

- Q.1 State the important features of 8051 microcontroller
- ans.
- 8051 microcontroller it consists 4 K byte ROM
 - 8051 microcontroller it consists 128 byte RAM
 - The 8051 microcontroller has a powerful CPU that can execute instruction at a clock speed
 - The 8051 microcontroller has two 16-bit timer / counters
 - microcontroller support both hardware & software interrupt
 - 8051 microcontroller has four 8-bit I/O ports
 - 8051 microcontroller has a low-power mode
 - 8051 microcontroller has a rich instruction set

- Q.2 Define the term Bus related to microcontroller and list different buses used in microcontroller
- ans.
- Bus is a group of wires which uses as a communication canal or acts as means of data transfer. The different bus configuration includes 8, 16 or more cables. Therefore, a bus can bear 8 bits, 16 bits all together

8051 microcontroller has a two types of buses i) address bus ii) data bus

• Address bus - 8051 microcontroller is consisting of 16-bit address bus it is generally be used for transferring the data from CPU to memory

• Data bus - 8051 microcontroller is consisting of 8-bit data bus it is generally be used for transferring the data from one peripheral position to other peripherals

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Q.3 List out any two instructions of following addressing mode
i) immediate addressing ii) immediate register addressing
iii) register addressing

Ans.

1) Immediate addressing -

- in this immediate addressing mode the data is provided in the instruction itself
- The data is provided immediately after the opcode

• `mov R3, #43H`

• `mov DPTR, #00H`

2) Register addressing

- in the register addressing mode the source or destination data should be present in a register
- in this data store in general purpose register

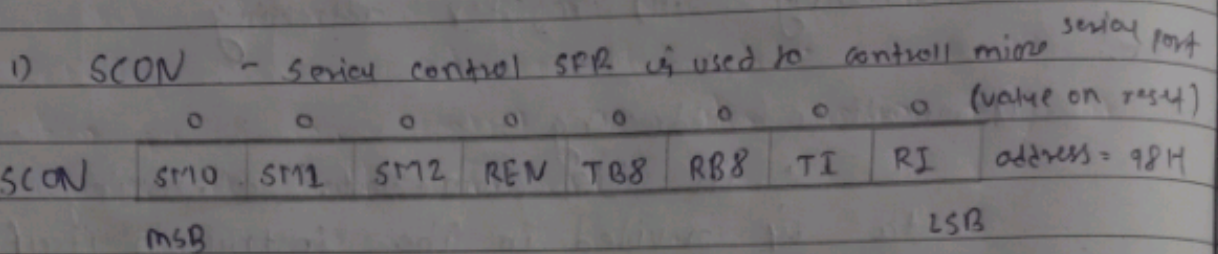
• `mov R1, A`

• `mov R0, R2` → not allowed.

3) immediate ^{register} addressing mode

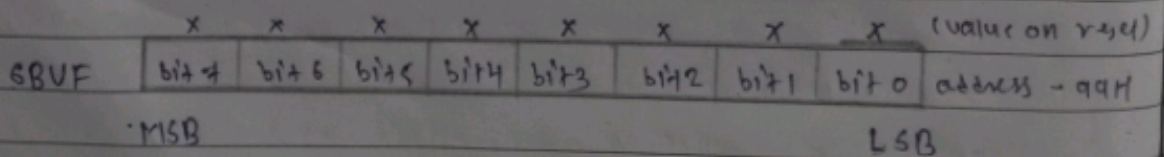
Q.4 Draw format of SCON & SBUF special function register

ans



Bit	Symbol	Description
7	SM0	serial port mode selection bit 0
6	SM1	serial port mode selection bit 1
5	SM2	multiprocessor comm. bit
4	REN	Receive enable bit
3	TB8	Transmitted bit 8
2	RB8	Received bit 8
1	TI	Transmit interrupt flag
0	RI	Receive interrupt flag

2) SBUF - The serial buffer or SBUF register is used to hold the serial data while transmission or reception



Q.5 state the alternative function of port 0, port 1, port 2

Port 0 - • Port 0 is an 8-bit bidirectional I/O port it can be used for both input and output operations

- it has an internal pull-up resistor that can be enabled or disabled by software.

- it is often used for external memory interfacing

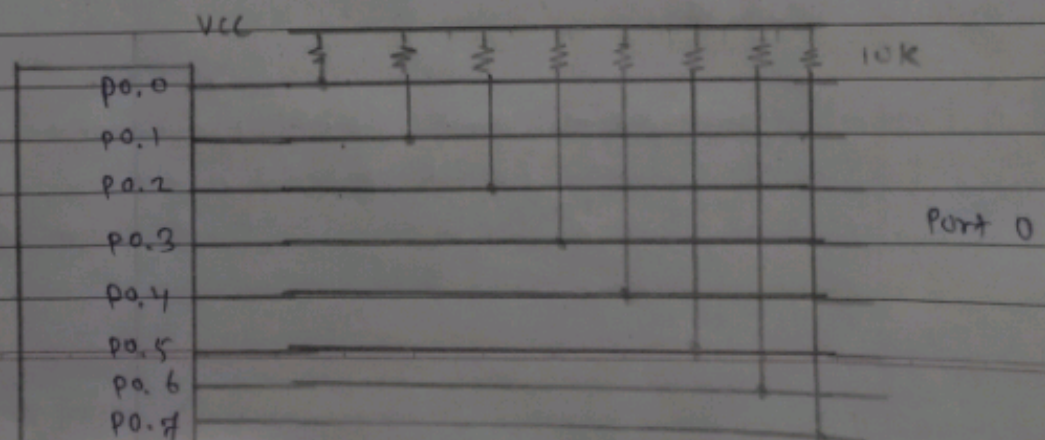
Port 1 - • P1 is also an 8-bit bidirectional I/O port
• it can be used for both input & output operations

- Port 1 pins have additional functions like timer / counter input, external interrupt input & serial communication signals.

Port 2 - • P2 is an 8-bit bidirectional I/O port
it can be used for both input & output operation

- P2 pins are multiplexed with the high-order address bus & some control signals so it is often used for external memory

Port 0 pull up register -



Q. 6
ans

Explain the interrupts of 8051 microcontroller

• interrupts are the events that permanently suspend the main program pass the control to extends source and executed their work it then passes the control to the main program where it hand left off.

- There are 5 interrupts in 8051 microcontroller.
- 1) Timer 0 overflow interrupt (TF₀)
- 2) Timer 1 overflow interrupt (TF₁)
- 3) External hardware interrupt (INT₀) INT₀
- 4) External hardware interrupt (INT₁) INT₁
- 5) Serial communication interrupt (RT, TI)

in this -

- TF₀, TF₁ & (RT, TI) are internal interrupt
- INT₀, INT₁ are external interrupt
- all are vector interrupt
- all are maskable interrupt

Q. 4 Draw and explain The pin configuration / diagram of 8051 microcontroller

ans.

PI.0	1	40	VEE
PI.1	2	39	PO.0 (AD0)
PI.2	3	38	PO.1 (AD1)
PI.3	4	37	PO.2 (AD2)
PI.4	5	36	PO.3 (AD3)
PI.5	6	35	PO.4 (AD4)
PI.6	7	34	PO.5 (AD5)
PI.7	8	33	PO.6 (AD6)
RES	9	32	PO.7 (AD7)
(RxD) P3.0	10	31	\overline{EA} / VPP
(TxD) P3.1	11	30	ALE / PROG
(INT0) P3.2	12	29	PSEN
(INT1) P3.3	13	28	P2.7 (A15)
(T0) P3.4	14	27	P2.6 (A14)
(T1) P3.5	15	26	P2.5 (A13)
(WR) P3.6	16	25	P2.4 (A12)
(RD) P3.7	17	24	P2.3 (A11)
XTAL2	18	23	P2.2 (A10)
XTAL1	19	22	P2.1 (A9)
GND	20	21	P2.0 (A8)

8051

- 1) Pin 1 to 8 - This pin known as port 1
- 2) Pin 9 - This is RESET pin which is used to reset the microcontroller to its initial value.
- 3) Pin 10 to 17 - This pins known as port 3
- 4) Pin 18 & 19 - This pin used for to get system clock
- 5) Pin 20 - This pin used to provide power supply
- 6) Pin 21 to 28 - This pin known as port 2
- 7) Pin 29 - This is pin PSEN which stands for program store enable.
- 8) Pin 30 - This is pin ALE (address latch enable)
- 9) Pin 31 - This is pin EA (External access)
- 10) Pin 32 to 39 - This pin known as port 0
- 11) Pin 40 - This pin used to power supply

Q.8

Explain the following examples of each

- i) Logical instruction
- ii) Branching instruction
- iii) Data transfer instruction

ans.

- 1) Logical instruction - Logical instructions are used to perform logical operations like AND, OR, XOR, NOT. Logical instructions are performed on bytes of data on a bit-by-bit basis.

example -
AND A, #0x0F
ORL A, #0xF0

- 2) Branching instruction - These instructions control the flow of program logic. The branching instructions are following - LJMP, AJMP, SJMP, JZ, JNZ etc.

example -
JZ label ; jump if accumulator is 0
JNZ label ; jump to label if the accumulator not 0

- 3) Data Transfer instruction - These instructions allow you to move data between registers & memory, load or store data in memory & manipulate stack.

example -
MOV R0, R1 ; move content of R1 to R0
XCHG A, R0 ; exchange the data of A with R0

Q.9 List different timer modes of 8051 microcontroller and describe mode 1 & 2

ans. The 8051 microcontroller has four different timer mode.

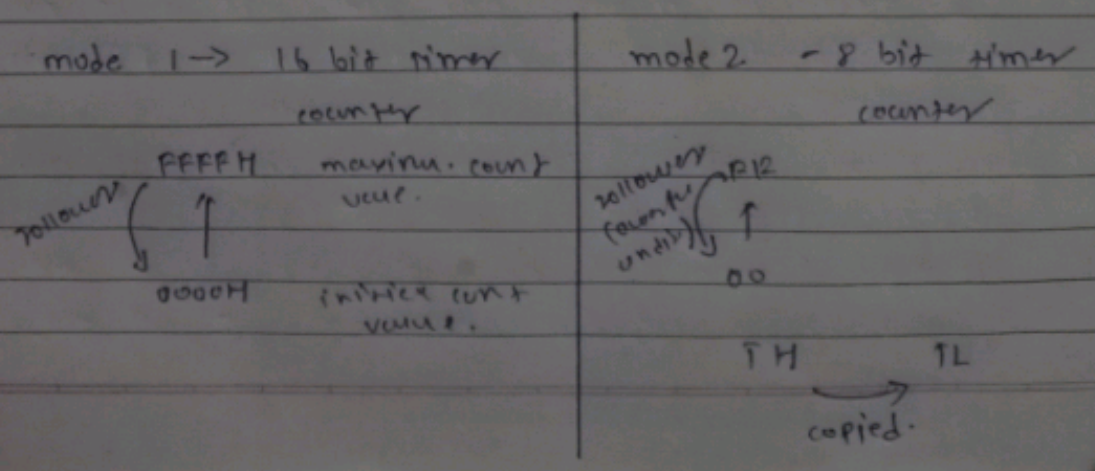
mode 0 - in this mode, timer 0 operate as a 13-bit timer it has a maximum count value of 8191 & generates interrupt when it overflow

mode 1 - in this mode, timer 1 operate as a 16-bit timer, timer 1 generate an interrupt when it overflow

mode 2 - in this mode, timer 1 operates in 8-bit split mode. The high & low bytes of timer 1 are separated & modify separated.

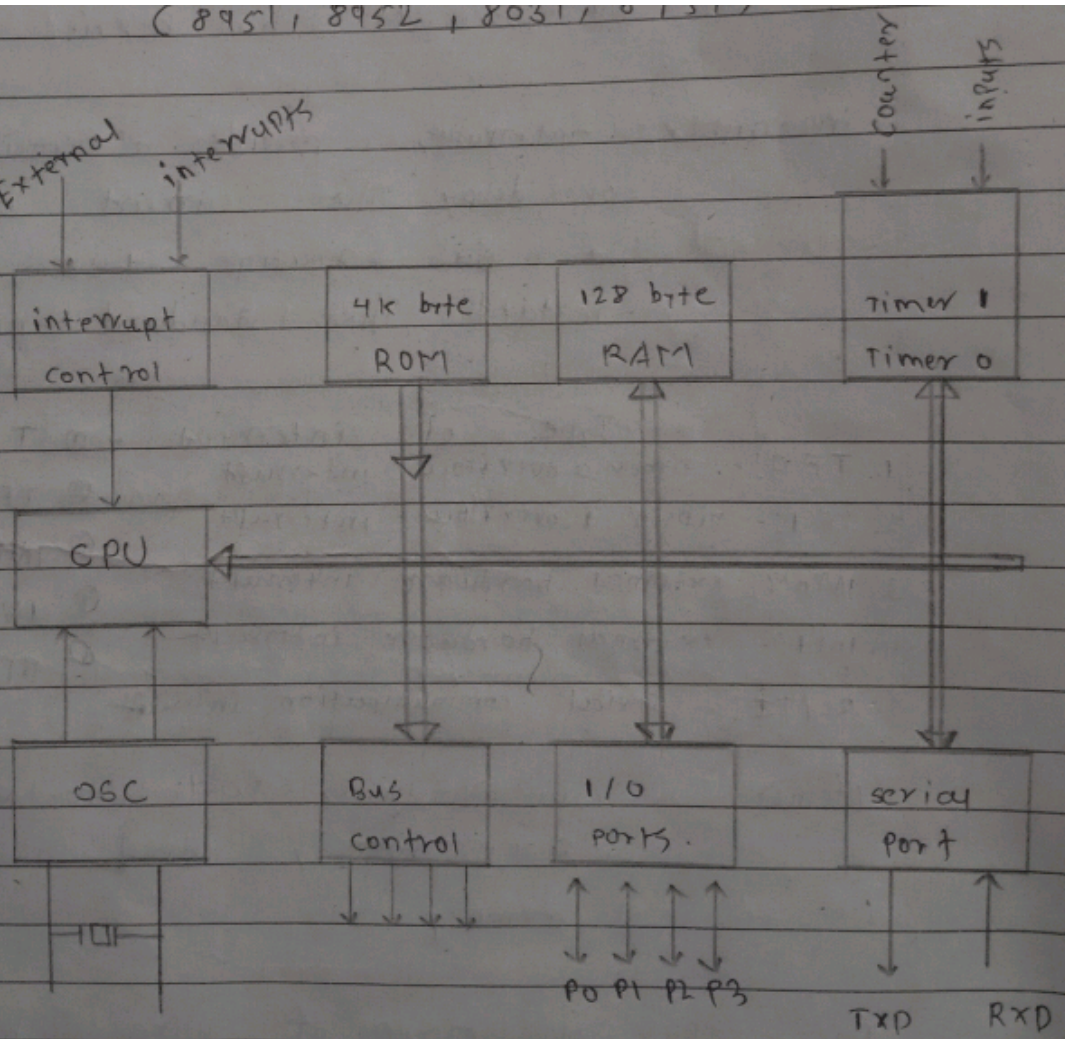
mode 3 - in this mode, timer 0 & timer 1 operate in timer / counter mode both timer can be used as external event counter.

describ mode 1 & 2. ->



Q. 10

1.1 >>> External interrupts



* Explanation of micro^{cont}roller 8051

→ microcontroller 8051 contain is designed by intel in 1981 it is an 8-bit microcontroller it is built with 40 pins, 4kb ROM, 128 bytes of RAM, 2 16 bit timer

CPU - CPU act as a mind of any processing machine it synchronizes and manages all processes that carried out in microcont.

interrupts - interrupts provide a method to postpone or delay the current process, performs a sub-routine task and then restart the standard program again

Type of interrupt -

- | | |
|--|---------|
| 1. TFO! - timer 0 overflow interrupt | Ⓐ TFO |
| 2. TF1! - timer 1 overflow interrupt | Ⓑ TPI |
| 3. INT0! - external hardware interrupt | Ⓒ INTO |
| 4. INT1! - external hardware interrupt | Ⓓ INTI |
| 5. RI/TI! - serial communication interrupt | Ⓔ RI/TI |

Memory - microcontroller 8051 contain 4k byte of ROM memory and 128 byte ram memory

Bus - Bus is group of wire which uses as a communication channel of data transfer. microcontroller 8051 contain Address bus & Data bus

OSC - As The microcontroller is digital circuit
Therefore it needs timer for their
operation To perform timer operation inside
microcontroller it required externally
connected or one-chip OSC (oscillator)