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**PRESIDENCY UNIVERSITY
BENGALURU**

SET B

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024**

Semester : Semester V - 2021

Course Code : ECE3111

Course Name : Microprocessor and Microcontroller

Program : B.Tech.

Date : 0J-JAN-2024

Time : 9:30AM - 12:30 PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS

5 X 4M = 20M

1. A processor is a device that has computing i.e., data processing capability. Attempt the following question

1. If the address bus of a processor is 64 bits, what is its address space? 2 marks
2. Find the status of the flags CF, SF, AF after the following instructions are executed in 8051 microcontroller. 2 marks

```
MOV A, #38H  
ADD A, #35H
```

(CO3,CO2,CO1) [Knowledge]

2. 8086 Microprocessor is an enhanced version of 8085 Microprocessor that was designed by Intel in 1976. If IP contains the number 0034H, and CS = 5555H, where will the next instruction be fetched from? 4Marks

(CO3,CO2,CO1) [Knowledge]

3. The architecture of the 8086 microprocessor is based on a complex instruction set computer (CISC) architecture. Attempt the following questions: 4×1 marks

- a) Name the 8-bit registers of 8086.
- b) Which are the first and last memory addresses that an 8086 can address?
- c) Which unit (EU or BIU) is responsible for performing arithmetic calculations?
- d) What is the difference in operation between the carry flag and the overflow flag?

(CO3,CO2,CO1) [Knowledge]

4. The most popular and commonly used 8051 Microcontroller Packaging is Dual in-line or DIP. Which of the following instructions are illegal for 8051 microcontroller? 4×1 marks
- a) ADD R3, #50H
 - b) ADD A, #50H
 - c) ADD R7, R4
 - d) ADD A, #F5H

(CO1,CO3,CO2) [Knowledge]

5. The instruction set of the 8086 microprocessor includes many powerful instructions that can perform multiple operations in a single instruction, reducing the number of instructions needed to perform a given task. Find the result due to the following instructions. Given AX = 008CH, BX = 345EH, CX = 67EBH
- a) AND BL, CL
 - b) OR AH, BH

(CO2,CO1,CO3) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

5 X 10M = 50M

6. While the segmented memory architecture allows the 8086 microprocessor to address a large amount of memory, it can be difficult to program and manage, as it requires programmers to use both segment registers and offsets to address memory. Attempt the following programs: 2×5 marks.
- a) Write an Assembly Language Program (ALP) in 8086 to find the factorial of 10.
 - b) Write an Assembly Language Program (ALP) in 8086 to find the sum of the first 10 natural numbers (1+2+3...+10). Assume that the numbers are stored in memory address 2000H onwards. Store the sum in memory address 3000H.

(CO3) [Comprehension]

7. The complementary metal-oxide-semiconductor technology used in making a microcontroller is far cheaper than the material used in making microprocessors
- a) What is the value of register B for the 8051 program mentioned below: 5 Marks

```
MOV A, #50H
MOV B, #60H
CJNE A, B, NEXT
MOV B, A
NEXT: MOV B, #40H
END
```

- b) Write the addressing mode of the following instructions of 8086. 5 Marks

- i) MOV [4560H], AX
- ii) ADD BL, 89H
- iii) ADD BX, [DI]
- iv) MOV 6[BP][DI], AL
- v) MOV CX, [BP+9]

(CO3) [Comprehension]

8. The 8051 microcontroller is used in consumer appliances, home appliances, communication system, automobiles, defense system etc. Attempt the following questions: 2×5 marks

a) Find the value of register A and B for the ALP of 8051 microcontroller as shown below:

```
MOV A, #90
MOV B, #10
DIV AB
END
```

b) Find the value of register A for the ALP of 8051 microcontroller as shown below:

```
MOV A, #36
RR A
RR A
RR A
RR A
RR A
END
```

(CO3) [Comprehension]

9. The 8051 microcontroller is widely used in automotive applications. Attempt the following programs: 2×5 marks

a) Write an Assembly Language Program (ALP) in 8051 to transfer a block of 10-byte data starting from RAM address 50H onwards to the destination address starting from 60H onwards.

b) Write an Assembly Language Program (ALP) in 8051 to exchange a block of 10-byte data starting from RAM address 50H onwards to destination address starting from 60H onwards.

(CO3) [Comprehension]

10. The 8086's ability to use various buses efficiently and effectively helps to ensure that it remains competitive in its performance and capabilities, even as technology continues to advance. Design an address decoder using OR logic for a 32 K × 8 RAM. Find the address space of this memory chip. 10 Marks

(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

2 X 15M = 30M

11. The different ways in which a source operand is denoted in an instruction are known as addressing modes. Discuss the addressing modes of 8086. 10 Marks

Also, draw the architecture of 8086.

5 Marks

(CO2) [Application]

12. Rarely, a microprocessor work continuously without getting interrupted. What do you mean by interrupt? 1 marks

What do you mean by interrupt vector and interrupt vector table? 2 marks

Describe the classification of interrupts of the 8086 microprocessor. 5 marks

Also, describe all steps involved before jumping to ISR and after returning to the main program from ISR. 4 marks

Explain five dedicated interrupts of 8086. 3 marks

(CO2) [Application]