USN [| | | | | | | |]   06ES42

Fourth Semester B.E. Degree Examination, June/July 2014

Microcontrollers

Time: 3 hrs.   Max. Marks:100

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

PART – A

1   a.   Define microcontroller and compare the RISC and CISC processors.   **(05 Marks)**
    b.   With the neat block diagram, explain the architecture of 8051.   **(10 Marks)**
    c.   Explain TCON and TMOD registers of 8051, with the help of timer/counter control logic.
                                                                                      (05 Marks)

2   a.   What is addressing mode? Explain different addressing modes with examples.   **(08 Marks)**
    b.   Explain with examples the PUSH and POP instructions.   **(06 Marks)**
    c.   Write an assembly language program using 8051 mnemonics to multiply the unsigned
         number in register R3 by the unsigned number on Port 2 and put the result in external RAM
         location 10 h (MSB) and 11 h (LSB).   **(06 Marks)**

3   a.   Explain different ranges for jump instruction available in 8051 microcontroller.   **(08 Marks)**
    b.   With the suitable figure, write a sequence of events that occur in 8051 microcontroller when
         the CALL and RET instructions are executed.   **(06 Marks)**
    c.   Write a program to exchange the lower nibble of data present in external memory 6000 H
         and 6001 H.   **(06 Marks)**

4   a.   What are the ways to create time delay? Discuss the factors affecting the accuracy of the
         time delay.   **(06 Marks)**
    b.   Write an 8051 C program to toggle the bits of P1 ports continuously with a 250 ms delay.
                                                                                      (06 Marks)
    c.   Write a C program to bring in a byte of data serially one bit at a time through P1.0. The LSB
         should come in first.   **(08 Marks)**

PART – B

5   a.   Describe with the sketch characteristics and operations of timer in mode 2.   **(06 Marks)**
    b.   Assuming XTHAL = 22 MHz, write a program to generate a pulse train of 2 sec period on
         Pin P2.4. Use timer 1 in mode 1.   **(06 Marks)**
    c.   Write an 8051 C program to toggle only Pin P1.5 continuously every 250 ms. Use timer 0,
         mode 2 (8 – bit auto-reload) to create the delay.   **(08 Marks)**

6   a.   Explain RS-232 handshaking signals and specify the purpose of max-232 while interfacing.
                                                                                      (06 Marks)
    b.   Write the steps required for programming 8051 to transfer data serially.   **(08 Marks)**
    c.   Write an 8051 C program to transfer the message "YES" serially at 9600 baud, 8 bit data,
         1 stop bit. Do this continuously.   **(06 Marks)**

7 a. What are interrupts and interrupt service routines? Explain the interrupts that are present in 8051. **(06 Marks)**

   b. With sketch explain level triggered interrupt mode. **(06 Marks)**

   c. Write a C program that continuously gets a single bit of data from P1.7 and sends it to P1.0, while simultaneously creating a square wave of 200 μs period on Pin P2.5. Use timer 0 to create the square wave. Assume that XTAL = 11.0592 MHz. **(08 Marks)**

8 a. Explain with a block diagram the procedure steps involved to interface 4 × 4 matrix keyboard with 8051. **(10 Marks)**

   b. Show the interfacing of a stepper motor to 8051 and write a program in C to monitor the status of switch SW connected to Pin P2.7 to perform the following:
       i) If SW = 0, the stepper motor moves clockwise.
       ii) If SW = 1, the stepper motor moves counter clockwise. **(10 Marks)**

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