CS 2006 COMPUTER ORGANIZATION AND ARCHITECTURE Cr- 4

Course Outcome: At the end of the course, the students will be able to:

CO1. understand how computer hardware has evolved to meet the needs of multiprocessing systems, instruction Set Architecture: Instruction format, types, various addressing modes.

CO2. understand the basic components and design of the CPU: the ALU and control unit.

CO3. understand the memory organization: SRAM, DRAM, concepts on cache memory, Memory Interleaving, associative memory, Virtual memory organization.

CO4. understand the I/O Organization: Basics of I/O, Memory-mapped I/O & I/O mapped I/O, Types of I/O transfer: Program controlled I/O, Interrupt-driven I/O, DMA.

Prerequisite : NIL

Basic Structure of Computers: (UNIT-1)

Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Machine Instructions and

Programs: Memory Location and Addressing mechanism, Memory Operations, Addressing Modes, Machine Instruction Format, Program Flow, Control, Logic and Shift/Rotate Instructions, Subroutines, Programming examples.

Basic Processing Unit: (UNIT-2)

Some Fundamental Concepts, Execution of a Complete Instruction, Single and Multiple Bus Organization, Hardwired Control, Micro programmed Control unit.

Arithmetic: (UNIT-3)

Design of fast adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating-point Numbers and Operations.

Memory System: (UNIT-4)

Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, memory module design, Cache Memories – Mapping Functions, Replacement Algorithms, Memory interleaving, Memory Performance Considerations Virtual Memories.

Input/ Output Organization: (UNIT-5)

Basic Input and Output Operations, Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access. Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB, Flynn's Classification, RISC vs CISC

Text Book

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 5th Edition, TMH, 2002.

Reference Book

1. Computer Organization & Architecture, William Stallings, 7th Edition, PHI, 2006