VTU B.E/B.TECH QUESTION PAPER SET

CBCS
SEMESTER V

8051 MICROCONTROLLER

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15EC563

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
8051 Microcontroller

Time: 3 hrs.   Max. Marks: 80

Note: *Answer any FIVE full questions, choosing*
ONE full question from each module.

Module-1

1   a. Compare microprocessor and microcontroller.   (04 Marks)
    b. Explain the internal organization of 8051 microcontroller RAM.   (04 Marks)
    c. Write the block diagram of 8051 and explain its features.   (08 Marks)

OR

2   a. Write bit pattern of PSW register and explain the conditional flags present in PSW.
                                                                             (04 Marks)
    b. How many SFR's present in 8051 and write the bit addressable SFR's present in 8051 with its address.   (04 Marks)
    c. Explain how $4K \times 8$ bit RAM and $8K \times 8$ EPROM can be interfaced to 8051 with necessary control signal.   (08 Marks)

Module-2

3   a. Write the any four addressing modes percent 8051 and explain each one of them with an example.   (08 Marks)
    b. Write a program to add the BCD numbers 99 and 85 present in RAM address 32 and 33. Store the BCD result in memory location 34 and 35. Also show how the BCD instruction works.   (08 Marks)

OR

4   a. Explain how MUL and DIV instruction works with an example in 8051 microcontroller.
                                                                             (08 Marks)
    b. Find the time required to execute the following instructions if AT 89C51 microcontroller is used :
        i)   ADDCA,#54 if XTAL frequency is 12MHz
        ii) XRL 35, # 47h if XTAL frequency is 11.0592
        iii) MULAB if XTAL frequency is 12 MHz
        iv) NOP if XTAL frequency is 11.0592MHz.   (04 Marks)
    c. Explain how the following instructions works with an example.
        i)   MOUX A, @ DPTR
        ii) MOVC A, @A + PC.   (04 Marks)

Module-3

5   a.   What is stack and explain push and pop instruction works with an example.   (06 Marks)

b.   Calculate the delay produced in the program shown and XTAL used is of value
11.0592 MHz
```
        MOUR2, #250
100P NOP
     NOP
     NOP
     NOP
     DJN2 R2, 100P
     RET.
```
(05 Marks)

c.   Write an ALP to read the number from P1 if it is odd find the compliment of the number and send it though P2 otherwise send it through P3.   (05 Marks)

OR

6   a.   Write an ALP to read the status of witch S connected to P1.2 if it is in the on condition switch on the LED connected P2.2 otherwise off LED connected P2.2.   (06 Marks)

b.   What is subroutine and mention the advantages of subroutine.   (05 Marks)

c.   Use subroutine to find the factorial of a number stored in memory location 45. Assume that the number stored in memory location is ≤ 05.   (05 Marks)

Module-4

7   a.   Explain TMOD and SCON register with its bit pattern.   (05 Marks)

b.   Write the steps to be followed for using timer1 in mode 2 and also find the value to be stored in reg.THI and get a delay of 100 µS when XTAL frequency is 11.0592MHz.   (05 Marks)

c.   Using time 0 write a program to generate a square wave on P1.4 of frequency of 2KHz in model. Assume XTAL frequency is 11.592MHz.   (06 Marks)

OR

8   a.   What are advantages of serial communication over parallel communication?   (05 Marks)

b.   Write a program to transfer the message 'HELLO' serially at 4800 baudrate with 1 stop bit.   (05 Marks)

c.   Write a C program for 8051 to transfer the letter 'V' serially at 9600 baud continuously use 8 bit data and 1 stop bit.   (06 Marks)

Module-5

9   a.   Explain the bit pattern of IE registrar and how (i) to enable the serial interrupt, time r0 interrupt and external hardware interrupt in 8051.   (04 Marks)

b.   Write a ALP that continuously gets 8 bit data from P0 and sends it to P1 while simultaneously creating a square wave of 200µs on pin 2.1 use timer 0 to create a square wave and XTAL frequency is 11.592MHz.   (06 Marks)

c.   Explain how TCON can be used in handling the interrupts and also indicate its bit pattern.   (06 Marks)

OR

10   a.   Write the name of the interrupt present in 8051 and also indicate the starting address reserved in ROM for each interrupt.   (05 Marks)

b.   Write a ALP to switch on LED connected on P1.3 for 500µsec when INT1 is activated. XTAL used 12MHz.   (06 Marks)

c.   Name the 14 pins present in LCD and show how it can be interfaced to microcontroller 8051 with P1 connected to data lines.   (05 Marks)

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Fifth Semester B.E. Degree Examination, Aug./Sept.2020
8051 Microcontroller

Time: 3 hrs.   Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Differentiate between Microprocessor and Microcontroller.   (03 Marks)
   b. Mention the details of dual functions of the PORT-3 of 8051.   (04 Marks)
   c. With the help of diagram explain how to interface External ROM and RAM and how 8051 access them.   (09 Marks)

OR

2 a. Explain the internal RAM organization of 8051.   (06 Marks)
   b. Write the block diagram of 8051 micro controller and explain the function of each block in detail.   (10 Marks)

Module-2

3 a. Explain different Addressing modes of 8051 and give an example for each one of them.   (08 Marks)
   b. If A = 53H write output after executing each of the following instruction 2 times. Assume CY = 1.
      (i) RR A   (ii) RLC A   (iii) RRC A   (iv) RL A   (08 Marks)

OR

4 a. (i) Explain the jump instructions of 8051. Indicate their range.
      (ii) Explain any two conditional byte jump instructions available in 8051 with examples.   (08 Marks)
   b. Ten numbers are stored in RAM locations 50H onwards. Write an ALP to find the smallest number and store it in 60H.   (08 Marks)

Module-3

5 a. Write an ALP using 8051 Instructions
      (i) To get X value from P_1 and send X^2 to P_2, X value can range from 0 to 9.
      (ii) To subtract two 16 bit numbers. Assuming that numbers are to be subtracted are stored in consecutive memory locations in RAM.   (10 Marks)
   b. Explain the sequence of events on executing subroutine CALL and RET in 8051.   (06 Marks)

OR

6 a. Write an ALP to add N 8 bit numbers stored in internal memory starting with address 10H. Store the 16-bit sum after the last data.   (06 Marks)
   b. Write an ALP to move 8 bytes of data stored in RAM location 40H onwards to RAM location 50H onwards.   (06 Marks)
   c. Explain the operation of PUSH and POP instructions with examples.   (04 Marks)

Module-4

7 a. Write an 8051 ALP program using Timer1 in mode 2 to create frequency of 2500Hz on Pin 2.7. Assume XTAL frequency as 11.0592 MHz. **(08 Marks)**

   b. Write an 8051 ALP/Embedded C program to send message "WELCOME" serially at baud rate of 4800 with 1 stop bit 8 data bits. Crystal frequency = 11.0592 MHz. **(08 Marks)**

OR

8 a. Write an ALP program to generate a square wave of 50 ms ON time and OFF time on P1.4 using Timer 0 mode 1. **(08 Marks)**

   b. Explain the principles of operation of 8051 serial Port of 8051 to Transmit or Receive a character serially. **(06 Marks)**

   c. How to double the baud rate without changing the THI value? **(02 Marks)**

Module-5

9 a. (i) Explain the different interrupts of 8051 (External and Internal)
      (ii) Explain the sequence of operation when interrupt call occurs in 8051. **(08 Marks)**

   b. Write a C program using 8051 interrupts to do following task:
      (i) Receive data serially and send it to PO
      (ii) Generate 5 KHz square wave on P2.1 using timer 0, mode 1.
      Assume frequency = 11.0592 MHz, Baud rate = 4800. **(08 Marks)**

OR

10 a. Interface 8051 to stepper motor write an ALP program to rotate it 4 steps clockwise. **(08 Marks)**

    b. Interface an LCD to 8051 and write an ALP program to display "Good". **(08 Marks)**

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17EC563

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
8051 Microcontroller

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Write the comparison between Microprocessor and Microcontroller. **(05 Marks)**
   b. Define Embedded System and write the characteristics of an Embedded System. **(05 Marks)**
   c. Write and explain the Architecture of 8051 Microcontroller and also explain the PSW, RAM memory organization. **(10 Marks)**

OR

2 a. Write and explain the pin diagram of 8051 Microcontroller. **(10 Marks)**
   b. Explain the Interfacing of 16K EPROM and 8K RAM to 8051 Microcontroller. **(10 Marks)**

Module-2

3 a. Write and explain the Addressing modes of 8051 Microcontroller with an example. **(10 Marks)**
   b. Explain the following instructions with an example:
      (i)   DJNZ R_n, rel
      (ii) MOVC A, @A+DPTR
      (iii) RRC A
      (iv) PUSH 02
      (v)   DAA **(10 Marks)**

OR

4 a. Explain Call and Jump Instructions. **(06 Marks)**
   b. Explain any four directives. **(04 Marks)**
   c. Write and explain an Assembly Language Program to divide the data in RAM location in 38H by data in 15H and store the quotient in 70H and remainder in 71H. **(10 Marks)**

Module-3

5 a. Write and explain an Assembly Language Program to transfer five 8-bit of data from starting memory location 30H to other memory starting at 40H. **(08 Marks)**
   b. Write and explain an Assembly Language Program to find largest 8-bit number form the given five 8-bit numbers. **(08 Marks)**
   c. Write and explain an Assembly Language Program to toggle all the bits of port 1, with a time delay between toggling. **(04 Marks)**

OR

6 a. Write and explain an Assembly Language Program to read the lower nibble of data by P_0 is to be displayed on LEDS are connected to upper 4-bits of P_1. **(10 Marks)**
   b. Write and explain an Assembly Language Program to Add two 32-bit numbers. The numbers are stored from RAM location 40H and 50H respectively. Store the result from RAM location 60H. **(10 Marks)**

Module-4

7 a. Explain TMOD and TCON registers. **(08 Marks)**
   b. Write and explain an Assembly language program to toggle $P_{1.5}$ every 1 second. Use Timer1 in mode1. Assume crystal oscillator frequency is 11.0592 MHz. **(08 Marks)**
   c. Explain SCON register. **(04 Marks)**

OR

8 a. Write and explain a C program and assembly to generate a square wave of frequency 10 kHz on Pin 1.4. Use timer0 in mode2 with a crystal frequency of 22 MHz. **(10 Marks)**
   b. Write and explain a C program and assembly to transfer "VTU" serially with a baud rate of 9600. Assume crystal oscillator frequency is 11.0592 MHz. **(10 Marks)**

Module-5

9 a. Explain IE register. **(04 Marks)**
   b. Write and explain a C program and assembly to generate a square wave on $P_{2.4}$ with high of 1 ms and low portion of 2 ms using timer1 in interrupt mode with a crystal oscillator frequency of 11.0592 MHz and also read the value of port0 and display is on port1. **(08 Marks)**
   c. Write and explain an assembly language program to do the following:
       (i)   Reads data from port P_1 and writes it to P_2 continuously.
       (ii)   Also the data at P_1 is transferred serially.
       (iii) The data received serially is displayed at P_0.
       Assume 11.0592 MHz crystal frequency 9600 baud rate. **(08 Marks)**

OR

10 a. Write and explain a C program and assembly to interface an ADC 0804 to 8051 Microcontroller and display on P_2. **(10 Marks)**
    b. Write and explain a C program and assembly to monitor the status of a switch SW connected to Pin P2.7 and perform the following:
        (i) If SW = 0, the stepper motor rotates clockwise.
        (ii) If SW = 1, the stepper motor rotates in anticlockwise.
        Use the wave-drive 4-step sequence. **(10 Marks)**

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Fifth Semester B.E. Degree Examination, Aug./Sept.2020
8051 Microcontroller

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the architecture of 8051 with necessary diagram.   (08 Marks)
   b. Write the internal RAM division of 8051 and explain how it can be used.   (06 Marks)
   c. Compare microprocessor with microcontroller.   (06 Marks)

OR

2 a. Draw the diagram to show how 4K ROM and 8K RAM can be interfaced to 8051 microcontroller and explain.   (08 Marks)
   b. Explain the PSW of 8051 microcontroller.   (06 Marks)
   c. Mention the alternate functions of PORT 3 in 8051 microcontroller.   (06 Marks)

Module-2

3 a. Mention the four addressing modes used in 8051 microcontroller and explain each one of them with an example.   (08 Marks)
   b. What is bit level logical operation and explain the bit level instructions which affect the carry flag.   (06 Marks)
   c. Write an assembly level program to add two numbers present in external memory location 8000h and 9000h of 8051 microcontroller store the 16 bit result obtained in reg A and B with MSB of the result in reg A.   (06 Marks)

OR

4 a. Draw a figure to indicate the relative range of all the jump instructions. Also explain bit jump instruction present in 8051 microcontroller.   (08 Marks)
   b. Explain rotate instructions available in 8051 micro controller with an example to understand its working.   (06 Marks)
   c. Write a program to exchange the contents of reg.R0 in bank0 with the contents of reg.R5 in bank2 using PUSH and POP instructions. Assume that the SP is starting from 20h.

   (06 Marks)

Module-3

5 a. What is the use of stack in 8051 microcontroller and explain the instructions used to move and retrieve the data from stack with an example.   (06 Marks)
   b. Find the time required to execute the following instructions using 8051 microcontroller.
   (i)   MOUR3, #55; crystal frequency is 11.0592 MHz
   (ii) DJN2 R2, target; crystal frequency is 20 MHz
   (iii) MULAB; crystal frequency is 16 MHz   (06 Marks)
   c. Write an assembly level program for 8051 microcontroller to find the factorial of an 8 bit number. Assume the result obtained in maximum of 8 bits only.   (08 Marks)

OR

6 a. Write the sequence of events that happens on execution of CALL and RET instructions with necessary diagram. **(06 Marks)**

b. A switch is connected to microcontroller 8051 as shown in Fig.Q6(b). If switch is closed then switch on LED1 else switch on LED2. Write a program for the above requirement. Glow the LED for 100 μs XTAL = 11.0592 MHz.
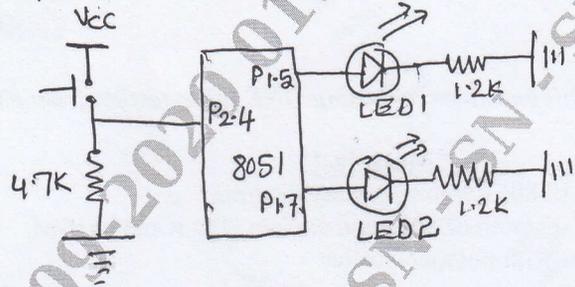

Fig.Q6(b) **(06 Marks)**

c. Write an assembly level program to find the smallest of the 05 numbers stored in consecutive memory location in internal RAM starting from 100 h and store the result in accumulator. **(08 Marks)**

Module-4

7 a. Indicate the bits present in TMOD register and explain its uses. **(06 Marks)**

b. Write the steps to program in MODE2 timer 01. Also find the frequency of square wave generated with duty cycle of 50% if TH1 is set to 05 when used in timer0 in mode 2. Given XTAL = 11.0592 MHz. **(06 Marks)**

c. Write an assembly level program to generate a square wave on $P_{1.2}$ with 50% duty cycle. Find the frequency of the square wave generated if timer0 is used in MODE1 in the above program if TH0 = 00 and TL0 = 00 and also the crystal frequency used is 11.0592 MHz.

(08 Marks)

OR

8 a. Indicate the bits present in SCON register and explain its uses. **(06 Marks)**

b. Write the steps used to transfer the data serially in 8051 microcontroller. **(06 Marks)**

c. Write an 8051 program to transfer the message "VTU" serially at 9600 baud, 8 bit data continuously. **(08 Marks)**

Module-5

9 a. Explain IE register and TCON register of 8051 microcontroller. **(06 Marks)**

b. List the interrupt priority upon reset on 8051 microcontroller and how the highest priority can be given to serial communication after reset. **(06 Marks)**

c. Write a program to generate a square wave of 50 Hz on $P_{1.2}$ using interrupt with 50% duty cycle. Assume XTAL = 11.0592 MHz. **(08 Marks)**

OR

10 a. Explain the various pins present in ADC0804. **(10 Marks)**

b. Write the various pins present in LCD and also indicate how LCD can be interfaced to 8051 microcontroller to check the status of the busy flag. **(10 Marks)**

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