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10ES42

Fourth Semester B.E. Degree Examination, Dec.2013/Jan.2014
Microcontrollers

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define microcontroller. Differentiate between microprocessor and microcontroller. **(05 Marks)**

b. With the neat diagram, explain the 8051 architecture. **(10 Marks)**

c. Briefly explain the dual functions of port-3 pins of 8051. **(05 Marks)**

2 a. What is addressing mode? Put the number OFAH in registers R_3, R_4 and R_5 in four different addressing modes. **(06 Marks)**

b. Explain the following in brief:
i) The pin that connects external memory.
ii) The port that has open-drain output.
iii) The register that sequences the program execution.
iv) PSW. **(08 Marks)**

c. Show the stack contents, sp contents and contents of any register affected after each step of the following sequences of operation:

```
MOV SP, #70H
MOV R5, #30H
MOV A, #44H
Add A, R5
MOV R4, A
PUSH 4
PUSH 5
POP 4
```

(06 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 one, else clear the carry flag. **(06 Marks)**

c. Write an 8051 assembly time delay subroutine to generate a time delay of 100 μsec when called. Assume crystal frequency as 12 MHz. Show delay calculations. Do not use timers. **(06 Marks)**

4 a. Give bit size and data range details for the widely used seven 'C' data types of 8051. **(04 Marks)**

b. Write an 8051 ALP to convert packed BCD number 48 to ASCII and display the result on port-2 and port-3. **(06 Marks)**

c. Write an ALP 8051 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 P_0, P_1 and P_2. **(10 Marks)**

PART – B

5 a. With regard to timers of 8051:
   i) Explain briefly the difference between the timer and counter operation.
   ii) Indicate how to start/stop the timer if GATE control is also used.
   iii) Explain mode-2 operation. (06 Marks)

b. Write an ALP to generate a square wave continuously of 2 kHz with a duty cycle of 66%. (06 Marks)

c. A switch is connected to the pin P1.2. Write a 'C' program to monitor the switch and create the following frequencies on pin P1.7:
   i) When SW = 0; 500Hz
   ii) When SW = 1; 750Hz
   Use timer 0, mode 1 for both of them. (08 Marks)

6 a. What is serial communication? How serial communication is carried out with RS232 in 8051? (06 Marks)

b. Explain the bit pattern of SCON register. (06 Marks)

c. Write:
   i) ALP to transfer serially letter 'A' continuously.
   ii) C program to receive bytes of data and put them in P1. Use 9600 baud rate, 8-bits and one stop bit, for both transmission and reception. Use timer 1, mode-2. (08 Marks)

7 a. Explain briefly the MSP430 RISC CPU architecture. (10 Marks)

b. Give details of register of MSP430. (10 Marks)

8 Write short notes on:
   a. RTC
   b. DMA
   c. DAS
   d. RF interfaces. (20 Marks)

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