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06ES42

Fourth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Microcontrollers

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Missing data may be assumed suitably.***

PART – A

1 a. With diagram list the specific features of 8051 microcontroller. **(08 Marks)**

b. Explain with neat sketches and examples the PORT 1 of 8051. **(08 Marks)**

c. Find:
i) Execution time of a single cycle instruction for 6 MHz crystal.
ii) The Flags those are stored in PSW.
iii) Number of Register Banks and their Address.
iv) The Bit Address of Bit-4 of RAM Byte 2Ah. **(04 Marks)**

2 a. With suitable diagram and instructions, explain how external data transfer is done from ROM and RAM external memory. **(12 Marks)**

b. Treat Registers Rϕ, R1 as 16 bit Registers and Rotate them one place to the left.
Bit7(Rϕ) → Bitϕ(R1)
Bit7(R1) → Bitϕ(Rϕ) and SO ON. **(04 Marks)**

c. Assume that the bit P2.2 is used to control the outdoor light and bit P2.5 to control the light inside a building. Show how to turn ON the outside light and turn OFF the inside one. **(04 Marks)**

3 a. Explain the oscillator circuit and timing of 8051 microcontroller. **(06 Marks)**

b. Explain the Byte Jump Instructions of 8051 with examples. **(08 Marks)**

c. Find the Delay of the subroutine, if the crystal frequency is 12 MHz.

```
DELAY : MOV R1, #OF3H
        MOV R0, #OOH
LOOP : DJN2 R0, LOOP
       DJN2 R1, LOOP
       RET
```

(06 Marks)

4 a. Explain the C data types for 8051 microcontroller. **(08 Marks)**

b. Write an 8051 C program to Toggle all the bits of Pϕ continuously with a 250 ms delay use the inverting operator. **(06 Marks)**

c. Write an 8051 C program to convert ASCII digits of 4 and 7 to packed BCD and display them on P1. **(06 Marks)**

PART – B

5 a. Differentiate between Timer and Counter. Explain the TCON and TMOD registers of 8051 microcontroller. **(10 Marks)**

b. Find value for TMOD to program Timer ϕ in MODE2, use 8051 crystal frequency as the clock source and use instruction to start and stop the Timer. **(02 Marks)**

c. Assume XTAL = 11.0592 MHz. Write a program to generate square wave of 2 kHz frequency on Pin $P_{1.5}$ bit using Timer 1. **(08 Marks)**

6 a. Which Register has the SMOD bit and what is its states when the 8051 is powered up? **(02 Marks)**

b. Find THJ value to set the Baud rate to each of the following:
i) 9600 } if SMOD = 1
ii) 4800 } XTAL = 11.0592 MHz. **(06 Marks)**

c. Write an 8051 C program to send the two messages 'Normal speed' and 'High speed' to the serial port assuming that switch (SW) is connected to pin $P_{2.0}$. Monitor its status and set the Baud rate as follows:
SW = 0 28,800 Baud rate } XTAL = 11.0592 MHz
SW = 1 56 K Baud rate }
(12 Marks)

7 a. Differentiate between Interrupts versus polling. **(02 Marks)**

b. Explain the different types of interrupts. **(08 Marks)**

c. Write a C program that continuously gets a single bit of data from $P_{1.7}$ and sends it to $P_{1.6}$ while simultaneously creating a square wave of 200 μs period on Pin $P_{2.5}$. Use Timer ϕ to create the square wave. Assume XTAL = 11.0592 MHz. **(10 Marks)**

8 a. Give the functional Pins of LCD with the figure, explain the interfacing of 8051 to LCD. Write a program to display '06ES42' on LCD. **(10 Marks)**

b. With a neat sketch, interface 8051 to 4×4 matrix key board. Write a program to identify the key pressed with a flow chart. **(10 Marks)**

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