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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING  
MID TERM EXAMINATION - APR 2023**

**Semester :** Semester IV - 2021

**Course Code :** ECE3111

**Course Name :** Sem IV - ECE3111 - Microprocessors and Microcontrollers

**Program :** CSE

**Date :** 17-APR-2023

**Time :** 9:30AM - 11AM

**Max Marks :** 50

**Weightage :** 25%

**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 2 = 10M)**

1. The program control instructions control the flow of program execution and are capable of branching to different program segments. Describe JC and JNC program control instructions.  
(CO1,CO2) [Knowledge]
2. Assume the professor is teaching in class and an outsider knocks on the door to interrupt him. The professor has two options. The first is to go to the door and address the problem of that person before returning to teaching from where he paused. The second option is for the professor to ignore the outsider and continue teaching in class. There are two input Interrupt pins based on this concept: INTR and NMI. Which Interrupt pin corresponds to which of the options given?  
(CO1,CO2) [Knowledge]
3. The microprocessor checks the status of the flag register after the execution of every instruction. Describe how the ZF and CF flag bits are updated in the instruction CMP operand1, operand2 of 8086.  
(CO1,CO2) [Knowledge]
4. Just like indexing in any book helps a reader to identify topics faster there is a concept of segmentation in the memory chip of 8086. What is meant by memory segmentation? Write the advantages of memory segmentation.  
(CO1,CO2) [Knowledge]
5. Different microprocessors have different addressing modes. State True or false.
  - a. 8086 microprocessor have addressing modes in which both operands in the instruction can be in memory location.
  - b. MOV AX, [2345H] means move 2345H into AX.

(CO1,CO2) [Knowledge]

## PART B

### ANSWER ALL THE QUESTIONS

(4 X 5 = 20M)

6. The memory chip for the 8086 microprocessor is divided into various segments such as CS, DS, SS, and ES so that code and data can be stored separately. Given that the DS contains 7FA2h and the offset address is 438Eh, then calculate the following addresses giving an appropriate explanation for each.
- Physical Address
  - Lower Range address in the Data Segment
  - Upper Range address in the Data Segment
  - Logical address

(CO2,CO1) [Comprehension]

7. A program is a set of instructions that can be executed by a processor to do a specific task. Write an ALP to multiply the First five natural Numbers without using mul or Imul instruction.

(CO1,CO2) [Comprehension]

8. Microprocessor has a set of instructions that controls the transfer of execution in a program. JNZ is a program control instruction that jumps to the specified location if the zero flag is not set to zero. How many times LOOP1 will be executed in the following program so that the contents of BL register becomes 0Ch? Show the value to be loaded in the CL register.

```
MOV BL, 00H
MOV CL, ??H
LOOP1: ADD BL, 02H
DEC CL
JNZ LOOP1
```

(CO2,CO1) [Comprehension]

9. There is a total of seven addressing modes in 8086 microprocessor. Each addressing mode is unique in the way the operands are specified in the instructions. Name the type of addressing mode used in below instructions a) MOV [DI], AX b) MOV BX, 34E3H c) MOV [BX][DI], CX d) MOV CL, [BX + 10] e) MOV 7[BP][SI], AX

(CO1,CO2) [Comprehension]

## PART C

### ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

10. Assembly Language Programs are written with the help of English-like words known as mnemonics to program a microprocessor. You need to write an 8086 assembly language program to evaluate  $F = X(Y + Z) - 20h$ , where  $X = 02h$ ,  $Y = 30h$  and  $Z = 40h$ . Memory location F will store the result. All the values of X, Y, Z and F are hexadecimal and part of data segment.

(CO2,CO1) [Application]

11. The way in which operands are specified in an assembly language instruction is called its addressing mode. Explain all the addressing modes of 8086 with an example.

(CO1,CO2) [Application]