

2/4 B.Tech FOURTH SEMESTER

EM4T6 COMPUTER ARCHITECTURE & ORGANIZATION Credits: 4

Lecture: 4 periods/week
Tutorial: 1

Internal assessment: 30 marks
Semester end examination: 70 marks

Course Objectives:

- To understand the Structure and Function of the computer, the nature and characteristics of modern-day Computer System.

Learning Outcomes:

At the end of this course the Students will be able to

- Knows the Basic structure of a digital computer, designing of the control unit.
- Central processing unit and various instructions format together with a variety of addressing modes.
- Organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O Unit.
- Knows about the pipelining and parallel processing.

UNIT I

Introduction to Computer Organization: Basic Computer Organization, CPU Organization, Memory Subsystem Organization and Interfacing, I/O Subsystem Organization and Interfacing, A Relatively Simple Computer, An 8085-based Computer.

UNIT II

Instruction Set Architectures: Levels of Programming Languages, Assembly Language Instructions, Instruction Set Architecture Design, A Relatively Simple Instruction Set Architecture, The 8085 Microprocessor Instruction Set Architecture.

UNIT III

REGISTER TRANSFER & MICRO-OPERATIONS: Register Transfer Language, Register Transfer, Bus & memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit.

UNIT IV

MICRO PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

UNIT V

CENTRAL PROCESSING UNIT: General registers Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer

UNIT VI

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

UNIT VII

Memory Organization: Memory Hierarchy, main memory, auxiliary memory, associative memory, cache memory and Cache organisation, virtual memory, memory management hardware.

UNIT VIII

Input/Output Organization: Asynchronous Data Transfers Programmed I/O, Interrupts, Direct Memory Access, I/O Processors, Serial Communication, Serial Communication Standards.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors

Learning resources

TEXT BOOKS:

1. John P Hayes, 'Computer Architecture and Organisation' 2nd edition.
2. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI.

REFERENCE BOOKS :

1. Computer Organization, Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5/e, MCG,2002.
2. Computer Organization and Architecture,8/e, William Stallings , PEA,2010.
3. Computer Systems Organization and Architecture, John D. Carpinelli, PEA, 2009