COMPUTER ORGANIZATION AND ARCHITECTURE

III Semester: CSE / IT

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
ACS004	**Core**	3	1	-	4	30	70	100
Contact Classes: 45	**Tutorial Classes: 15**	**Practical Classes: Nil**				**Total Classes: 60**		

I. COURSE OVERVIEW:

This course intended to provide the structure, internal working and implementation of a computer system. The fundamentals of various functional units of computer, computer instructions, addressing modes, computer arithmetic and logic unit, registers, data transfer, memory and input output system. It focuses on analysis of computer performance and functioning in modern computers.

II. OBJECTIVES:

The course should enable the students to:

  I The basic concepts of the various functional units and characteristics of computersystems.
 II The concepts of central processing unit design and perform basic operations with signed and unsigned integers in decimal and binary number systems.
III The function of each element of a memory hierarchy and compare the different methodsfor computer input and output.

III. COURSE OUTCOMES:

 After successful completion of the course, students should be able to:

CO 1	**Illustrate** interaction of components in a computer system with functional units and levels of programming languages.	Understand
CO 2	**Demonstrate** the implementation of micro-operations with the help of register transfer language and electronic circuits.	Understand
CO 3	**Identify** appropriate addressing modes for specifying thelocation of an operand.	Apply
CO 4	**Make use of** number system for data representation andbinary arithmetic in digital computers.	Apply
CO 5	**Interpret** the design of hardwired and micro-programmed control unit for execution of micro programs.	Understand
CO 6	**Summarize** the concepts of pipelining and inter process communication for advanced processor design.	Understand

IV. SYLLABUS:

UNIT-I	INTRODUCTION TO COMPUTER ORGANIZATION	Classes: 08

Basic computer organization, CPU organization, memory subsystem organization and interfacing, input or output subsystem organization and interfacing, a simple computer levels of programming languages, assembly language instructions, instruction set architecture design, a simple instruction set architecture.

UNIT-II	ORGANIZATION OF A COMPUTER	Classes: 10

Register transfer: Register transfer language, register transfer, bus and memory transfers, arithmetic micro operations, logic micro operations, shift micro operations; Control unit: Control memory, address sequencing, micro program example, and design of control unit.

UNIT-III	CPU AND COMPUTER ARITHMETIC	Classes: 08

CPU design: Instruction cycle, data representation, memory reference instructions, input-output, and interrupt, addressing modes, data transfer and manipulation, program control.

Computer arithmetic: Addition and subtraction, floating point arithmetic operations, decimal arithmetic unit.

UNIT-IV	INPUT-OUTPUT ORGANIZATION AND MEMORY ORGANIZATION	Classes: 10

Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory; Input or output organization: Input or output Interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access.

UNIT-V	MULTIPROCESSORS	Classes: 09

Pipeline: Parallel processing, pipelining-arithmetic pipeline, instruction pipeline; Multiprocessors: Characteristics of multiprocessors, inter connection structures, inter processor arbitration, inter processor communication and synchronization.

Text Books:

1. M. Morris Mano, "Computer Systems Architecture", Pearson, 3rd Edition, 2007.
2. John D. Carpinelli, "Computer Systems Organization and Architecture", Pearson, 1st Edition, 2001.
3. Patterson, Hennessy, "Computer Organization and Design: The Hardware/Software Interface", Morgan Kaufmann, 5th Edition, 2013.

Reference Books:

1. John. P. Hayes, "Computer System Architecture", McGraw-Hill, 3rd Edition, 1998.
2. Carl Hamacher, Zvonko G Vranesic, Safwat G Zaky, "Computer Organization", McGraw-Hill, 5th Edition, 2002.
3. William Stallings, "Computer Organization and Architecture", Pearson Edition, 8th Edition, 2010.

Web References:

1. https://www.tutorialspoint.com/computer_logical_organization/
2. https://www.courseera.org/learn/comparch
3. https://www.cssimplified.com/.../computer-organization-and-assembly-language-programming

E-Text Books:

1. https://www.groupes.polymtl.ca/inf2610/.../ComputerSystemBook.pdf
2. https://www.cse.hcmut.edu.vn/~vtphuong/KTMT/Slides/TextBookFull.pdf

Course Home Page: