

# CBCS SCHEME

USN

A V P Q O E C O Q 2

18EC46

Fourth Semester B.E. Degree Examination, July/August 2022

## 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 the block diagram of 8051 and explain its main features. (08 Marks)
- b. What is an embedded system and write its characters. (06 Marks)
- c. Write the starting address and ending address of internal RAM used in 8051 and how it is classified. (06 Marks)

OR

- 2 a. Show how 8K RAM and 8K EPROM can be interfaced to 8051 micro controller. Assume the EPROM starts from address 0000H. (08 Marks)
- b. How many ports are present in 8051 and explain the different functions of each port. (06 Marks)
- c. Compare microprocessor and micro controllers. (06 Marks)

### Module-2

- 3 a. How the instruction set of 8051 is classified depending on the addressing mode and explain all of them with example. (08 Marks)
- b. List the different SFR's present in 8051 and also write the address of them. (04 Marks)
- c. Write an assembly level program to multiply the number present in external memory location 800AH and 8050H. Store the lower byte of result obtained in R0 and higher byte in R1. (08 Marks)

OR

- 4 a. Explain the different rotate instructions present in 8051  $\mu$ C with an example. Also explain the working of SWAP instruction. (08 Marks)
- b. Explain the working of the following instructions and also find the time required to execute each instruction :
  - i) MOVC A, @A+PC XTAL = 12 MHz used
  - ii) XCHD A, @R1 XTAL = 11.0592 MHz used
  - iii) ADDC A, R5 XTAL = 10MHz used
  - iv) DIV AB XTAL = 11.0592MHz. (08 Marks)
- c. Write an assembly level program to set the bits 1, 4, 6, 7 of port 0 use bit level instructions to set the bits. (04 Marks)

### Module-3

- 5 a. Explain the working of PUSH and POP instruction with necessary diagram. (04 Marks)
- b. Write a program to toggle all bits of P1 every 200ms. Assume crystal frequency is 11.0592MHz. Show all the calculations. (08 Marks)
- c. Write an assembly level program to count the number 1's and 0's present in the content of external memory location 8000H. Store the count of number 1's in reg. R0 and count of number of 0's in reg. R1. (08 Marks)

OR

- 6 a. What is the need of subroutine and explain the instructions associated with subroutine. (08 Marks)
- b. Write an assembly level program to mutually exchange the 10 bytes of data stored in external memory location starting from 8000H and 8020H. (06 Marks)
- c. Find the delay produced in the 8051 program.  
 Delay : MOVR3, # 200  
 Here : NOD  
 NOP  
 DJN2 R3, here  
 RET  
 Assume XTAL used 11.0592 MHz. (06 Marks)

Module-4

- 7 a. Explain all the bits of TMOD and TCON register. (08 Marks)
- b. Assuming XTAL frequency as 11.0592MHz write a program to generate 4 KHz square wave on P2.1. Use timer 0 in model show all the calculations. (08 Marks)
- c. Write the steps to program the timer of 8051 in mode 2. (04 Marks)

OR

- 8 a. In asynchronous method of communication how the framing is done explain with necessary diagram. Also mention the different pins of DB – 9 pin connector. (08 Marks)
- b. A switch is connected to pin 2.0 monitor the status of the switch if SW = 0. Write an 8051C program to send the message 'READ' and if SW = 1 send the message 'WRITE' XTAL frequency = 11.0592MHz. (08 Marks)
- c. Compare parallel and serial data transfer. (04 Marks)

Module-5

- 9 a. Name the external hardware interrupts present in 8051 and how the activation of them will be done. (06 Marks)
- b. Write a program to read the data from port P1 and send it to P2 continuously. While incoming data from the serial port is sent to P0. Assume XTAL = 11.0592MHz set the baud rate at 2400. (06 Marks)
- c. Write the interrupt priority upon reset in 8051. Also explain how the priority of the interrupts can be set using IP register. (08 Marks)

OR

- 10 a. Write a table to find the digital value to be send to DAC for generating sine wave in steps of 30°. Using the table write an assembly level program to generate a sine wave using DAC interfaced to microcontroller 8051. Assume full scale voltage for DAC is 10V and XTAL = 11.0592MHz. (10 Marks)
- b. How draw the diagram to inter face a stepper motor to 8051MC. Also write a program to monitor the status of switch connected to port P2.7. If SW = 0. The stepper should rotate clockwise else it should rotate in anticlockwise direction. (10 Marks)

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