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

(An Autonomous Institution affiliated to VTU, Belgaum)

Sixth Semester, B.E. - Electrical and Electronics Engineering

Semester end Examination; June - 2016

Microcontroller and PLC

Time: 3 hrs *Max. Marks: 100*

Note: i) *Answer **FIVE** full questions, selecting **ONE** full question from each unit.*
ii) Missing data may suitably assume.

UNIT - I

1 a. Describe the advantages of microcontrollers over microprocessors. 4

b. Briefly explain the following with respect to 8051 microcontrollers :
i) 8051 oscillator circuit and machine cycle ii) 16 bit, 8 bit registers and PSW
iii) Internal RAM organization iv) Stack operation. 16

2 a. Differentiate between RISC and CISC CPU architectures. 4

b. I/O ports of 8051 are multifunctional. Draw port pin circuits and explain how alternate pin functions can be programmed in 8051. 16

UNIT - II

3 a. Explain the following 8051 instructions with examples :
(i) MOV X and MOV C (ii) XCH and XCHD
(iii) RL and RLC (iv) INC and DEC (v) ADD and ADD C 10

b. Write the contents of registers after the execution of each instruction,

```
MOV   R5, # 34 H  ;
MOV   R6, # 43 H ;
MOV   A, R6 ;
MOV   R7, A
MOV   A, R5;
MOV    R6, A ;
MOV   A, R7, ;
MOV R5, A;
```
6

c. Assume that register R2 contains 08H. Write a program to double the number in R2. 4

4 a. With examples explain the following instructions of 8051 :
(i) ANL and ORL (ii) MUL and DIV
(iii) PUSH and POP (iv) RR and RRC (v) CLR and CPL. 10

b. Write a program to multiply the unsigned number in register R3 by the unsigned number on port 1 and put the result in memory. 6

c. Write the contents of accumulator A and carry fly after the execution of each instruction,

```
MOV   A,  #   42h
ADD   A,  #   13h
DAA
ADD   A,  #  17h
DAA
```
4

Contd….2

UNIT - III

5	a.	Ten hex numbers are stored in RAM locations 50 H onwards. Write ALP program to find the biggest number in the set. The biggest number should finally be saved in 60 H.	8
	b.	Write a program to read and test port 1 to see whether it has the value 45 H. If it does sent 99 H to P2. Otherwise sent 00 to P2.	6
	c.	List 8051 interrupts and briefly explain.	6
6	a.	Write a note on Jump instruction ranges.	6
	b.	Write interrupt enable register format and explain.	6
	c.	Assume that 5 BCD data items are stored in RAM locations starting at 40 H. Write a program to find the sum in BCD.	8

UNIT - IV

7	a.	Write TMOD register format explain different modes of operation of timer.	10
	b.	Explain the role of TI flag during serial transmission using 8051.	4
	c.	Write a program to transfer a letter 'Y' serially at 9600 based continuously, and also to send a letter 'N' through port 0, which is connected to a display device.	6
8	a.	Write the format of SCON register and explain.	6
	b.	Write steps to be followed to program 8051 to receive data serially. What is the importance of RI flag in receiving bits serially?	6
	c.	Write a program to generate a pulse of width 5 ms on P2.3. Assume XTAL = 11.0592 MHz use timer 0 to generate the pulse.	8

UNIT - V

9	a.	Draw ladder rungs to represent the following cases, (i) Two switches are normally open and both have to be closed for a motor to operate (ii) Either of the two normally open switches is to be closed for a coil to be energized and operate an alternator. (iii) A motor in switched 'ON' by pressing a spring-relation push button start switch, and the motor remains on until another spring return push button stop switch in pressed.	6
	b.	Write a short note on off-delay timer.	6
	c.	Write a ladder diagram and timing diagram for up counter and explain.	8
10	a.	Design a ladder program for the system to carry out the following task count 10 objects passing along a conveyor belt and close a deflecting gate. Allow a time of 5 seconds between the tenth object being counted and closing the gate.	6
	b.	Write a typical ladder diagram of latching circuit and explain.	6
	c.	Draw a block diagram of PLC system hardware and explain.	8

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