



## P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

**Fourth Semester, B.E. - Electrical and Electronics Engineering**

**Semester End Examination; May / June - 2019**

### Microcontrollers

Time: 3 hrs

Max. Marks: 100

*Note: Answer FIVE full questions, selecting ONE full question from each unit.*

#### UNIT - I

- |      |   |   |
|------|---|---|
| 1 a. | List out any four differences between Microprocessor and Microcontroller.                                   | 4 |
| b.   | Draw the functional block diagram of 8051 $\mu$ c and explain various 8-bit and 16-bit registers only.      | 8 |
| c.   | Explain and analyze the difference between two architectures based on instruction sets.                     | 8 |
| 2 a. | Draw the functional block diagram of 8051 $\mu$ c and explain the architecture excluding various registers. | 8 |
| b.   | List and analyze the differences between the Von-Neumann and Harvard architecture based on memory.          | 6 |
| c.   | What is the size of internal ROM and RAM? Explain the internal RAM organization with relevant diagram.      | 6 |

#### UNIT - II

- |      |   |   |
|------|---|---|
| 3 a. | What is the need of stack? When $\mu$ c is powered on, SP is initialized to what value? Explain the stack operations with an example.   | 8 |
| b.   | What is the need of addressing modes? Mention the various addressing modes used in 8051 $\mu$ c. Explain any three addressing modes with an example.  | 8 |
| c.   | Explain and analyze the following instructions with an example :<br>(i) MOVX      (ii) MOVC      (iii) SWAP      (iv) XCH   | 4 |
| 4 a. | Explain and analyze the various byte level logical AND operation.   | 6 |
| b.   | Identify and explain the various addressing modes used on the following instructions :<br>(i) MOVC A, @A+PC      (ii) MOVX A, @A+DPTR<br>(iii) MOV A, #25H      (iv) MOV A, @R <sub>i</sub><br>(v) MOV R <sub>2</sub> , 40H      (vi) MOVX A, @R <sub>i</sub> | 6 |
| c.   | Identify the syntax in the following instructions and write the correct instructions with valid reason :<br>(i) MOV A, @R <sub>7</sub> (ii) MOV #70H, R <sub>3</sub> (iii) XCH R <sub>1</sub> , R <sub>7</sub> (iv) MOV DPTR, A                               | 8 |

#### UNIT - III

- |      |   |   |
|------|---|---|
| 5 a. | Explain and analyze the following JUMP instructions with an example with respect to the distance :<br>(i) SJMP      (ii) AJMP      (iii) LJMP      (iv) JMP @A+DPTR | 8 |
| b.   | If ten bytes of data are stored from RAM locations 45H to 54H add 02 to each of them and save the result in RAM locations 79H down to 70H.                          | 8 |

c. Find the contents of register A and B after executing the following code in each case :

(i) MOV A, #37 H                      (ii) MOV A, #95 H  
       ANL, #0CA H                      MOV B, #05H  
   MUL AB

4

6 a. Why 8051 is called as Boolean processor? Explain any five bit handling instructions with an example. 6

b. Explain and analyze the following instructions with an example :

(i) INC and DEC                      (ii) A CALL and LCALL  
       (iii) DJNZ and DJZ              (iv) CJNE and CJE

8

c. Write an ALP to count the number of ones and zeros in a given number 68H with comments. 6

#### UNIT - IV

7 a. What is the difference between a Timer and Counter? How many timers are there in 8051  $\mu$ c? Mention the various modes of operation. 6

b. Explain the various steps involved in mode-1 operation of timers. 6

c. If the crystal frequency is 12 MHz, find the counts we need to load into timer registers. Also write a program to create a pulse width of 5 ms on pin P1.5 using timer '0'. 8

8 a. Draw and analyze the contents of TMOD register. 6

b. Explain the various steps involved in mode-2 operation of timer. 6

c. Assuming the clock pulses are fed into T<sub>1</sub> (P3.5). Write a program for counter '1' in mode-2 and display the state of TL1 count on port '2' with comments. 8

#### UNIT - V

9 a. Write the format of SCON register and analyze its contents. 4

b. Explain and analyze the following with respect to serial communication and give an example for each: 6

(i) Simplex                      (ii) Half duplex                      (iii) Full duplex

c. Draw the vector interrupt table and analyse the various interrupts. 4

d. Write an ALP that continuously read 8-bit data from port '2' and sends to port '0'. At the same time it should generate a square wave on port '0'. Assume the crystal frequency 11.0592 MHz and TH0 = 1AH. Use time '0' interrupt. 6

10 a. Explain and analyse the following with respect to serial communication :

(i) Asynchronous

(ii) Synchronous

(iii) RS232 standard

8

b. What is an interrupt? Distinguish between interrupts versus polling in detail. 6

c. Write an ALP to transfer the message "WELCOME" serially, set the band rate at 4800, 8-bit data and 1 stop bit with comments. 6