONTROLLER

UNIT-III

Lecture-8
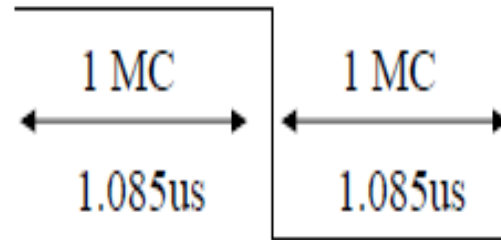
Sampling Edge-Triggered Interrupt

▸ In edge-triggered interrupts:

▸ The external source must be held high for at least one machine cycle, and then held low for at least one machine cycle

▸ The falling edge of pins INT0 and INT1 are latched by the 8051 and are held by the TCON.1 and TCON.3 bits of TCON register
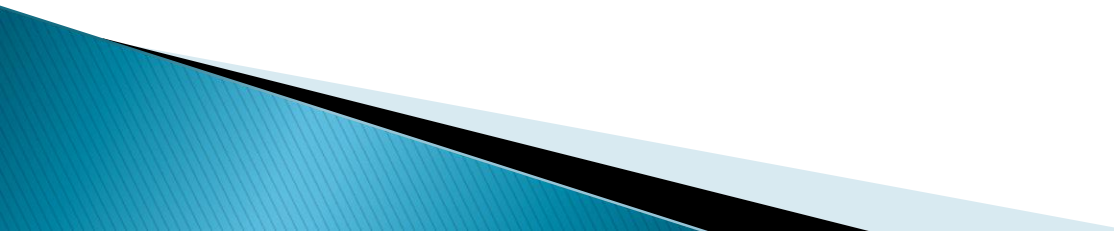
▸ Function as interrupt-in-service flags

Contd.

- It indicates that the interrupt is being serviced now and on this INTn pin, and no new interrupt will be responded to until this service is finished
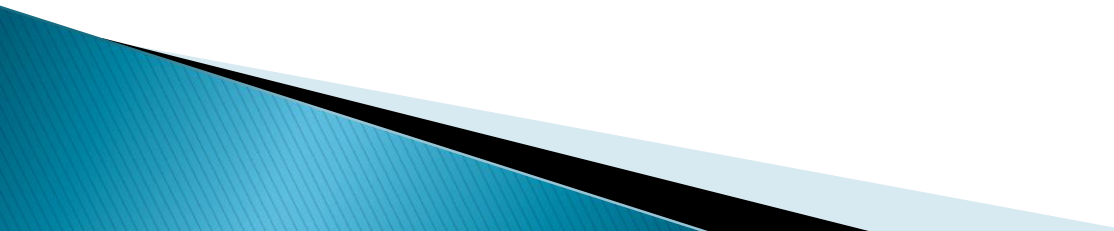
Minimum pulse duration to detect edge-triggered interrupts XTAL=11.0592MHz

1 MC   1 MC

1.085us   1.085us

Contd.

- Regarding the IT0 and IT1 bits in the TCON register, the following two points must be emphasized

- When the ISRs are finished (that is, upon execution of RETI), these bits (TCON.1 and TCON.3) are cleared, indicating that the interrupt is finished and the 8051 is ready to respond to another interrupt on that pin

Contd.

- During the time that the interrupt service routine is being executed, the INTn pin is ignored, no matter how many times it makes a high-to-low transition
- RETI clears the corresponding bit in TCON register (TCON.1 or TCON.3)
- There is no need for instruction CLR TCON.1 before RETI in the ISR associated with INT0

Contd.

- TI (transfer interrupt) is raised when the last bit of the framed data, the stop bit, is transferred, indicating that the SBUF register is ready to transfer the next byte
- RI (received interrupt) is raised when the entire frame of data, including the stop bit, is received

RI and TI Flags and Interrupts

- In the 8051 there is only one interrupt set aside for serial communication
- This interrupt is used to both send and receive data
- If the interrupt bit in the IE register (IE.4) is enabled, when RI or TI is raised the 8051 gets interrupted and jumps to memory location 0023H to execute the ISR
- In that ISR we must examine the TI and RI flags to see which one caused the interrupt and respond accordingly

Use of Serial COM in 8051

- The serial interrupt is used mainly for receiving data and is never used for sending data serially
- This is like getting a telephone call in which we need a ring to be notified
- If we need to make a phone call there are other ways to remind ourselves and there is no need for ringing
- However in receiving the phone call, we must respond immediately no matter what we are doing or we will miss the call

Interrupt Flag Bits

▶ The TCON register holds four of the interrupt flags, in the 8051 the SCON register has the RI and TI flags

Interrupt Flag Bits

Interrupt	Flag	SFR Register Bit
External 0	IE0	TCON.1
External 1	IE1	TCON.3
Timer 0	TF0	TCON.5
Timer 1	TF1	TCON.7
Serial Port	T1	SCON.1
Timer 2	TF2	T2CON.7 (AT89C52)
Timer 2	EXF2	T2CON.6 (AT89C52)