



10ES42

Fourth Semester B.E. Degree Examination, Dec.2019/Jan.2020  
**Microcontrollers**

Time: 3 hrs.

Max. Marks:100

**Note:** Answer any FIVE full questions, selecting atleast TWO questions from each part.

**PART - A**

- 1 a. With basic block diagrams, compare microprocessors and microcontrollers. (06 Marks)  
b. With a neat block diagram, explain the major architectural features of 8051. (10 Marks)  
c. Explain the principal of stack operation using PUSH and POP instructions by using suitable diagram. (04 Marks)
- 2 a. Explain the five major addressing modes of 8051 with examples. (10 Marks)  
b. Explain the following instructions of 8051 with examples for each instruction :  
i) MUL AB    ii) CLR A    iii) MOVX A@ R<sub>i</sub>    iv) XCHD A, @ R<sub>0</sub>  
v) SUBB A, @ R<sub>0</sub>    vi) DEC DPTR. (06 Marks)  
c. Show the steps involved in the following :  
CLR C  
MOV A, # 3 FH  
MOV R<sub>3</sub>, # 23H  
SUBB A, R<sub>3</sub>. (04 Marks)
- 3 a. What are Assembler directives? Explain any four of them. (05 Marks)  
b. Write 8051 ALP to add two 16 – bit numbers 3CE7H and 3B8DH. The program should store first numbers higher and lower byte in memory locations 30 and 31, second numbers higher and lower byte in 32 and 33. Result of lower and higher byte in locations 40 and 41. (05 Marks)  
c. Write 8051 ALP to test whether the byte at 20H is nibble wise palindrome. If it is a palindrome, store FF at 21H, else store 00 at same location. (05 Marks)  
d. Find the size of the time delay in the following ALP program , if the crystal frequency is 11.0592 MHz.  
MOV A, # 55H  
AGAIN : MOV P1, A  
A CALL DELAY  
CPL A  
SJMP AGAIN  
Time delay  
DELAY : MOV R<sub>3</sub>, # 200  
HERE : DJNZ R<sub>3</sub>, HERE. (05 Marks)
- 4 a. Draw a block schematic of DAC 0808 interfaced to 8051 at port P1 and write an 8051 ALP program to generate a sine wave. (10 Marks)  
b. Write 8051 connection to stepper motor and give the number of times the four step sequence must be applied to a stepper motor to make an 80 degree move if the motor has a 2 – degree step angle. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written e.g, 42+8 = 50, will be treated as malpractice.

**PART – B**

- 5 a. What is an Interrupt and Interrupt service routine? Explain interrupt structure of the 8051 microcontroller. (04 Marks)
- b. Differentiate between a counter and timer. Explain any two modes of operation of timer/counter of the 8051 with a diagram. (10 Marks)
- c. Explain TCON and TMOD SFR registers of 8051 timers. (06 Marks)
- 6 a. Explain Asynchronous serial communication and data framing. (05 Marks)
- b. Write a ALP program to transfer the message "YES" serially at 9600 baud 8 – bit data, 1 stop bit continuously. (07 Marks)
- c. Explain with block diagram, the architectural features of 8255A programmable peripheral interface. (08 Marks)
- 7 a. Show the interfacing circuit and functional PINS of LCD. (05 Marks)
- b. Explain SCON register with its bit pattern. (05 Marks)
- c. Show a simple keyboard interface with a port of 8051 and explain its operation. (07 Marks)
- d. What is Baud rate? Which timer of the 8051 is used to set the baud rate? (03 Marks)
- 8 a. List the Qualities of characteristics of MSP – 430 microcontroller. (06 Marks)
- b. With a neat block diagram, explain the CPU of MSP – 430 microcontroller. (10 Marks)
- c. Briefly explain different types of instruction set in MSP – 430 microcontroller. (04 Marks)

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