



**RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES,
BASAR**

Computer Science and Engineering Department

CS2201

COMPUTER ORGANIZATION AND ARCHITECTURE

Externals: 60Marks

L-T-P-C 3 -0-0-3

Internals: 40Marks

Objectives:

- To understand how Computer Systems work & its basic principles
- To learn how to analyze the system performance.
- To understand the concepts behind advanced pipelining techniques.
- To learn the current state of art in memory system design
- To understand how I/O devices are being accessed and its principles.
- To provide the knowledge on Instruction Level Parallelism

UNIT-I:

Basic functional blocks of a computer, Basic Functional blocks - CPU, Memory, Input-output, Control unit, Instructions and Instruction execution cycle, Instruction set architecture-Elements of machine instructions, Instruction representation, Instruction types, classification based on number of addresses, Data types, Types of operations-Data transfer, Arithmetic, Logical, Conversion, Input-output, system, Control and transfer of control operations, Addressing modes, Case study of 8086 instruction set.

UNIT-II:

Data representation and Arithmetic Data Representation: signed number representation, fixed and floating point representations, character representation. Converting between different bit lengths, Integer arithmetic: Negation, integer addition and subtraction, ripple carry adder, carry look ahead adder, etc. multiplication shift-and-add, and Booth multiplier. Division non restoring and restoring techniques, floating point: floating point representation and floating point arithmetic: Addition, Subtraction, Division, Multiplication

UNIT-III:

CPU control unit design Micro operations : fetch, indirect, interrupt, execute, Instruction cycle, Control Signals: inputs and outputs, Hard Wired Control Unit, Micro instructions: horizontal and vertical instruction formats, Micro program, Micro programmed control unit, Advantages and Disadvantages of hardwired and Micro programmed control unit Pipelining: Parallel processing, pipelining, Arithmetic pipelining, Instruction pipelining, RISC pipelining, throughput and speedup, pipeline hazards and solutions.

UNIT-IV:

Input-output organization External devices, Input -output Interface: I/O Bus and interface Modules, I/O Versus memory Bus, I/O Modules structure and their functions, Modes of Transfer: Programmed I/O, Interrupt driven I/O, Direct Memory Access: DMA Controller and Transfer, DMA Configurations, Privileged and Non-privileged instructions, Software Interrupts and exceptions, Processor modes: User mode and kernel mode.

UNIT-V:

Semi-conductor main memory & Memory organization Memory Hierarchy, Main Memory: Semi-conductor main memory, Organization of memory cell, RAM: DRAM, SRAM and ROM Chips, Memory Connection to CPU. Auxiliary memory: Disks, Read and write mechanisms, Data organization and formatting, Physical Characteristics, Disk performance parameters, Overview of optical discs, Memory Organization: Memory Interleaving, Cache memory, Cache memory principles, Mapping functions: Direct mapping, Associative mapping function, Set Associative mapping function, Replacement Algorithms.

Suggested References:

1. William Stallings, Computer Organization & Architecture, 6th edition, Pearson Education Asia
2. M.Morris Mano, Computer System Architecture, 3rd edition, Pearson Education Asia
3. V.CarlHamacher, Z.G.Vranesic, S.G.Zaky, Computer organization, McGraw Hill.