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06ES42

Fourth Semester B.E. Degree Examination, December 2011
Microcontrollers

Time: 3 hrs.

Max. Marks:100

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

PART – A

- 1
 - a. Compare CISC and RISC CPU architectures. (04 Marks)
 - b. Draw the internal block schematic of 8051 microcontroller. Explain its characteristics. (10 Marks)
 - c. Interface the external ROM and RAM to 8051. Explain how to access them. (06 Marks)

- 2
 - a.
 - i) What is the necessity of a flag register in a microprocessor/microcontroller?
 - ii) Which flags of 8051 are affected after the execution of instruction INC A?
 - iii) For what condition the OV flag of 8051 is set after the addition instruction.
 - iv) Can the result of logical AND instruction be stored in some destination other than Reg A? If so, indicate such instructions.
 - v) Give two examples of 9-bit rotate instructions. (05 Marks)
 - b. Explain briefly the addressing modes of 8051, with an example for each. (06 Marks)
 - c. Write a program in 8051 to find the sum of 20 data bytes stored in an array of external RAM starting with address 2000H. Store the 16-bit sum at the end of array. (09 Marks)

- 3
 - a. Sketch the contents of stack memory indicating the position of SP after the execution of the following :
 - i) CALL instruction and ii) RET instruction. Assume initially SP = 20H.

.	2050H FACT:	.
.		.
.		.
2000H ACALL FACT		.
.		RET
.		
.		

(04 Marks)

(10 Marks)

(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.

- 4 a. Give the bit size and data range details for the widely used seven C data types of 8051 C. (04 Marks)
- b. Write an 8051 C program to read the content of port P1. If it is greater than 200, wait for 250 msec and send the data to port P2. Otherwise wait for 150 msec and send the data to port P0. (06 Marks)
- c. Write an 8051 C program to find the checksum byte of data stream 30H, 4AH, 65H and 10H. Convert the binary value of checksum into decimal and display the value of the BCD digits on ports P0, P1 and P2. (10 Marks)

PART – B

- 5 a. What are advantages and disadvantages of Mode-2 operation of 8051 timer when compared to Mode-1 operation? (02 Marks)
- b. Write an 8051 ALP to generate a square wave of 1 kHz on pin P2.1 using Timer-1 in Mode-1 operation. Assume crystal frequency as 12 MHz. Show delay calculation. (08 Marks)
- c. Write an 8051 C program to generate a rectangular wave of 2 kHz with 60% duty cycle in pin P1.2. Assume crystal frequency as 11.0592 MHz. Use Timer-0 in Mode-1 operation. Show delay calculations. (10 Marks)
- 6 a. Explain the format of asynchronous serial communication. (04 Marks)
- b. Explain the function of RS232C pins of DB-9 connector. (06 Marks)
- c. Write an 8051 ALP to send the message 'CORRECT' or 'FALSE' serially depending on the status of a switch connected to pin P2.2 if it is ON or OFF, respectively. Assume the crystal frequency as 11.0592 MHz. Use 2400 baud rate, 8 bit data and one stop bit format. Show delay calculation. (10 Marks)
- 7 a. Explain the different interrupts of 8051 indicating their vector addresses. (06 Marks)
- b. How to enable/disable the interrupts of 8051 and to set priority for them? Explain. (04 Marks)
- c. Write an 8051 C program to i) continuously read the status of switch connected to pin P1.2 and send it to pin P2.1 in the main program and ii) generate a square wave of 100 μ sec period on P2.3 and send character '*' continuously serially using time and serial interrupt routines, respectively. Use XTAL frequency as 11.0592 MHz and 8 bits data, one stop bit, 4800 baud rate format. (10 Marks)
- 8 a. Interface a 2x4 keys keyboard to 8051 and write an ALP to send the keycode to port P1, whenever a key is depressed. (10 Marks)
- b. Interface a stepper motor to 8051 and write an ALP to rotate the motor in clockwise direction, if the status of a switch connected to port pin P1.2 is ON. Otherwise rotate it in counterclockwise direction. (10 Marks)

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