

B.Tech III Year I Semester**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA****19AEC53- COMPUTER ARCHITECTURE AND ORGANIZATION**

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Course Objectives: The objectives of the course are to make the students learn about

- To impart basic concepts of computer architecture and organization.
- To understand the design of the various functional units and micro operations of digital computers.
- To analyze micro programming and arithmetic operations.
- To gain knowledge about interfacing of input output devices and memory organization.
- To learn the basics of Parallel Computing and Pipelining.

UNIT – I: Basic Structure of Computers

Computer types, Functional units, basic operational concepts, Bus structures, Data types, Software: Languages and Translators, Loaders, Linkers, Operating systems.

Addressing Methods and Machine Program Sequencing

Memory locations – addresses and encoding of information – main memory operations – Instruction formats and instruction sequences – Addressing modes and instructions – Simple input programming – pushdown stacks – subroutines.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand various components of computer and their interconnections. **L2**
- Learn different addressing methods and machine program sequencing. **L1**

UNIT – II: Register Transfer and Micro Operations

Register transfer Language, Register transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, shift Micro operations, Arithmetic Logic Shift Unit

Central Processing Unit

Stack organization, instruction formats, Addressing modes, Data transfer and manipulation, Execution of a complete instruction, Sequencing of control signals, Program Control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Register Transfer and Micro Operations in computer organization. **L2**
- Learn different types of instruction formats and program control unit. **L1**

UNIT – III: Micro-Programmed Control

Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.

Computer Arithmetic

Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand Micro-programmed control unit. **L1**
- Learn the implementation of Computer Arithmetic operations. **L2**

UNIT – IV: Input-Output Organization

Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication.



Memory Organization

Memory hierarchy, main memory, auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on interfacing of Input-Output devices and data transfer between them. L1
- Understand memory organization in different types of memory and memory management hardware. L2

UNIT – V: Pipeline and Vector Processing

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Multi-Processors

Characteristics of Multiprocessors, Interconnection Structures, Inter processor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand parallel processing, pipelining and vector processing. L2
- Gain knowledge on basic Multi-Processors and their characteristics. L1

Text Books:

1. M. Morris Mano
2. William Stallings

Reference Books:

1. Carl Hamacher, ZvonksVranesic andSafwatZaky, “Computer Organization”,5th Edition, McGraw Hill, 2002.
2. Andrew S.Tanenbaum, “Structured Computer Organization”, 4th Edition PHI/Pearson

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts of computer architecture and organization. L2
- Gain knowledge about various functional units and micro operations of digital computers. L1
- Describe micro programing and arithmetic operations. L1
- Understand the concept of memory organization and Interfacing input output devices. L2
- Learn the basics of Parallel Computing and Pipelining. L1

