

6. (a) What are different serial I/O modules available in mid-range PIC microcontroller? Discuss SPI module for port expansion. Explain related SFRs. (7.5)
- (b) Discuss meaning (with format and example) and flags affected by following instructions :
- (i) movf (ii) swapf (iii) clrw (iv) retlw (v) rlf (vi) btfsc (vii) decfsz. (7.5)
7. Explain all the interrupts and associated SFRs in the 8051 microcontroller. Write a program using interrupts to do the following :
- (a) Receive data serially and send it to Port 2
- (b) Configure Port 1 as input, read it, transmit data serially
- (c) Program timer0 to generate a square wave of 5 KHz frequency on Port0.1. Assume that XTAL=11.0592 MHZ. Set the baud rate at 9600. (15)

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B.Tech. (ENC) V SEMESTER

Embedded System Design (ECP-501)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.
2. Answer any four questions from Part-B in detail.
3. Different sub-parts of a question are to be attempted adjacent to each other.
4. Assume data wherever required.

PART-A

1. (a) What are the advantages and disadvantages of using Harvard architecture in comparison to Princeton? (1.5)
- (b) What is the Baud rate in serial communication? In 8051, for serial communication in mode 1, how the Baud rate is calculated? (1.5)
- (c) Discuss how instruction pipelining is implemented in PIC? (1.5)

- (d) What is the maximum delay the Timer0 produces when 8051 is operated at 22MHz? Give calculations.

(1.5)

- (e) In 8051, after the instruction MOV IP, #00011000, what will be the priorities of interrupts?

(1.5)

- (f) Which bits in which register(s) must be set to make INT0 level activated, and INT1 edge triggered?

(1.5)

- (g) The following program generates a square wave on pin P 1.5 Using timer 1. Find the frequency.

Consider XTAL = 11.0592 MHz

MOV TMOD, #10H

AGAIN : MOV TL1, #26H

MOV TH1, #71H

SETB TR1

BACK : JNB TF1, BACK

CLR TR1

CPL P1.5

CLR TF1

SJMP AGAIN

(1.5)

- (h) What are the various architectural features of PIC?

(1.5)

- (i) Find the value of INTCON, PIE and PIR registers for enabling the following interrupts: Timer 1, USART for data transmission and external interrupt.

- (j) Write short note on Intel Hex Format object file.

PART-B

2. (a) Draw the port structure of 8051 and explain its working. A switch SW is connected to pin P1.4. Write a program to output 00H on port1 if SW=0 and FFH on port1 if SW=1.

(7.5)

- (b) Why interrupt is an important feature of a controller? Discuss different interrupt sources available for PIC. Explain associated SFRs.

(7.5)

3. (a) Sketch the interface of a 16ch × 1 line LCD to the 8051 microcontroller. Write an 8051 assembly program segment to display any character.

(7.5)

- (b) What is an embedded system? Enlist and explain its components. What are the applications of an embedded system?

(7.5)

4. What is meant by pre-scaling and post-scaling in PIC microcontroller? Discuss the timer 1 and 2 operations and write the various steps to initialize them stating appropriate control words in the associated SFRs.

(15)

5. (a) Write a program to add 10 numbers stored in bank 0 starting at address 20H in RAM. Store the result at RAM address 30H and 31H using PIC instructions.

(7.5)

- (b) The speed of a stepper motor has to be controlled using an 8051 microcontroller. Design the required hardware and explain the necessary software.