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18EC46

Fourth Semester B.E. Degree Examination, June/July 2023

Microcontrollers

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. Write and explain the pin diagram of 8051 microcontroller. (10 Marks)
- b. With a neat diagram, explain the Block diagram 8051 microcontroller. Also explain PSW, RAM memory organization. (10 Marks)

OR

- 2 a. Describe the features of 8051 microcontroller with a neat diagram. (10 Marks)
- b. Explain the external interfacing of 16KB of ROM, 32KB of RAM to 8051 microcontroller such that the starting address of ROM is 0000H and RAM 8000H. (10 Marks)

Module-2

- 3 a. What are the addressing modes supported by 8051? Explain with example. (10 Marks)
- b. Write an assembly language program along with flow chart to divide the data in RAM location 41H by the data in 20H. Store the quotient on 70H and remainder in 71H. (10 Marks)

OR

- 4 a. Explain the following instructions with example
i) DJNZ Rn, rel ii) MOVC A, @A + DPTR iii) RRC A iv) PUSH 02 v) DAA. (10 Marks)
- b. Write a program segment to copy the value 55h into RAM memory locations 40h to 44h using i) Direct addressing mode ii) Register indirect addressing mode without a loop iii) and with a loop. (10 Marks)

Module-3

- 5 a. Explain the role of CALL and subroutines in 8051 microcontroller programming. Give an example. (10 Marks)
- b. Write on ALP along with flow chart to find smallest number in an array of 10bytes of data stored in external memory location starting with 3000H. Store the result in internal memory 30H. Show the results obtained with sample data given. (10 Marks)

OR

- 6 a. Explain the operation of PUSH, POP, LCALL, ACALL and RET instructions of 8051 giving all the steps involved with suitable examples. (10 Marks)
- b. Write an assembly language program to toggle all the bits of P0, P1 and P2 every $1/4^{\text{th}}$ of a second. Assume crystal frequency is 11.0592MHz. (10 Marks)

Module-4

- 7 a. Explain TMOD register format of 8051. (04 Marks)
 b. Explain MODE-1 programming of timers in 8051. (06 Marks)
 c. Write an ALP to generate square wave of frequency 1KHz on P1.3. Assume crystal frequency, XTAL = 22MHz. User Timer 1 in mode 1. (10 Marks)

OR

- 8 a. Write an 8051 program to transfer "YES" serially at 9600 baud, 8 bit data, 1 stop bit, do this continuously. (05 Marks)
 b. Explain SCON register with its bit pattern. (05 Marks)
 c. Write the steps required for programming 8051 to transmit and receive the data serially and what is the role of PCON register in serial communication. (10 Marks)

Module-5

- 9 a. Assume that the INT1 pin is connected to a switch that is normally high. Whenever it goes low, it should turn on the LED. The LED is connected to P1.3 and is normally off. When it is turned on it should stay on for a fraction of a second. As long as the switch is pressed low, the LED should stay on. Write an ALP for this. (05 Marks)
 b. Write a program in which the 8051 reads data from P1 and writes it to P2 continuously; while giving a copy of it to the serial comport to be transferred serially. Assume that XTAL = 11.0592MHz. Set the baud rate at 9600. (05 Marks)
 c. Explain the structure of Interrupt Priority (IP) and Interrupt Enable (IE) SFR. (10 Marks)

OR

- 10 a. Explain DAC interface with diagram and also write a program to generate stair case waveform. (10 Marks)
 b. Explain stepper motor interface with diagram and also write C program to monitor the status of switch and rotate clockwise if status of switch is zero and anticlockwise if status of switch is one. (10 Marks)

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