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10ES42

**Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Microcontrollers**

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.**

**PART – A**

- 1
  - a. Distinguish Harvard and Von-Neumann (Princeton) architectures with diagrams. (06 Marks)
  - b. Explain with block diagram the architectural feature of 8051 and list out salient features of 8051 microcontroller. (08 Marks)
  - c. Discuss the need for stack memory in microcontrollers. Explain with examples the PUSH and POP instructions. (06 Marks)
  
- 2
  - a. What are the addressing modes supported by 8051  $\mu$ C? Explain with examples. (08 Marks)
  - b. Explain the different types of conditional and unconditional jump instructions of 8051. Specify the different ranges associated with jump instructions. (08 Marks)
  - c. Differentiate between the following instructions:  
i) SWAP and XCH    ii) SJMP and LJMP. (04 Marks)
  
- 3
  - a. Write a ALP to copy the most significant nibble of A in both nibbles of RAM address 3Ch. Also write the algorithm for example if A = 36h, then 3Ch = 33h. (06 Marks)
  - b. Write an ALP to add the unsigned numbers found in internal RAM locations 25h, 26h and 27h together and put the result in RAM locations 31L (MSB) and 30h (LSB). (08 Marks)
  - c. For a machine cycle of 1.085  $\mu$ sec find the time delay in the following subroutine:  
DELAY: MOV R2, # 200  
AGAIN: MOV R3, # 250  
HERE: NOP  
      NOP  
      DJNZ R3, HERE  
      DJNZ R2, AGAIN  
      RET. (06 Marks)
  
- 4
  - a. With a relevant figure write a sequence of events that occur in 8051 microcontroller when the CALL and RET instructions are executed. (06 Marks)
  - b. What are the ways to create time delay? Discuss the factors affecting the accuracy of the time delay. (07 Marks)
  - c. What are the differences between timer and counter? Explain with the formats of the SFR. (07 Marks)

**PART – B**

- 5
  - a. In what way timer/counter mode 2 programming is different from mode 0 and mode 1? (06 Marks)
  - b. Write an ALP to generate square wave on pin 3.4 of ON Time 4 msec and OFF Time 3 msec, using timer 0, mode 0. Assume that crystal frequency of 8051 is 11.0592 Hz. (08 Marks)
  - c. Explain the importance of interrupt priority (IP) SFR and the beginning fixed address of the interrupt handler subroutines. (06 Marks)

- 6 a. Write the steps required for programming 8051 to transfer data serially and what is the role of PCON register in serial communication? (07 Marks)
- b. Write a C program to interface 8051 to LCD. Draw the hardware schematic. (07 Marks)
- c. Write a 'ALP' program to interface stepper motor to 8051, with a neat diagram of 8051 connection to stepper motor. (06 Marks)
- 7 a. Tabulate the different data types in 'C', bits and the data range. (05 Marks)
- b. Write an 8051 C program to send two different strings to the serial port. Assuming that SW is connected to pin P2.0, monitor its status and make a decision as follows:  
SW = 0. send your first name  
SW = 1. send your last name.  
Assume XTAL = 11.0592 MHz, baud rate of 9600, 8 bit data 1 stop bit. (10 Marks)
- c. Write a 'C' program to serially transmit the message "HELLO" continuously at baud rate of 9600, 8-bit data and 1 stop bit. (05 Marks)
- 8 a. Briefly discuss the features of MSP 430 microcontrollers. (06 Marks)
- b. Explain different addressing modes of MSP 430 with examples. (08 Marks)
- c. Write a MSP 430 assembly program to find the largest in the given array of 'n' bytes. (06 Marks)

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