VIVEKANANDA COLLEGE
THAKURPUKUR
KOLKATA-700063

NAAC ACCREDITED 'A' GRADE

Topic: Microcontrollers

Course Title: Microprocessor and Microcontrollers

Paper: GE-4

Unit:

Semester: 4

Name of the Teacher: Romela Dutta

Name of the Department: Electronics

Microcontrollers

Port 2 (Pin no 21 – 28)

Port 2 uses a total of 8 pins and it can also be used as input and output operation. Same as Port 1, P2 also not require external pull up resistors. Port 2 can be used along with P0 to provide 16 bit address for an external memory. Therefore it is designed as (A0 - A7).

If Port2 is configured as an o/p port, then for using it as an input port again we write 1 to all bits of port 2 as shown in below code.

```
MOV A, #FFH  : Value of accumulator, FFH
MOV P2, A    ; Port2 worked as i/p port
BACK:
MOV A, P1    ; get data from P2
```

MOV P1, A : save it in Port 1
SJMP BACK: Keep doing that

Port 3 (Pin No 10 – 17)

Port 3 is also of 8 bits and it can be used as i/p/o/p. This port provides some important signals

P3.1 and P3.0 are RXD (Receiver) and TXD (transmitter) respectively and is collectively used for serial communication.

P3.3 and P3.2 are used as external interrupts.

P3.5 and P3.4 are used as timers T1 and T0 respectively.

P3.6 and P3.7 are write (WR) and Read (RD) pins.

Let's see the Port 3 table showing and individual pin function.

Pin	Function	P3 bit
10	Receiver (RXD)	P3.0
11	Transmitter (TXD)	P3.1
12	Complement of INT0	P3.2
13	INT1	P3.3
14	Timer 0 (T0)	P3.4
15	Timer 1 (T1)	P3.5
16	Write (WR)	P3.6
17	Complement of read (RD)	P3.7

Sunday 29

Remember

I/O ports and Bit Addressability

It is a mostly used feature of 8051 while writing code for 8051. Sometimes there is a need to use only 1 or 2 bits of the port instead of using entire 8 bits. 8051 microcontroller provides the feature to use each bit of the ports.

While using a port in a single bit manner, use: provide the syntax 'SETB X.Y', where X is the port number varies from 0 to 3, Y is a bit number varies from 0 to 7.

For example: "SETB P1.3" sets high bit 3 of port 1.

→ Let see an assembly code for toggling the bit of P1.5 continuously.

```
AGAIN
SETB P1.5
ACALL DELAY
CLR P1.5
ACALL DELAY
SJMP AGAIN.
```

→ Single bit Instruction

Instruction	Function
CLR bit	Clear the bit (bit=0)
CPL bit	Complement the bit (bit=NOT bit)
SETB bit	Set the bit
JB bit, target	Jump to target if bit=1

JBC bit, target Jump to target if bit = 1, clear bit.

JNB bit, target Jump to target if bit = 0, (jump if no bit)

Addressing modes of 8051

following addressing modes are used for executing the instruction in 8051.

- Immediate addressing mode
- Indexed addressing mode
- Direct addressing mode
- Register direct addressing mode
- Register Indirect addressing mode.

Immediate addressing mode

Let's start with an example

MOV A, #4AH i.e MOV A, #data

It is known as immediate because 8 bit data is send immediately to the accumulator.

Consider the following illustration describes the above set of instructions and their execution
The opcode 74H is saved at 0202 address.
The data 4AH is saved at 0203 address inside a program memory. After reading an opcode 74H, the data at the next memory address is copied to the accumulator A (E0H is the address of accumulator). Since an instruction

is of 2 bytes and it is executed in single cycle, the program counter will increment by 2 and will point to 0204 address of the program memory.

Immediate Addressing Mode

Instruction	Opcode	Bytes	Cycle
MOV A, #6AH	74H	2	1