III Year I Semester L T P C
Code: 20AI5655 3 0 0 3

## **HIGH PERFORMANCE COMPUTING (Honors)**

### **Course Objectives:**

After completion of this course, students able to

- 1. Understand the high-performance computing techniques
- 2. Understand the pipelining techniques in performance of the computing.
- 3. Understand the memory management techniques.
- 4. Understand the parallelism techniques
- 5. Understand the multiprocessor architectures

### **Course Outcomes:**

Upon completion of the course, graduates will be able to

- 1. Inferring the high-performance computing techniques
- 2. Interpreting the pipelining techniques in performance of the computing
- 3. Annotating the memory management techniques
- 4. Inferring the parallelism techniques
- 5. Distinguish the multiprocessor architectures

#### **UNIT-I**

Introduction: Review of basic computer architecture, quantitative techniques in computer design, measuring and reporting performance. CISC and RISC processors.

#### UNIT-II

Pipelining: Basic concepts, instruction and arithmetic pipeline, data hazards, control hazards, and structural hazards, techniques for handling hazards. Exception handling. Pipeline optimization techniques. Compiler techniques for improving performance.

#### UNIT-III

Hierarchical memory technology: Introduction, Coherence and locality of reference properties; Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, mapping and management techniques, memory replacement policies.

### **UNIT-IV**

Instruction-level parallelism: Basic concepts, techniques for increasing ILP, superscalar, superpipelined and VLIW processor architectures. Array and vector processors.

# **UNIT-V**

Multiprocessor architecture: Taxonomy of parallel architectures. Centralized shared-memory architecture: synchronization, memory consistency, interconnection networks. Distributed shared-memory architecture.

#### **Text Book:**

**1.** John L. Hennessy and David A. Patterson, Computer Architecture: A Quantitative Approach, Morgan Kaufmann.

Reference Books: 1. John Paul Shen and Mikko H. Lipasti, Modern Processor Design: Fundamentals of	
<ul> <li>Superscalar Processors, TataMcGraw-Hill</li> <li>M. J. Flynn, Computer Architecture: Pipelined and Parallel Processor Design, Narosa Publishing House.</li> <li>Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmab McGraw-Hill.</li> </ul>	
RAGHU ENGINEERING COLLEGE (Autonomous)	CSM Dept.