Question Paper

Exam Date & Time: 29-Apr-2019 (02:00 PM - 05:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

MICROCONTROLLERS [IBM 241 - S2]

Marks: 100 **Duration: 180 mins.**

Answer 5 out of 8 questions.

1. Answer any FIVE FULL questions
2. Draw neat diagrams wherever necessary
3. Assume missing data, if any

1) A.) Draw the format of the 8051 registers IE and IP, and write significance of each bit of the registers. (12)

B.) How do you implement a time delay of 10mS using the Timer-1 of the 8051 microcontroller, operating at 12MHz? Explain. (8)

2) A.) How does the register PSW of the 8051 helps in selecting register banks? Explain. (6)

B.) What are the different operating modes of the 8051 timers? How do you configure the mode? (6)

C.) Design an 8051 microcontroller based display device to have two Common-Anode seven-segment digits. And program the same to display a message "HI" continuously. Refresh the display at a rate of 200Hz. (8)

3) A.) How do you interface an 8-channel, 8-bit ADC in the interrupt space of the 8051 microcontroller, using INT0 interrupt? Write an assembly language program to digitize an analog signal of amplitude varying between 0 to 5V, and maximum frequency component 100 Hz, applied to the IN-0 input of the ADC. (12)

B.) How do you make use of the 8051 microcontroller's Serial Port (UART) in mode-1? Explain. (8)

4) A.) Write an 8051 assembly language program to add ten 2-digit decimal numbers available in the internal data memory starting at 20H. Store the result in the registers A and B. (7)

B.) What is the significance of the stack pointer in the 8051 microcontroller? Why is it required to initialize the Stack Pointer? Justify your answer with an illustration. (5)

C.) List and explain the unconditional branching instructions of the 8051 microcontroller. (8)

5) A.) Explain the following interfacing devices useful in the 8051 microcontroller system. (8)
(i) Decoder

(ii) Latch

B.) Generate a square wave of frequency 1 KHz with a duty cycle of 50% on P0.1 pin of the microcontroller without interfacing the DAC. Assume that the microcontroller is operating at frequency of 11.0592 MHz. (8)

C.) Write the features of PIC microcontroller. (4)

6) A.) Explain in detail the following instructions of the 8051 microcontroller: (12)
(i) MUL AB
(ii) DIV AB
(iii) ANL C, /bit
(iv) JNB bit, rel

B.) Explain with an example to each, the following addressing modes of the 8051 microcontroller: (8)
(i) Direct
(ii) Indirect
(iii) Indexed
(iv) Register

7) A.) Interface one 2KB EPROM chip, one 2 KB Static RAM chip and one 8255 PPI to the 8051 microcontroller. Draw the interface diagram and allocate addresses to all the devices. (10)

B.) Write an 8051 assembly language program to read a byte from the external memory location 2000H, and if it is an even number send it to Port1 of the microcontroller, else write it in to the register R0 of default bank. (10)

8) A.) List and explain the instructions available to access the external data memory and internal or external program memory of the 8051 microcontroller. (8)

B.) Draw the structure of internal data and program memory of the 8051 microcontroller, and explain the technique used to bypass the internal program memory. (6)

C.) Draw and explain the PIC microcontroller's registers- the Program Counter and the Status Register. (6)

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