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**PRESIDENCY UNIVERSITY
BENGALURU**

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

Semester : Semester VI - 2020

Course Code : ECE3014

Course Name : Sem VI - ECE3014 - Microcontroller Applications

Program : ECE

Date : 18-MAY-2023

Time : 10.30AM - 12.00PM

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.
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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. In 8051 there are six most important types of addressing modes available. The only memory which can be accessed using indexed addressing mode is
(CO2) [Knowledge]
3. In 8051, there are various types of addressing modes. Identify the given instruction to which addressing mode it belongs to: MOVX A,@R1. And is used to access
(CO2) [Knowledge]
4. Microcontroller 8051 comes with four I/O Ports. Few Ports have dual functionality. Specify the Ports used to interface external memory.
(CO1) [Knowledge]
5. If a microcontroller architecture has both 8-bit and 16-bit versions, which of the following statements is true?
(i) The 8-bit software will run on the 16-bit system.
(ii) The 16-bit software will run on the 8-bit system.
(CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(3 X 10 = 30M)

6. A given assembly language program is a series of statements or lines which are either assembly language instructions or statements called directives. Identify valid instruction and also identify the addressing mode and mention the output at each line.

(a) `MOVC A, @A+DPTR` ; A = 06H, DPTR = 01FAH

(b) `MOV A, @R3` ; R3 = 54H, Data in 54H = 3EH

(c) `MOV R4, R6` ; R6 = 29H

(d) The instruction to transfer data from R2 of RB0 to R4 of RB2 will be _____ (CO2) [Comprehension]

7. The limitations of microprocessors are overcome in microcontroller by having on chip peripherals like memory, I/O ports etc. Design the major units required to build 8051 microcontroller and also describe the functions of each unit which is essential for fetching the instructions and decoding it.

(CO1) [Comprehension]

8. 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 R0, #45H
        MOV R2, #00
        MOV A, @R0
        MOV B, A
BACK:   MOV P2, B
        ACALL DELAY
        INC R0
        MOV A, @R0
        ADD A, B
        JNC LABEL1
INC R2
LABEL1: MOV B, A
MOV A, @R0
CJNE A, #00, BACK
        ORG 287H
DELAY:  MOV 06H, #32H
HERE:   DJNZ R6, HERE
        RET
```

(CO1) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

9. An instruction set is a group of commands for a CPU in machine language. If 1Kg apple costs Rs. 0DEH, if you buy 14H Kgs, then what would be the total cost of apple, write the set of instructions to execute the same along with the content of registers A & B.

(CO4) [Application]

10. In 8051 microcontroller has on chip memory. For the given application, if the programmer requires extra storage, microcontroller supports external memory interfacing which has different interfacing pins and control pins to enable external RAM & ROM chip. Design a microcontroller system, using the 8051 microcontroller, 8K bytes of ROM and 16K bytes of RAM. Interface the memory such that the starting address of the ROM is 0000H & RAM is 8000H.

(CO1) [Application]