

Roll No																				
---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



**PRESIDENCY UNIVERSITY
BENGALURU**

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

Semester : Semester VI - 2020

Course Code : ECE3014

Course Name : Sem VI - ECE3014 - Microcontroller Applications

Program : ECE

Date : 18-APR-2023

Time : 9:30AM - 11AM

Max Marks : 60

Weightage : 30%

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. Microprocessor is based on CISC architecture and Microcontroller is based on RISC architecture. What do RISC and CISC stand for respectively?
(CO1) [Knowledge]
2. Microcontroller 8051 is a 8 bits controller but it contains few 16 bits registers. The Program Counter is _____ bits register. Mention the minimum and maximum values that can be stored in this register.
(CO1) [Knowledge]
3. There are 128 bytes of RAM in the 8051, the 128 bytes are divided into 3 different groups. It contains _____ number of register banks and each register bank contains _____ number of Registers.
(CO1) [Knowledge]
4. An instruction set is a group of commands given to CPU and these are unique for a given CPU. Identify which of the following Instruction(s) is (are) illegal? (i) MOV R3,#500h (ii) MOV R9,#50h
(CO2) [Knowledge]
5. The data transfer instructions are used to transfer data from one location to another. This transfer of data can be from register to register, register either to memory or to memory to register. State two instructions that transfers the data from register to memory. Write the mnemonic for the same.
(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(3 X 10 = 30M)

6. Microcontroller is a controlling unit of a embedded systems, fabricated on a small chip capable of performing ALU (Arithmetic Logical Unit) operations and communicating with the other devices connected to it. Explain the architectural block diagram of 8051 microcontroller.

(CO1) [Comprehension]

7. Mr. Sani is an Embedded Engineer at ARM®. He has written a program. He wanted to test this program in Proteus®, before he could actually implement it in hardware. He is not having Keil® software to get the HEX file so that he can dump the HEX file in 8051 in Proteus®. Help him by formulating the HEX file of the program so that he can use this to dump in to the ROM.

```
        MOV B, #05H
        MOV R2, #00H
        MOV R0, 30H
        MOV A, @R0
BACK:   INC R0
        ADD A, @R0
        JNC LABEL1
        INC R2
LABEL1: MOV P2, A
        ACALL DELAY
        DJNZ B, BACK
HERE1:  SJMP HERE1
        ORG 123H
DELAY:  MOV R6, #98H
HERE:   DJNZ R6, HERE
        RET
        END
```

(CO1) [Comprehension]

8. In microcontroller 8051, Addressing modes is the way for which an operand is specified for an instruction in the accumulator. Register Indirect Addressing mode reduces the repeated instructions in a given program. With the following example show how the Register Indirect Addressing mode reduces the number of instructions.

Program a 8051 Microcontroller to copy the value 45H into RAM memory locations 40H to 49H using

- (a) Direct addressing mode
(b) Register indirect addressing mode with a loop.

(CO2) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

9. In 8051 microcontroller, the System designer is not limited by the amount of internal RAM & ROM available onchip. Two separate external memory spaces are made available by PC & DPTR and also have different interfacing pins and control pins to enable external RAM & ROM chip. With neat connections, show how a 32KB ROM and 16KB RAM memories are interfaced with 8051 Microcontroller along with control signals. Also calculate starting & ending memory addresses for each memory.

(CO1) [Application]

10. In a college if a student scores 30h, 33h, 39h & 3FH in four different subjects, these score are stored from memory location 40h onwards. Write an ALP using 8051 microcontroller instruction to compute the total marks and average marks obtained by a student.

(CO4) [Application]