Department of Electronics
Government Degree College (Autonomous), Baramulla

SEMESTER 5ᵗʰ   **MAJOR / MINOR COURSE**

Course Title: Microprocessors & Microcontrollers   **Course Code: BET22C501**
Credits: Theory: 04; Practical: 02

Learning Objectives:

1. *To understand the differences in architecture and applications between Microprocessors and Microcontrollers*
2. *To understand basic architecture of 8085 microprocessor*
3. *To understand the 8085 instruction set and write programs in assembly language*
4. *To understand basic architecture of 8051 microcontroller*
5. *To understand the 8051 instruction set and write programs in assembly language*

Learning Outcomes:

On completion of this course the students will be:

1. *Familiar with the components and functioning of a computer system, gaining an understanding of how a computer system operates.*
2. *Familiar with the fundamental concepts and architecture of 8085 microprocessor and 8051 Microcontroller.*
3. *Familiar with the addressing modes, computer instructions and its types.*
4. *Able to write assembly language programs for microprocessors and microcontrollers.*
5. *Able to interface different peripherals with 8051 Microcontrollers.*

THEORY (4 Credits):

UNIT-I: Introduction to Microprocessors and Microcontrollers (16 HOURS)

Computer System: Central Processing Unit, Memory, I/O, System Bus; Introduction/History/Evolution and Applications of Microprocessors, Programmer's Model of Microprocessors, Von Neumann and Harvard Architectures, CISC and RISC Architectures. Introduction/ Evolution and Applications of Microcontrollers, Comparison of Microprocessor and Microcontroller, Microcontrollers for embedded system, Introduction to various Programming Languages.

Unit-II: 8085 Architecture of 8085 Microprocessor (16 HOURS)

Introduction and main features of 8085 microprocessor: Architecture of 8085 Microprocessor, Registers of 8085: Programmable & non programmable Registers, Flag Registers. Pin-out diagram of 8085 microprocessor. 8085 Bus Structure, Address data demultiplexing and use of control signals. Types of memory used for interfacing 8085 (RAM, ROM, EEPROM); Address range and memory mapping of 8085 microprocessor.

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Unit III: Instruction Set & Programming of 8085 Microprocessor (16 HOURS)

Instructions set (Data transfer, Arithmetic, logical, branch, and control instructions), 8085 Stacks & Subroutines, Time delay loops, Instruction and Data Formats. Instruction Timing Diagram, Memory read/write Timing Diagrams. 8085 Interrupts: (Hardware, Software Maskable, Non Maskable, Vectored & Non- Vectored). Simple Programming examples of 8085 based on Data Transfer, Arithmetic and logic Instructions.

Unit-IV: 8051 Architecture and Programming (16HOURS)

Introduction and Architecture of 8051 microcontroller, Pin description of 8051 microcontroller, Register set and Addressing Modes of 8051, Instruction set of 8051 (data transfer/arithmetic/logic/bit level and byte control transfer instructions), 8051Assembly Language Programming: I/O port programming, bit manipulation, programming using Data Transfer, Arithmetic and logic Instructions.

Recommended Books:

1. Microprocessor Architecture Programming & applications with 8085, 2002, R.S. Goankar, Prentice Hall.
2. Microprocessors and Microcontrollers: Architecture, Programming & Interfacing using 8085, 8086, and 8051, S.K Mandal, Tata Mcgraw Hill Education.
3. The 8051 Microcontroller and Embedded Systems Using Assembly and C, M.A. Mazidi, J.G.Mazidi, and R.D. McKinlay,2ndEd.,2007, Pearson Education India.
4. Microprocessor Theory and Applications, M. Rafiq-uz-Zaman, McGraw Hill Publishing Company
5. Microprocessor Techniques by A.P. Godse, 2nd Ed., Technical Publication

PRACTICAL (2 Credits)

  Programming 8085 Microprocessor:
1. Arithmetic and logical operations of 8-bit/16-bit numbers.
2. Count number of 1's/ 0's in a given number.
3. Multiplication by repeated addition.
4. Division by repeated subtraction.
5. Block Data transfer.
6. Programs handling 32-bitnumbers.

7.   Calculate the sum of series of Even/Odd numbers

8.   Find larger/ smaller of two 8 and16-bit numbers

9.   Find the square of given number.
10.   Delay loops.

Programming 8051 Microcontroller:

1.   Arithmetic and logical operations of 8-bit/ 16-bit numbers.

2.   Data Transfer and shift operations.

3.   Program to toggle the bits of port with some delay

4.   Find the Largest/ smallest number in a series of 10 numbers.

5.   Sort Numbers in Ascending/ Descending Order.

6.   Singly and Multibit Shifting, Rotation and manipulation.

7.   To find the factorial of a number.
8.   Program to make the two numbers equal by increasing the smallest number and decreasing the largest number.