ADVANCED COMPUTER ARCHITECTURE
CSE-401 F

L	T	P			
				Class Work:	50
3	1	-		Examination:	100
				Total:	150

Text book

- **Computer Architecture by Michael J. Flynn**

- **Advance computer architecture by Hwang & Briggs, 1993, TMH**

Syllabus

Section A

- **Architecture And Machines:** Some definition and terms, interpretation and microprogramming. The instruction set, Basic data types, Instructions, Addressing and Memory. Virtual to real mapping. Basic Instruction Timing.

- **Time, Area And Instruction Sets:** Time, cost-area, technology state of the Art, The Economics of a processor project: A study, Instruction sets, Professor Evaluation Matrix

Section B

- **Cache Memory Notion:** Basic Notion, Cache Organization, Cache Data, adjusting the data for cache organization, write policies, strategies for line replacement at miss time, Cache Environment, other types of Cache. Split I and D-Caches, on chip caches, Two level Caches, write assembly Cache, Cache references per instruction, technology dependent Cache considerations, virtual to real translation, overlapping the Tcycle in V-R Translation, studies. Design summary.

Section C

- **Memory System Design:** The physical memory, models of simple processor memory interaction, processor memory modeling using queuing theory, open, closed and mixed-queue models, waiting time, performance, and buffer size, review and selection of queuing models, processors with cache.

Section D

- **Concurrent Processors:** Vector Processors, Vector Memory, Multiple Issue Machines, Comparing vector and Multiple Issue processors.

- **Shared Memory Multiprocessors:** Basic issues, partitioning, synchronization and coherency, Type of shared Memory multiprocessors, Memory Coherence in shared Memory Multiprocessors.

Computer Architecture & Organization

Computer Architecture: Those attributes of a system which are visible to a machine language programmer having direct impact on logical execution of a program.

These attributes include :

Instruction set,

word size,

no of bits used to represent various data types,

techniques of addressing memory etc.

Computer Organization: The operational units and their inter connections that realize the architecture.

Control signals ,

Memory Technology,

Interfaces between computer and peripherals etc.

Introduction

Computer Architecture

Computer Organization

Some Definitions and Terms

- **<u>State:</u>** **It is a particular configuration of storage units (like Registers or Memory) and a *state transition* is a change in that configuration.**

- **<u>Cycle:</u>** **It is the Time between state transitions.**

  ⟹ *Machine Cycle:*

  If storage being reconfigured is register, its called *Machine Cycle.*

  ⟹ *Memory Cycle :*

  If Memory is being reconfigured it is called *Memory Cycle*.

- **<u>Command:</u>** **A term used to describe various *Instructions*, is responsible for affecting state changes.**

- **<u>Process:</u>** **It is a sequence of commands and an initial state. These sequence of commands apply to the initial state and generate a final state.**

The Machine: Interpretation & Microprogramming

Management of *Interpretation* Process is responsibility of decoder.

The *Interpretation Process* begins with the decoding of opcode field from the *Instruction*.

OP Code field being decoded by the *Decoder.*

OP CODE	A	B	C

The Instruction

The *Decoder* activates *Registers* for a series of state transitions that correspond to the action of OP Code.