Fourth Semester B.E. Degree Examination, Jan./Feb. 2023
Microcontroller

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a.   Differentiate between microcontrollers and microprocessor (any five).   **(05 Marks)**
    b.   Explain the following pins of 8051 microcontroller   i) $\overline{EA}$ ii) ALE   iii) $\overline{PSEN}$
         iv) XTAL1 and XTAL2   v) $\overline{RD}$.   **(05 Marks)**
    c.   With a neat block diagram, explain the architecture of 8051 microcontroller briefly.
                                                                                 (10 Marks)

OR

2   a.   Explain in brief with respect to 8051 microcontroller:
         i) Program status word   ii) Dual function of port 3 pins.   **(04 Marks)**
    b.   Show neat schematic to interface 8KBROM (External) and 8KB external Data RAM to 8051
         microcontroller.   **(06 Marks)**
    c.   Write circuit diagram of port 1, Explain input, output operations in 8051 using port 1.
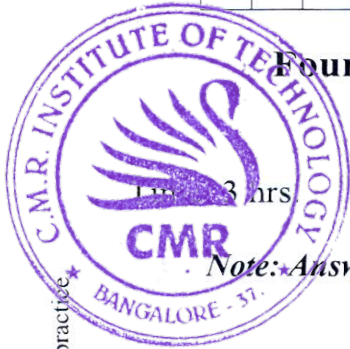   **(10 Marks)**

Module-2

3   a.   Define addressing mode, explain the addressing modes of 8051 with examples (any 4).
                                                                                 (10 Marks)
    b.   Explain the following instructions of 8051 with an example for each instruction:
         i) SUBBA, addr   ii) Movc A, @ A + DPTR   iii) PUSH addr   iv) SETB psw . 4
         v) RL A   **(10 Marks)**

OR

4   a.   Write an ALP in 8051 to exchange the contents of registers R7 and R6 in register Bank 0 in
         five different ways.   **(10 Marks)**
    b.   Explain the different types of conditional and unconditional jump instructions of 8051.
         Specify the different range associated with jump instruction.   **(10 Marks)**

Module-3

5   a.   Assume that the RAM locations 40h-44h have the following values. Write an ALP to find
         the sum of the values. Store the low byte of the result in A register and high byte of the
         result in R7 register, (involving loops in program)
         40h – (70)
         41h = (EBG)
         42h = (C5h)
         43h = (5Bh)
         44h = (30h)   **(10 Marks)**
    b.   Write an ALP in 8051 to move a block of data stored in external memory location 9000h to
         a location starting from foooh. Block length N = 5.   **(10 Marks)**

OR

6 a. Using registers write a subroutine to get
    i) A delay of 5 msec, assume the crystal oscillator frequency is 22MHZ show delay calculations.
    ii) A delay of 200msec, assume the crystal frequency is 11.0592MHZ show the delay calculations. **(10 Marks)**
  b. Design a circuit to interface a simple LED and a switch to 8051µc. Write an ALP in 8051 to turn LED ON/OFF, if the content of the internal bit addressable memory location 20h content is 01 or ooh respectively. LED is connected to pin p2.0, switch (sw) connected to p1.0. **(05 Marks)**
  c. Briefly explain about stack and stack operations. **(05 Marks)**

Module-4

7 a. With regard to timers of 8051
    i) Explain TMOD and TCON registers with its bit pattern.
    ii) Indicate how to start/stop timer if GATE control is also used. **(10 Marks)**
  b. Explain mode 2 programming with neat sketch and specify the program steps. **(05 Marks)**
  c. Write an assembly language program in 8051 to generate a pulse using mode-1 on a port pin p1.4 with delay of pulse as 1ms, crystal frequency of 11.0592 MHz. Show delay calculation. **(05 Marks)**

OR

8 a. List the advantages of serial communication over parallel communication. **(06 Marks)**
  b. Explain briefly the asynchronous serial communication format with an example. **(04 Marks)**
  c. Write an 8051 ALP and C program for the 8051 to transfer the letter 'A' serially at 4800 baud rate continuously. Use 8 bit data and 1 stop bit. **(10 Marks)**

Module-5

9 a. With regard to the interrupt of 8051:
    i) Give the vector addresses of the interrupts.
    ii) Briefly explain the procedure of enabling/disabling the entire interrupt system and enabling/disabling of individual interrupts.
    iii) What are the steps micro controller to perform up on activation of an interrupt. **(10 Marks)**
  b. Show the interfacing of a stepper motor to 8051. A switch is connected to (SW) pin P3.2. Write an assembly language program to monitor the status of SW and perform the following:
    i) If SW = 0 the stepper motor moves clockwise
    ii) If SW = 1 the stepper motor moves anti clockwise. **(10 Marks)**

OR

10 a. Write an ALP to generate a square wave of 5kHz on pin P1.2. Using an interrupt generated from timer 0 of 8051µc, crystal frequency 22MHZ. **(08 Marks)**
   b. Interface an LCD display to 8051 and write an ALP to display the characters 'A' 'B' 'C'. **(12 Marks)**

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