COMPUTER ORGANIZATION

(Common to CSE, ECE, EEE, IT)

Course Code : 15CT1104

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Course Outcomes:

At the end of the course, a student will be able to

CO 1 Discuss basic structure and organization of computers.

CO 2 Explain register transfer and micro operations.

CO 3 Apply fixed and floating point arithmetic algorithms.

CO 4 Discuss memory and input/output organizations

CO 5 Explain pipeline and vector processing.

UNIT-I: (10 Lectures)

BASIC STRUCTURE OF COMPUTERS:

Organization and Architecture, Structure and Function, Computer Components, 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, program control, RISC.

UNIT-II (10 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

UNIT-III (10 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

UNIT-IV (10 Lectures)

MEMORY ORGANIZATION:

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

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 (10 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,

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