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Fourth Semester B.E. Degree Examination, June/July 2013
Microcontrollers

Time: 3 hrs.

Max. Marks:100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

- 1 a. Compare the CPU architectures: i) CISC and RISC; ii) Von – Neumann and Harvard and iii) Microprocessor with microcontroller. (12 Marks)
- b. Interface 8051 to external ROM and RAM and explain how 8051 access them. (08 Marks)
- 2 a. Explain briefly the five addressing modes of 8051 with an example for each. (10 Marks)
- b. After reset, the contents of internal memory of 8051 with address 0AH and 0BH contains data 22H and 33H, respectively. Sketch the contents of internal memory from address 07H to 0BH and the value of register SP, after executing the following code:
PUSH 0AH
:
MOV 81H, #0BH
POP 09H. (05 Marks)
- c. Write a subroutine which checks the content of location 20H. If it is a positive number, the subroutine finds its TWO's complement and stores it in same location and returns. (05 Marks)
- 3 a. What are assembler directives? Explain any four of them. (05 Marks)
- b. If the XTAL frequency of 8051 is 8 MHz, find the time taken to execute the following program:
MOV R2, #04
MOV R1, #06
WAIT: DJNZ R2, WAIT. (05 Marks)
- c. Write 8051 ALP which checks whether the ten numbers stored from external RAM memory address, 2000H are odd/even. The program should store accordingly 00H/FFH from internal location 30H onwards. (10 Marks)
- 4 a. Interface ADC0809 to 8051 and write an ALP to convert the analog voltage connected to second channel. Display the digital value on LEDs connected to port-0. (10 Marks)
- b. Interface 8051 to a stepper motor and write an ALP to rotate the motor first +4 steps and then -6 steps. (10 Marks)

PART – B

- 5 a. What is the difference between timer and counter operation of 8051? How to start/stop the timer/counter of 8051 when i) GATE control is not used and ii) GATE control is used. (05 Marks)
- b. Explain briefly the interrupts of 8051, indicate their vector addresses. (05 Marks)
- c. Write an ALP in 8051 which generates a square wave of frequency 10kHz on pin 1.2, using timer-1. Assume XTAL frequency as 11.0592 MHz. What is the minimum frequency that can be generated? (10 Marks)

- 6 a. Explain the functions of the pins of 9-pin RS-232 connector. (04 Marks)
b. Explain how 8051 transmits the character and receives a character serially using its UART. (06 Marks)
c. Write 8051 C program to transmit serially the message 'SWITCH ON' or 'SWITCH OFF' depending on the status of the simple switch connected to pin 1.2. Use 2400 baud rate, 1 stop bit, 8 data bits format and assume XTAL frequency as 11.0592 MHz. (10 Marks)
- 7 a. Interface an LCD display to 8051 and write an ALP to display the message 'VERY GOOD'. (10 Marks)
b. With a block schematic explain the features 8255 PPI chip and its Mode-0 operation. (06 Marks)
c. If the internal memory 20H contains AAH and 07H contains 55H, what is the content of register A and status of carry bit after executing the following code:
MOV C, 07H
MOV A, #20H
ADDC A, 07H. (04 Marks)
- 8 a. Explain the architecture of MSP430 CPU with its internal block diagram. (10 Marks)
b. Explain briefly the i) Clock system and ii) Low power modes of operation of MSP430. (10 Marks)

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