

## **MCPC1008 COMPUTER ORGANIZATION AND ARCHITECTURE (3-0-0)**

Objectives:

- To obtain the basic architectural and organizational concepts of a digital computer.
- To analyze performance issues in processor and memory design of a digital computer.
- To understand processor performance improvement using instruction level parallelism.

### **Course Outcomes(CO):**

After successful completion of the course the student will be able to:

- CO1: Understand background of internal communication of computer and have better idea on how to write assembly language programs.
- CO2: Be clear with memory management techniques.
- CO3: Understand the communication IO devices with processor.
- CO4: Notice how to perform computer arithmetic operations.
- CO5: Be clear with pipeline procedure and multi processors.

### **Module-I**

Introduction: Review of basic computer architecture, Quantitative techniques in computer design, measuring and reporting performance.

### **Module-II**

Pipelining : Basic concepts, Instruction and Arithmetic pipeline, Data hazards, Control hazards and Structural hazards, Techniques for handling hazards. Exception handling. Pipeline optimization techniques.

### **Module-III**

Hierarchical memory technology: Inclusion, Coherence and locality properties, Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, Mapping and Management techniques, Memory replacement policies. Instruction-level Parallelism: Basic concepts, Techniques for increasing ILP, Superscalar, Superpipelined and VLIW Processor architectures. Array and Vector processors.

### **Module-IV**

Multiprocessor architecture: Taxonomy of Parallel Architectures, Centralized shared-memory architecture, Synchronization, Memory consistency, Interconnection networks. Distributed shared memory architecture. Cluster computers.

Books:

1. Morris Mano, "Computer System Architecture", PHI
2. William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003
3. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.
4. Patterson, "Computer Organisation and Design", Elsevier
5. John P Hayes, "Computer Organization", McGraw Hill