COURSE TITLE	**PARALLEL AND DISTRIBUTED COMPUTING**
COURSE CODE	**05MD0306**
COURSE CREDITS	**5**

Course Outcomes: After completion of this course, student will be able to:

1 Understand concepts of Parallel programming.
2 Analyze various parallel programming algorithms.
3 Understand analytical modeling and parallel programs.
4 Understand concepts of Distributed Computing.
5 Apply basic distributed computing algorithms in real life.

Pre-requisite of course: Basic knowledge of computer networks, operating system and programming language.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	1	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	**UNIT-1** Introduction: Motivating Parallelism, Scope of parallel computing, Parallel Programming Platforms: Implicit Parallelism- Trends in Microprocessor Architectures, Limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms,, Communication Costs in Parallel Machines, Routing Mdechanisms for Interconnection Networks,, Impact of Process-Processor Mapping and Mapping Techniques	8
2	**UNIT-2** Principles of Parallel Algorithm Design: Decomposition Techniques, Decomposition Techniques, Decomposition Techniques, Characteristics of Tasks and Interactions, Characteristics of Tasks and Interactions, Characteristics of Tasks and Interactions, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing. , Mapping Techniques for Load Balancing. , Mapping Techniques for Load Balancing.	10

Contents : Unit	Topics	Contact Hours
3	**UNIT-3** Analytical Modeling of Parallel Programs: Sources of Overhead in Parallel Programs, Sources of Overhead in Parallel Programs, Sources of Overhead in Parallel Programs, Sources of Overhead in Parallel Programs, Performance Metrics for Parallel Systems, Performance Metrics for Parallel Systems, Performance Metrics for Parallel Systems, Performance Metrics for Parallel Systems, The Effect of Granularity on Performance,, Scalability of Parallel Systems, Scalability of Parallel Systems, Minimum Execution Time and Minimum Cost Optimal Execution Time	12
4	**UNIT-4** Introduction to Distributed Computing: Relation to computer system components, Relation to parallel multiprocessor/multicomputer systems, Message-passing systems versus shared memory systems, Message-passing systems versus shared memory systems, Primitives for distributed communication, Primitives for distributed communication, Synchronous versus asynchronous executions, Design issues and challenges	8
5	**UNIT-5** Terminology and basic algorithms: Topology abstraction and overlays, Terminology and basic algorithms: Topology abstraction and overlays, Classifications and basic concepts, Classifications and basic concepts, Complexity measures and metrics, Complexity measures and metrics, Elementary graph algorithms, , Synchronizers, Maximal independent set (MIS), Connected dominating set, compact routing tables, Leader election, Challenges in designing distributed graph algorithms	12
Total Hours		**50**

Textbook :

1 Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Addison Wesley, 2ndE

2 Distributed Computing – Principles, Algorithms and Systems, Ajay D. Kshemkalyani, Mukesh Singhal, Cambridge University Press, .

References:

1 Principles of Parallel Programming, Principles of Parallel Programming, C Lin, L Snyder, Addison-Wesley Publishing Company, 2008

2 An Introduction to Parallel Programming, An Introduction to Parallel Programming, Peter S. Pacheco, Morgan Kaufmann Publishers, .

3 Distributed Systems Concepts and Design, Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair, 5thE

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking**
10.00	10.00	30.00	20.00	20.00	10.00

Instructional Method:

1 Board-Work
2 PPT
3 Video

Supplementary Resources:

1 https://www.geeksforgeeks.org/introduction-to-parallel-computing/
2 https://www.heavy.ai/technical-glossary/parallel-computing
3 http://www.mkp.com/pacheco
4 https://hpc.llnl.gov/documentation/tutorials/introduction-parallel-computing-tutorial
5 https://www.geeksforgeeks.org/what-is-distributed-computing/
6 https://www.ibm.com/docs/en/txseries/8.2?topic=overview-what-is-distributed-computing