

Subject Code: 1ET1030403	Subject Title: Computer Organization and Architecture
Pre-requisite	Basic Understanding of Computer System

Course Objective: The core objective of this course is to have a thorough understanding of the basic structure and operation of a digital computer. This course aims to present various operation of the arithmetic unit, design Control Unit, different ways of communicating with I/O devices, memory system.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	--	--	03	70	30	-	-	100

Subject Contents			
Sr. No	Topic	Total Hours	Weight (%)
1.	Basic structure of Computers: Block Diagram of General Purpose Computers; Detailed Understanding of Each Functional Unit; Register Transfer language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logical shift unit.	04	10
2.	Basic Computer Organization and Design: Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, Complete computer description, Design of Basic Computer, design of Accumulator Unit.	05	15
3.	Programming The Basic Computer: Introduction, Machine Language, Assembly Language, assembler, Program loops, Programming Arithmetic and logic operations, Subroutines, I-O Programming.	05	10
4.	Central Processing Unit Design: Introduction, Control Memory, design of control Unit, General Register Organization, Stack Organization, Instruction format, Addressing Modes, data transfer and manipulation, Reduced Instruction Set Computer (RISC), Complex Instruction Set Computer (CISC).	06	20
5.	Pipeline And Vector Processing: Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline, RISC Pipeline, Vector Processing, Array Processors.	05	15
6.	Arithmetic Processor Design: Introduction, Addition and subtraction, Multiplication Algorithms, Division Algorithms, Floating Point, Design Standards and Issues.	05	10
7.	Input-Output and Memory Organization: Input-Output Interface, Asynchronous Data Transfer, Modes Of Transfer, Priority Interrupt, DMA, Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.	06	20

Course Outcome:

After learning the course, the students should be able to:

- Basic structure of a digital computer
- Understand the organization of the control unit and arithmetic and logical unit.
- To design component of central processing unit
- To Design Interfacing of Memory and I/O.
- Recognize the importance of parallelism in computer architecture
- To articulate design issues in the development of processor or other components that satisfy design requirements and objectives.
- Apply concepts and skills to solve problems using a low-level programming language

List of References:

1. M. Morris Mano, "Computer System Architecture", Pearson
2. William Stallings, "Computer Architecture and Organization Designing for Performance", Pearson Education.
3. David A. Patterson and John L. Hennessy, "Computer Organization and Design The Hardware/Software Interface" Morgan Kaufmann, 2013
4. Andrew S. Tanenbaum and Todd Austin, "Structured Computer Organization", PHI
5. M. Murdocca & V. Heuring, "Computer Architecture & Organization", WILEY
6. John Hayes, "Computer Architecture and Organization", McGrawHill

E-Resources / Web Links

- NPTEL Lecture Series
- <http://www.intel.com/pressroom/kits/quickreffam.htm>
- <http://williamstallings.com/COA6e.html>