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Fourth Semester B.E. Degree Examination, December 2010
Microcontrollers

Time: 3 hrs.

Max. Marks:100

Note:1. Answer any FIVE full questions, selecting atleast TWO questions from Part – A and Part - B.
2. Missing data may be assumed suitably.

PART - A

- 1 a. Bring out the architectural difference between Von – Neumann and Harvard architecture. (06 Marks)
- b. With a neat diagram, write the programming model of 8051 with addresses of SFRs and ports. Also give the 128 bytes RAM allocation. (10 Marks)
- c. Explain the oscillator circuit and timing of a 8051 micro controller. (04 Marks)
- 2 a. Write a program to set the carry flag to 1, if the number in reg A is even and reset the carry flag to 0, if the number in reg A is odd. Use the assembly language of 8051. (04 Marks)
- b. Explain the following instructions of 8051 with examples : (09 Marks)
- i) XCHD A, @Ri ii) MOV CA, @A + PC iii) SWAP A iv) RL A
- v) MUL AB vi) DA A.
- c. Explain the different addressing modes of 8051. Give an example for each of them and state the advantages and disadvantages of each. (07 Marks)
- 3 a. Explain the different types of conditional and unconditional jump instructions of 8051. Specify the different ranges associated with jump instructions. (08 Marks)
- b. Find the address of first two internal RAM locations between 20H and 40H, which contains consecutive numbers. If so, set the carry flag to 1, else clear the carry flag. (06 Marks)
- c. What does the following program do? What is the final result in accumulator? Give the result in terms of functionality. (06 Marks)
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START : MOV A, R3
 RLA
 ANL A, # 0AAh
 PUSH ACC
 MOV A, R3
 RRA
 ANL A, # 55h
 MOV R3, A
 POP ACC
 ORL 03h, A
 STMP $
 END

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- 4 a. Explain C data types for 8051 with their data size in bits and data range. (06 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 eg, 42+8 = 50, will be treated as malpractice.

- b. Write a 8051 C – program to read the P1.0 and P1.1 bits of 8051 and issue an ASCII character to port 0 according to the following table. Use case statement only. (08 Marks)

| P1.1 | P1.0 |                |
|------|------|----------------|
| 0    | 0    | Send '0' to PO |
| 0    | 1    | Send '1' to PO |
| 1    | 0    | Send '2' to PO |
| 1    | 1    | Send '3' to PO |

- c. Write a 8051 C program to convert packed BCD number  $0 \times 29$  to ASCII and display the result on port 1 and port 2. (06 Marks)

### PART - B

- 5 a. Explain the different modes of operation of timer / counter of 8051 with relevant block diagram and steps to program the modes. (07 Marks)
- b. With a neat diagram, explain the TMOD and TCON registers of 8051. (08 Marks)
- c. Write a 8051 C program to toggle all the bits of port P1 continuously with some delay in between. Use timer 0, 16 bit mode to generate the delay and calculate the delay in msec. (05 Marks)
- 6 a. Explain the serial port of 8051. In detail, explain the SCON register with the diagram. (08 Marks)
- b. State asynchronous serial communication and data framing. Explain with diagram RS232 pinout. (08 Marks)
- c. Write a program in assembly language for 8051 to transfer the message "XES" serially at 9600 baud, 8 bit data, 1 stop bit. Do this continuously. (04 Marks)
- 7 a. Explain the six interrupts of 8051, with the priority and interrupt vector table. (07 Marks)
- b. Explain with a diagram, IP and IE registers of 8051. What is their significance? (08 Marks)
- c. Write an ALP for 8051 to generate a square wave of 50Hz frequency on P1.2, using an interrupt for timer  $\phi$ . Assume that XTAL = 11.0592 MHz. (05 Marks)
- 8 a. Explain with a diagram, the interfacing of DAC 0808 to 8051 chip. Write the program to generate a sine wave on the CRO. Show the relevant calculation and look up table. (08 Marks)
- b. Show the interfacing circuit and functional pins of LCD. (04 Marks)
- c. With a neat diagram, show how a stepper motor is interfaced to 8051. Write a program to rotate it continuously. (08 Marks)

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