M/E/TX

Reg. No: 22BCE3339

VIT®
Vellore Institute of Technology

## Final Assessment Test – May 2024

Course: BECE204L - Microprocessors and Microcontrollers
Class/ NBR(s):/ 5462 / 5464 / 5467 / 5469 / 5472 / 5473 / 5477 / 5479 / 5482 / 5484 / 5485 / 5487 / 5489 / 5492 / 6641 Slot: C1+TC1
Time: Three Hours Max. Marks: 100

- KEEPING MOBILE PHONE/ELECTRONIC DEVICES EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

**Answer ALL Questions**
**(10 X 10 = 100 Marks)**

1. What are the differences between i3, i5, and i7 processors, and how do they compare in terms of performance, features, and suitability for various computing tasks?

2. (a) What are the key architectural components of the Intel 8086 microprocessor? Explain the function of Bus Interface Unit (BIU) with suitable diagram. [5]

   (b) Rectify errors if any and identify the addressing mode of each of the following instruction in 8086 microprocessor: [5]

   (i) MOV AX, #3FE1H
   (ii) MOV DS, 3000H
   (iii) MOV BL, CX
   (iv) MOV AX, 50H[BX]
   (v) MOV CL, [BX+SI+30H]

3. Develop an Intel 8086 assembly language program to count the odd and even numbers from a given list of 100 numbers stored at starting address of 2000:0300H and save the count values at 3000:0500H and 4000:0700H, respectively.

4.(a) Assume a data (x) is present in Accumulator. If x is negative number, write an 8051 assembly language program to transfer a string of data from code space starting at address 200H to RAM location starting at 40H in reverse order. The data is given below:

0200H: DB "Believe in yourself "

**OR**

4.(b) Develop an 8051 based assembly language program to implement the expressions for half adder and half subtractor circuits. Store the sum/Difference, carry and borrow in PSW.1, PSW.5 and ACC.7, respectively. (Use Basic Logic Gates only).

5. Calculate the amount of delay caused by the delay subroutine if the system has an 8051 microcontroller with frequency of 16 MHz. The number of machine cycles are provided in parentheses.

```
DELAY:  MOV R2, # 10010110B     (1)
AGAIN:  MOV R3, #250            (1)
HERE:   NOP                     (1)
        NOP                     (1)
        NOP                     (1)
        DJNZ R3, HERE           (2)
        DJNZ R2, AGAIN          (2)
        RET                     (2)
```

6. Assume P1 and P2 of the 8051 are connected to LEDs and switches, respectively as shown in Figure 1. Write an 8051 assembly language program to perform the following tasks: (a) get data on switches connected to P2 and send it to the PC COM serially, (b) receive any data sent by the PC COM and put it on LEDs connected to P1. Perform both the tasks one after another continuously with 2400 baud rate.

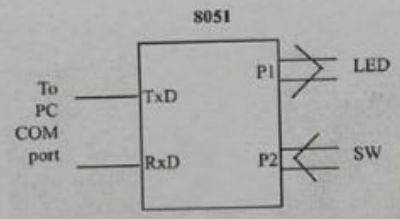


**Figure 1**

7. Write an 8051 assembly language program that continuously get 8-bit data from P0 and sends it to P1 while the P3.3 (INT1) pin is connected to a switch which is normally high. Whenever it goes low, it should turn on an LED for 100 microsecond which is connected to P2.5 pin.

8.(a) Write an 8051 assembly language program to interface an 16x2 LCD by sending Hex code commands "38H, 0EH, 01H, 06H" and display "VIT Vellore" on it in line 2 position 3. Assume D0-D7, RS, R/W', and E pins of LCD are connected with P1.0-P1.7, P2.0, P2.1, and P2.2 pins of 8051 microcontroller, respectively.

**OR**

8.(b) Develop an assembly language program to interface a 4x4 matrix keyboard with 8051 microcontroller.

9. Explain the 3-stage pipelining architecture of ARM7 and the 5-stage pipelining architecture of ARM9 processors with relevant diagrams depicting their pipeline structures.

10. Provide a concise overview of the data processing instructions available for ARM processors.

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