VIT Vellore Institute of Technology

Reg. No. : 21BPS1364

Final Assessment Test (FAT) - APRIL/MAY 2023

Programme	B.Tech	Semester	Winter Semester 2022-23
Course Title	MICROPROCESSORS AND MICROCONTROLLERS	Course Code	BECE204L
Faculty Name	Prof. Ravi Tiwari	Slot	F2+TF2
		Class Nbr	CH2022235002461
Time	3 Hours	Max. Marks	100

PART - A (1 X 5 Marks)
Answer All questions

01. Discuss the features of the microprocessor that addresses 64 KB of memory [5] 5

PART - B (6 X 10 Marks)
Answer All questions

02. Give a systematic analysis to discuss the 8086 microprocessor in terms of BIU, EU and flags with a neat block diagram. [10] 10

03. Write an 8086 assembly language program to find whether the given 8-bit number which is available in 1220H is odd or even. If the number is even, store 00H in memory location 1234H, else, store FFH in memory location 1234H. [10] 5

04. Discuss the different types of addressing modes of 8051 microcontroller with at least two examples. [10] 9

05. The aim of the below program is to flash the LEDs connected to the port P2 with a delay of 10 seconds and simultaneously read data from port P0 continuously and send it to port P1. Use timer 0 in mode 1 with interrupt concept. Fill in the blanks with the appropriate vector address, values and registers. [10] 5

```
ORG 0000H
LJMP MAIN
ORG _____
CPL ___
MOV ___, A

_____
MAIN: MOV ____, #01H
MOV TH0, #____
MOV TL0, #____
MOV IE, #____
MOV P2, #00H
MOV P0, #____
BACK: MOV ____, P0
MOV P1, A
SJMP BACK
```

06. Assume the clock frequency is 12 MHZ. Analyze the below code snippet and find the on time and off time of the waveform generated at P3.0. [10] 5

```
ORG 0000H
```

```
        CLR P3.0
        MOV TMOD, #20H
        MOV TH1,-250
        SETB TR1
AGAIN: JNB TF1, AGAIN
        CPL P3.0
        CLR TF1
        SJMP AGAIN
        END
```

Modify the above code with necessary additional instructions to generate a 75% duty cycle waveform at P3.0.

07. Let R1 = 0X00000030 [10]
R2 = 0X00000500
R3 = 0X00000006
Write the values stored in the registers after executing the following instructions.
a) MOV R1, R2, LSL #3
b) MOV R0, R2, ROR #4
c) ADD R0, R1, R2, LSL R3
d) ORR R0, R1, R2

PART - C (1 X 15 Marks)
Answer All questions

08. Draw and discuss in detail about the various blocks present in the architecture of ARM processor [15]

PART - D (1 X 20 Marks)
Answer All questions

09. Assume that the Government of India reports the statistics of mortality rate due to infectious diseases in the given Table. [20]

Disease No.	Infectious Disease	Number of Death
1	CORONA	100
2	H3N1 FLU	120

Design an 8051 based microcontroller system, for displaying the statistics. The selection of disease can be entered through a 4-key in keypad. The rows and columns of the keypad are connected to the ports P0 and P1, respectively. The keys are organized in 2x2 matrix. When the disease number is entered through keypad, the program must be capable of recognizing the disease and display its name and number of death in LCD. The port P2 is connected to LCD data pins, the port pins P3.0, P3.1, and P3.2 are connected to RS, R/W, and E pins of LCD, respectively. Draw the necessary schematic and write an 8051 ASM program to implement the same.

VIT

Reg. No. : 21BLC1488

Final Assessment Test (FAT) - APRIL/MAY 2023

Programme	B.Tech	Semester	Winter Semester 2022-23
Course Title	MICROPROCESSORS AND MICROCONTROLLERS	Course Code	BECE204L
Faculty Name	Prof. Guga Priya G	Slot	A2+TA2
		Class Nbr	CH2022235001117
Time	3 Hours	Max. Marks	100

SECTION -A (2 X 5 Marks)
Answer All questions

01. Draw a block diagram for the following tasks to be carried out by a Microprocessor with necessary components, and briefly describe the block diagram. [5]
    a) Count the number of persons entering an elevator (lift) using IR sensor for 15s and display on LCD
    b) Maximum number of persons allowed in the elevator is stored in a RAM location.
    c) When count exceeds, the elevator produces an alarm through a speaker
02. Write an ARM assembly language program to perform the addition of two 64-bit numbers.Assume your own data. [5]

SECTION-B (6 X 10 Marks)
Answer All questions

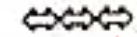
03. With a neat block diagram, explain the internal architecture of 8086 microprocessor in detail. [10]
04. Write an 8086 assembly language program to find the average of ten 8-bit numbers stored starting from the memory location 2000H. Store the result in 2500H.Assume the result is less than FFH. [10]
05. Write an 8051 assembly language program to convert the given temperature 25°C in Celsius(C) to Fahrenheit (F) scale using the formula F=(9C/5)+32 .Assume the result is not exceeding FFH. [10]
06. With a neat diagram, briefly explain the Memory organization of 8051. [10]
07. With a neat sketch, discuss the ARM architecture in detail. [10]
08. Write the values stored in the registers after executing the following instructions. Assume R1= 0X00000030, R2=0X00002020. [10]
    a) MOV R0, R2, LSR #2
    b) EOR R0,R1,R2
    c) RSB R0,R1,R2
    d) BIC R0,R1,R2
    e) MVN R0, 0x0000FFFF

SECTION-C (2 X 15 Marks)
Answer All questions

09. a). Generate a square waveform with T_{on}=6ms and T_{off}=4ms on port pin P1.0 using timer 0 in mode1. Assume the crystal frequency as 11.0592MHz[8 Marks] [15]
    b). Write an 8051 program to receive bytes of data serially at a baud rate of 9600 and send them through port 2.[7 Marks]

10. a). An 8-bit ADC is interfaced with 8051 microcontroller. The data lines of ADC (D0-D7) is connected to port 1 of 8051, and the RD, WR and INTR pin of ADC is connected to P2.5, P2.6 and P2.7 respectively. Write a program to monitor the INTR pin and bring an converted digital output from port 1 into register A. Also draw schematic diagram for the above configuration.[7 marks] [15]

b). Write an 8051 assembly language program to generate a triangular waveform and saw-tooth waveform using DAC where 8051 is interfaced with DAC through P1.[8 Marks]



VIT

Reg. No. : 21BCE5547

Final Assessment Test (FAT) - APRIL/MAY 2023

Programme	B.Tech	Semester	Winter Semester 2022-23
Course Title	MICROPROCESSORS AND MICROCONTROLLERS	Course Code	BECE204L
Faculty Name	Prof. Sumathi V	Slot	G1+TG1
		Class Nbr	CH2022235002453
Time	3 Hours	Max. Marks	100

PART-A (5 X 5 Marks)
Answer All questions

01. As compared to 16 bit microprocessor, 8 bit microprocessor are limited by following functionalities [5]

    a. Speed of execution of instructions
    b. Addressing memory
    c. Data handling capabilities

    Justify each of your chosen options with explanations.

02. Identify the errors in the following 8086 instructions and rewrite in the correct form: [5]

    a. MOV AX, DI.
    b. ADD 2031H, AX
    c. XOR DS, 10001I
    d. SUB [2500H], [1235H]
    e. SHR 02H

03. Mention the significance of the following 8086 instructions instructions/directives [5]

    a. CLD
    b. DAA
    c. IRET
    d. TEST
    e. OFFSET

04. Examine the internal memory organization of 8051 Microcontroller and show how it is segmented? [5]

05. Assess and identify the address mode of the following instructions. Explain its operation. [5]

    (i). MOV A, @ A+ PC
    (ii). DAA
    (iii). MOV 03H, 04H
    (iv). INC DPTR
    (v). SJMP Label

PART-B (6 X 10 Marks)
Answer All questions

06. The marks scored by a student in a semester in seven subjects are 67, 87, 45, 78, 79, 56 and the last mark is the last two digits of your registration number. All the marks are assumed to be in hexadecimal. Write an 8086 assembly language program to average the marks and store the [10]

average mark in 3050h using indirect addressing mode. Also if the student has scored less than 40 marks in any of the subjects print the result as a fail and if scored equal to or greater than 40 print the result as a pass

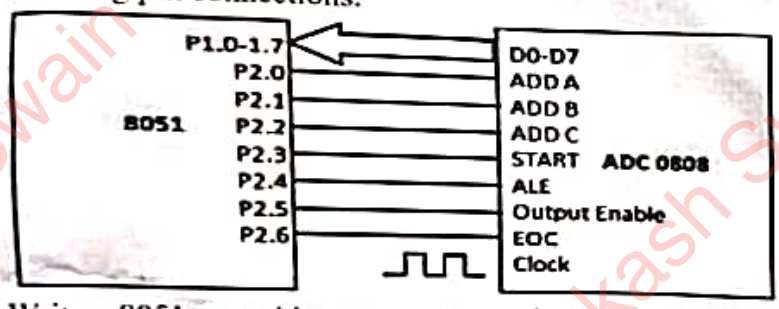
Use appropriate directives wherever necessary.

07. A Switch SW is connected to port-1 pin P1.3 and LEDs are connected to all pins of Port P2 & P3. Write a program to perform the following: [10]
(i). If SW=0, make LEDs to glow serially only one at a time starting from P2.0 to P2.7 with the time delay of 0.5 seconds between each.
(ii). If SW=1, blink all LEDs of port P3 for every 0.5 seconds
Write a 8051 Microcontroller assembly language program for the above condition and assume the frequency is 12 MHz.

08. Write an 8051 assembly program to transfer 10 bytes of data from internal memory location 50H to external memory location 90H. [10]

09. Write a timer interrupt program that continuously get 8-bit data from P0 and sends it to P1 while simultaneously creating a square wave of 500 µs period on pin P2.1. Use timer 0 to create the square wave. Assume that XTAL = 12 MHz. [10]

10. An LM35(Temperature measuring sensor) is connected to P0 through an ADC0808 as per the following pin connections. [10]



Write a 8051 assembly program to receive the sampled data in the P1 port.

11. With a neat diagram, explain ARM core dataflow model. Describe the different types of barrel shift operations with relevant diagram [10]

PART-C (1 X 15 Marks)
Answer All questions

12. a) Use ARM assembly Instructions to write an assembly program to evaluate (A + 8B + 7C - 2D)/4, where A = 25, B = 19, C = 99 and D = 2. [15]
b) For the previous question justify how ARM based RISC architecture is efficient in computing in comparison to CISC architecture.

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Final Assessment Test (FAT) - November/December 2023

Programme	B.Tech.	Semester	FALL SEMESTER 2023 - 24
Course Title	MICROPROCESSORS AND MICROCONTROLLERS	Course Code	BECE204L
Faculty Name	Prof. Sourabh Paul	Slot	E1+TE1
		Class Nbr	CH2023240100947
Time	3 Hours	Max. Marks	100

Part A (2 X 5 Marks)
Answer all questions

01. Discuss the differences between Microprocessor and Microcontroller. [5]

02. Write an ARM assembly language program to find the sum of first N natural numbers. [5]

Part B (9 X 10 Marks)
Answer all questions

03. With a neat sketch, discuss the architecture of the Programmable Interval Timer (8253) in detail. [10]

04. Write an 8086 assembly language program to sort the given array stored starting from the memory location 2000H in ascending order. Store the result starting from location 2500H. Array= {10h,15h, 23h, 42h, 71h,56h, 83h, 93h, 54h, 64h}. [10]

05. Draw the architecture of 8051 and explain the functional blocks in detail. Also, discuss the program status word register. [10]

06. Write an 8051 assembly language program for the following task. [10]
Let R2=20D and R3= 204D. Increment R2 and decrement R3, until both the values are equal. Store the equal value in R4. Also find how many iteration it takes to make R2 and R3 equal and store the number of iterations in R5.

07. Write an 8051 assembly language program to generate a square wave of 2kHz frequency on P1.0 using timer 0 in mode1. Assume the crystal frequency as 11.0592MHz. [10]

08. Design an 8051-based LED display system where 16 LEDs are connected in a 4X4 matrix using port-0 and port-1. Initially, the character "N" is displayed on LEDs and upon receiving external interrupt INT0 which is edge triggered displays the character "S" in LEDs. Draw the schematic diagram and write an assembly language program for the same. [10]

09. Given a 1X4 keypad as an input device and an LCD screen as an output device, write an 8051 assembly language program to: (Each 5 Marks) [10]

a) Read the input from the keypad.

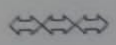
b) Display the corresponding operation ("+", "-", "*", or "/") on the LCD screen based on the keypad input.

Note: Each key on the 1X4 keypad corresponds to one of the operations.

10. Draw the architecture of an ARM processor and explain the various functional units in detail. [10]

H. In the table below, fill the contents of each register after the execution of every ARM instruction in the following single program. [10]

	r1	r2	r3	r4
Initial Values of Registers	0x00000005	0x00000007	0x0000000C	0x0000000E
ADD r4,r2,r3 LSL #1				
MLA r1,r2,r3,r4				
BIC r3,r2,r2				
CMP r1,r4				
EORGT r4,r1,r2				



VIT Vellore Institute of Technology

Reg. No. : 22BCE1351

Final Assessment Test (FAT) - November/December 2023

Programme	**B.Tech.**	Semester	FALL SEMESTER 2023 - 24
Course Title	**MICROPROCESSORS AND MICROCONTROLLERS**	Course Code	**BECE204L**
Faculty Name	**Prof. S Selvendran**	Slot	E2+TE2
		Class Nbr	**CH2023240100980**
Time	**3 Hours**	Max. Marks	**100**

Section A (4 X 5 Marks)
Answer all questions

01. Differentiate 8085 microprocessor and 8086 microprocessor. [5]

02. In the Intel 8086 microprocessor, assume the register AX contains the data 35ABH. What will be the contents of AX after executing the following programs? Assume that the initial content on the Carry Flag (CF) is one for all the calculations. Also, clearly show the steps in obtaining the final result. [5]

(a) MOV CL,04H **(3 Marks)**
SHR AX.CL

(b) MOV CL,04H **(2 Marks)**
RCR AX.CL

03. Write an 8086 assembly language program to solve the following expression. $Y = (A^2 + B^2 + 2*A*B)/C$ where A, B, and C are 8-bit hexadecimal numbers. [5]

04. Write an ARM assembly language program to perform the addition of two 64-bit numbers. [5]

Section B (8 X 10 Marks)
Answer all questions

05. With a neat diagram, explain the architecture of 16-bit 8086 microprocessor in detail. [10]

06. How the memory is organized in 8051 microcontroller? Explain in detail about the data and program memory available in 8051. [10]

07. Write an 8051 assembly language program to convert the given temperature 25°C in degree Celsius (°C) to degree Fahrenheit (°F) scale using the formula F=(°C*9/5)+32. Assume the result does not exceed FFH. [10]

08. Write an 8051 assembly language program to transfer "VIT" serially at 9600 baud rate, 8-bit data ,1 start bit and 1 stop bit. [10]

09. Write an 8051 assembly language program that uses interrupts to implement an intruder alarm system. Assume that the pressure sensor is connected to the INT0 (P3.2) pin. The pin is at 0 when an intruder steps on a special mat and 1 when there is no pressure on the mat. The program should turn on an alarm buzzer which is connected to P3.0 when an interrupt occurs. The program should keep the alarm on until there is no more pressure on the mat. [10]

1 → no prs
0 → yes prs

10. Assume that P1 is connected to the weight machine and receives the weight as a decimal whole number between 00 and 99 when an object is weighed. Write an 8051 assembly language program to display the weight on a 16 x 2 LCD display, specifically in the second row and fourth column, in the format "XX KG." Note: ASCII Value for 0 to 9 is 30 to 39. [10]

11. With a neat diagram, discuss the ARM register set in detail and explain the different operating modes of an ARM processor. [10]

12. Debug the below program to evaluate (A + 8B + 7C - 27)/4 by using ARM assembly instructions. [10]
Where: A = 25, B = 19, and C = 99. Also write the correct program after debugging the code and explain the codes.

```
LDR R0, #25
LDR R1, #19
ADD R0, R0, R1, ASR #3
MOV R1, #99
MOV R2, #7
MUL R0, R1, R2, R0
SUB R0, R0, #27
MOV R0, R0, LSL #2
```

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