COMPUTER ORGANIZATION
(Common to CSE, ECE, EEE, IT)

Course Code : 13CT1105

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Course Educational Objectives:

To give detailed information about the structure of computers and internal organization of different units regarding memory, I/O devices and registers.

❖ The internal organization of the computer system

❖ The internal operations.

❖ To know about register transfer and micro operations.

❖ To know about memory organization

❖ To know about pipeline and vector processing.

Course Outcomes:

At the end of the course student will be able to

❖ Get knowledge on basic structure of computers, register transfer operations.

❖ Get knowledge on memory organization and pipe line processing.

❖ Get knowledge on Arithmetic operations with float values.

❖ Get knowledge on input output devices organization.

❖ Get knowledge on vector processing.

UNIT-I   (12 Lectures)

BASIC STRUCTURE OF COMPUTERS:

Organization and Architecture, Structure and Function, Computer Components, Computer Function, Bus Interconnection, Processor Organization, Register Organization**.**

BASIC COMPUTER ORGANIZATION AND DESIGN:

Instruction codes, Computer instructions, Memory reference instructions, Instruction Cycle.

CENTRAL PROCESSING UNIT:

Stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, RISC.

UNIT-II   (12 Lectures)

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.

MICRO PROGRAMMED CONTROL:

Control Memory, Address Sequencing, Micro Program examples, Design of control unit, Hardwired control..

UNIT-III   (12 Lectures)

COMPUTER ARITHMETIC:

Data representation- Fixed point representation, Floating point representation, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-point Representations, Floating-point Arithmetic Operations, Decimal Arithmetic Units, Decimal Arithmetic Operations.

UNIT-IV   (12 Lectures)

MEMORY ORGANIZATION:

Memory system overview, Memory Hierarchy, Semi-conductor Main Memory, Cache Memory principle, Elements of cache design, Virtual Memory, Magnetic Disk, Optical Memory, Magnetic Tape, RAID.

INPUT- OUTPUT:

External Devices, I/O modules, Interrupts, Programmed I/O, Interrupt-driven I/O, Direct Memory Access, I/O Channels and Processors, PCI.

Asynchronous Data Transfer, Priority Interrupt, Serial Communication.

UNIT-V   (12 Lectures)

PIPELINE AND VECTOR PROCESSING:

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

MULTI PROCESSORS:

Multiprocessors and Multi computers, Characteristics of Multi-processors, Multiple Processor Organizations, Symmetric Multi-Processors, Cache Coherence, Clusters, Non Uniform Memory Access (NUMA).

TEXT BOOKS:

1. William Stallings, *"Computer Organization and Architecture"*, 8th Edition, Pearson Education, 2010.

2. M.Moris Mano, *"Computer Systems Architecture"*, 3rd Edition, Pearson Education, 2007.

REFERENCES:

1. John D. Carpinelli, *"Computer Systems Organization and Architecture"*, 3rd Edition, Pearson Education, 2001.

2. Carl Hamacher, Zvonks Vranesic, SafeaZak , *"Computer Organization"*, 5th Edition, TMH,2011.

WEB REFERENCES:

http://nptel.iitm.ac.in/video.php?subjectId=106106092

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