Fourth Semester B.E. Degree Examination, May/June 2010
Micro-Controllers

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FIVE full questions*
selecting at least TWO questions from each part.
2. Standard notations are used.

PART – A

1 a. Give the basic block diagrams, of a microprocessor and a microcontroller and justify that a microcontroller is an onchip computer. **(08 Marks)**
   b. What is Harvard architecture? Show that 8051 uses Harvard architecture. **(06 Marks)**
   c. Briefly discuss the features of 8051 microcontroller. **(06 Marks**

2 a. Explain the following in brief, with respect to 8051 :
       i)   The pin that connects the external memory
       ii) The port that has open-drain output
       iii) Asynchronous input pins of microcontrollers
       iv) The register that sequences the program execution
       v)   Program status word. **(10 Marks)**
   b. Write the circuit diagram for Port1. Explain the input, output operations in 8051 using Port1. **(10 Marks)**

3 a. Give the mode word, (TMOD) and the control word, (TCON) values to perform the following operations :
       i) Timer 0 in auto reload mode
       ii) Timer 1 in mode1. **(06 Marks)**
   b. Explain the serial data interrupts TI and RI in 8051. **(06 Marks)**
   c. Name the addressing modes of the following instructions :
       i)   MOVC A, @ A + DPTR
       ii) MULAB
       iii) MOV B, #OFFh
       iv) SUBB A, 45h. **(04 Marks)**
   d. Explain any two data transfer instructions and any one arithmetic instruction in 8051. **(04 Marks)**

4 a. Name the instructions which perform bit level logical operations in 8051. Give an example to show bit level logic operation. **(06 Marks)**
   b. Write an assembly program in 8051 to add two 16 bit numbers stored in external memory. After addition store the results in internal data memory. **(06 Marks)**
   c. Write the result statement after execution of each instruction :
       MOV 81 h, #30 h
       MOV RO, #OAC h
       PUSH 00
       PUSH 00
       POP 01
       POP 80 h
       MOV A, # OFF h
       XRL A, 80 h
       POP 82 h
       POP 83 h
       MOVX @ DPTR, A. **(08 Marks)**

PART – B

5 a. Write an assembly program in 8051 to convert a given two digit hexadecimal number to its equivalent decimal number and send the result on to port 2 byte by byte. **(06 Marks)**

   b. How is a 'call' subroutine different from an interrupt service routine? Give an example to show call subroutine' operation in 8051. **(06 Marks)**

   c. What are the final numbers in A, B and OV flag after the execution?
   MOV A, # 7B h
   MOV OFO, #02 h
   MUL AB
   MOV B, # OFE h
   MUL AB. **(04 Marks)**

   d. Give the magnitude of different data types used in embedded 'C'. **(04 Marks)**

6 a. Write the block diagram to show mode 2 operation of timer 1, as a counter, also write the programming steps to perform the same. **(06 Marks)**

   b. Find the delay generated by timer O in the following code. Calculate the delay generated excluding the instruction overhead. What count has to be loaded in TLO and THO if delay has to be increased to 25 msec?
   CLR P2.3
   HERE : MOV TMOD, #01
   MOV TLO, # 3E h
   MOV THO, # 0 B8 h
   SETB P2.3
   SETB TRO
   AGAIN : JNB TFO, AGAIN
   CLR TFO
   CLR TRO
   CLR P2.3. **(08 Marks)**

   c. What is asynchronous serial communication? Explain the different modes of serial communication in 8051. **(06 Marks)**

7 a. Write 8051 'C' program to receive bytes of data serially and put them in P1. Set the baud rate as 4800, 8 bit data and one stop bit. **(06 Marks)**

   b. Explain the different interrupt vector addresses in 8051. **(04 Marks)**

   c. Write a 8051 'C' program that continuously gets a single bit of data from P1.7 and sends it to P1.0, which creates a square wave of 200 μs period on pin P2.5. XTAL frequency = 11.0592 MHz. **(10 Marks)**

8 a. Interface LCD to 8051 and write a 8051 assembly /8051 'C' program to send 'M', 'A' 'S', 'T', 'E', 'R' to LCD display. **(10 Marks)**

   b. Show the interfacing of a stepper motor to 8051 and write 8051 assembly/8051 'C' program to rotate stepper motor 2 rotations clockwise and one rotation anticlockwise with appropriate delay. **(10 Marks)**

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