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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 μc 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 μc 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 μc 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 μc. Explain any three addressing modes with an example. 8

c. Explain and analyze the following instructions with an example : 4

(i) MOVX (ii) MOVC (iii) SWAP (iv) XCH

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 : 6

(i) MOVC A @A+PC (ii) MOVX A, @ A+DPTR

(iii) MOV A, #25H (iv) MOV A, @ R_i

(v) MOV R_2, 40H (vi) MOVX A, @ R_i

c. Identify the syntax in the following instructions and write the correct instructions with valid reason : 8

(i) MOV A, @ R_7 (ii) MOV #70H, R_3 (iii) XCH R_1, R_7 (iv) MOV DPTR, A

UNIT - III

5 a. Explain and analyze the following JUMP instructions with an example with respect to the distance : 8

(i) SJMP (ii) AJMP (iii) LJMP (iv) JMP @A+DPTR

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

Contd…2

c. Find the contents of register A and B after executing the following code in each case : 4

(i) MOV A, #37 H
ANL, #OCA H

(ii) MOV A, #95 H
MOV B, #05H
MUL AB

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 : 8

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

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 μc? 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_1 (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 THO = 1AH. Use time '0' interrupt. 6

10 a. Explain and analyse the following with respect to serial communication : 8

(i) Asynchronous
(ii) Synchronous
(iii) RS232 standard

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

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