| III Year I Semester | L | T | P | C |
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| 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, super-pipelined 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 Superscalar Processors, TataMcGraw-Hill
2. M. J. Flynn, Computer Architecture: Pipelined and Parallel Processor Design, Narosa Publishing House.
3. Kai Hwang, Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw-Hill.