ACHARYA INSTITUTE OF TECHNOLOGY
Bangalore - 560090

USN | | | | | | | | | | |

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 μC? 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 μsec 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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