Course Title: **Microprocessor and Computer Architecture (3 Cr.)**
Course Code: **CACS155**
Year/Semester: **I/II**
Class Load: **6 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1 Hr., Practical: 2 Hrs.)**

Course Description

This course is an introduction to microprocessor and computer architecture. It covers topics in both the physical design of the computer (organization) and the logical design of the computer (architecture).

Course Objectives

The course has following specific objectives:

- To explain the microprocessor.
- To explain the assembly language programming.
- To explain the overview of computer organization.
- To explain the principle of CPU system.
- To explain the principle of memory system
- To explain the principle of data flow.

Course Contents

Unit 1 Fundamental of Microprocessor   5 Hrs.

Introduction to Microprocessors, Microprocessor systems with bus organization, Microprocessor architecture and operation, 8085 Microprocessor and its operation, 8085 instruction cycle, machine cycle, T states, Addressing modes in 8085, Introduction to 8086.

Unit 2 Introduction To Assembly Language Programming   10 Hrs.

Assembly Language Programming Basics, Classification of Instructions and Addressing Mode, 8085 Instruction Sets, Assembling, Executing and Debugging the Programs, Developing Counters and Time Delay Routines, Interfacing Concepts

Unit 3 Basic Computer Architecture   4 Hrs.

Introduction: History of computer architecture, Overview of computer organization, Memory Hierarchy and cache, Organization of hard disk.
Instruction Codes: Stored Program Organization-Indirect Address, Computer Registers, Common bus system, Instruction set, Timing and Control-Instruction Cycle

Unit 4 Microprogrammed Control   10 Hrs.

Basic Computer Design of Accumulator: Control of AC Register, ALU Organization; Control Memory-Address Sequencing: Conditional Branching, Mapping of Instruction-Subroutines; Micro Program: Symbolic Micro

Program, Binary Micro Program; Design of Control Unit: Basic Requirement of Control Unit, Structure of Control Unit, Micro Program Sequencer.

Unit 5 Central Processing Unit   10 Hrs.

General Register Organization: Control Word, Stack Organization and Instruction; Formats-Addressing Modes.

Data Transfer and Manipulation: Data Transfer Instructions, Data Manipulation Instructions, Arithmetic Instructions, Logical and Bit Manipulation Instructions, Shift Instructions.

Program Control: Status Bit Conditions, Conditional Branch Instructions, Subroutine Call and Return, Program Interrupt, Types of Interrupts

Unit 6 Pipeline, Vector Processing and Multiprocessors   6 Hrs.

Parallel Processing, Pipeline Examples: Four Segment Instruction Pipeline, Data Dependency, Handling of Branch Instructions; Vector Processing: Vector operations, Matrix Multiplication;

Laboratory Works

8085 Assembly Language program

1. Multi byte Addition & Subtraction, Multi byte decimal addition & subtraction.
2. Adder and substractor circuit.
3. Study of 8259 programmable interrupt controller - Development of interrupt service routine.
4. Keyboard/display controller - Keyboard scan - blinking and rolling display.
5. Parallel data transfer
6. Study of Microcomputer development system.

Teaching methods

The general teaching pedagogy includes class lectures, group works, case studies, guest lectures, research work, project work, assignments (theoretical and practical), tutorials and examinations (written and verbal). The teaching faculty will determine the choice of teaching pedagogy as per the need of the topics.

Evaluation

	Examination Scheme			
Internal Assessment		External Assessment		
Theory	Practical	Theory	Practical	Total
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Text Book

1. Morris Mano.M., Computer System architecture, PHI.

Reference Books

1. Hamacher.V.C.,Vranesic.Z.G and Zaky.S.G., *"Computer Organisation"*, McGraw Hill, New York.
2. Hayes,*"Computer System Architecture"*,Mc Graw Hill.