Paper Name: Computer Organisation
Code: CS 401
Contacts: 3L +1T
Credits: 4
Allotted hours: 42L

COURSE OBJECTIVES

To discuss the fundamentals of computer organization and relate these basics to the contemporary design issues.

To provide the students a thorough understanding of the inner workings of a computer system, and the various hardware and software issues related to computers.

To introduce the students to various conventional computational organizations and more recent applications of computer organization in advanced digital systems.

To understand various data transfer techniques in a digital computer.

To help the students analyze the architectural and computational designs and hence identify where, when and how computer performance can be enhanced.

To demonstrate the key skills and tradeoffs required in construction of cost-effective computer systems.

To provide the students, especially who are interested in pursuing higher studies, the basic knowledge necessary to read more advanced articles in this field.

COURSE OUTCOME

On the completion of the course,

Students will be able to think critically and independently about computer system design and understand the strengths and weaknesses of the conventional computational organizations.

Student will learn the concepts of computer organization for several engineering applications.

Student will also develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.

SYLLABUS

Introduction: Basic organization and function of a stored program computer, Functional components of a computer, Interconnection of components, Performance of a computer [2L].

Representation of Instructions: Machine instructions, Operands, Addressing

modes, Instruction formats, Instruction sets, Addressing modes, Instruction set architectures - CISC and

RISC architectures [6L].

Arithmetic: Commonly used number systems. Fixed and floating point representation of numbers. Overflow and underflow. Design of adders - ripple carry and carry look ahead principles.

Fixed point multiplication -Booth's algorithm. Fixed point division - Restoring and non-restoring algorithms [8L].

Processing Unit: Organization of a processor - Registers, ALU and Control unit, Data path in a CPU, Instruction cycle, Organization of a control unit - Operations of a control unit, Hardwired control unit, Microprogrammed control unit [9L].

Memory Subsystem: Memory organization, Static and dynamic memory, Memory hierarchy, Associative memory, Secondary memory, Cache memory unit - Concept of cache memory, Mapping methods, Memory management unit - Concept of virtual memory, Address translation [10L].

Input/Output Subsystem: I/O operations, Concepts of handshaking, Program controlled I/O, Interrupt controlled I/O, and DMA controlled I/O [5L].

Pipelining: Introduction to instruction pipelining, pipeline hazards [2L].

Text Book:

1. Mano, M.M., “Computer System Architecture”, PHI.
2. Behrooz Parhami “ Computer Architecture”, Oxford University Press
3. Hayes J. P., “Computer Architecture & Organisation”, McGraw Hill
4. Hamacher, “Computer Organisation”, McGraw Hill,
5. Chaudhuri P. Pal, “Computer Organisation & Design”, PHI,