

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IVYear B.E. Computer Engineering (FullTime)				
SubjectCode&Name		Instructions Hours per Week			Credits			
7CERC1 Distributed Computing		L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours		3	1	-	3	1	-	4

### LearningObjectives:

- The field of machine learning is concerned with the question of how to build computer programs able to construct new knowledge or to improve already possessed knowledge by using input information.
- The goal of this course is to introduce the theoretical foundations of machine learning, to provide practical experience of applying machine learning techniques and to investigate new problems where machine learning techniques can do better.

**Prerequisites:** Basic knowledge of a programming language and Basic knowledge of probabilities and statistics is required.

### Course Outcomes (CO) and Program Outcomes (PO) Mapping

CO No.	Course Outcome	Program Outcomes (PO)
CO1	Understand the basic concepts and techniques of Distributed Computing and the need of Distributed computing systems in real-world problems.	PO1, PO2, PO12
CO2	Understand Distributed Coordination, and the way to Inter-process Communication architecture.	PO2, PO4, PO5, PO10
CO3	Apply Remote Communication to learn, and RPC,RMI implementation, in real-world problems	PO2, PO4, PO5
CO4	Understand, learn and handel Synchronization for the selected algorithms: Bully algorithm, Ring algorithm,	PO1, PO2, PO4, PO5, PO9, PO10, PO11, PO12
CO5	Understand the concept of Deadlocks in distributed systems and Distributed Shared Memory, Issues in designing human oriented names,	PO3, PO4, PO9, PO12

### CO-PO Relationship Matrix

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	-	2	-	2	3	-	-	-	-	2	-	-
CO3	-	3	-	3	3	-	-	-	-	-	-	-
CO4	3	3	-	3	3	-	-	-	2	2	2	3
CO5	-	2	3	3	-	-	-	-	3	-	-	3

## COURSE OF CONTENTS

### UNIT-I:

Introduction : Basic Concept-Concepts of Distributed Systems : Introduction, Distributed computing models, Software concepts, Design issues in distributed systems, Client-server model, WWW 1.0 and 2.0. Network Communication: LAN and WAN technologies, OSI Model and Internet protocols, ATM, Protocols for Distributed systems.

### UNIT-II:

Distributed Computing System DCS design goals, Transparencies, Fundamental issues, Distributed Coordination, Inter-process Communication: Message Passing and its features, IPC message format, IPC synchronization, Buffering, multi datagram messaging, process addressing techniques, failure handling, Formal Models for message passing systems, Broadcast and converge cast on a spanning tree, Flooding and building a spanning tree, Constructing a DFS spanning tree with and without a specified root.

### UNIT-III:

Remote Communication: Introduction, RPC basics, RPC implementation, RPC Communication, Other issues, Sun RPC, RMI basics, RMI Implementation, Java RMI

### UNIT-IV:

Synchronization: Clock synchronization, Logical clocks, Global state, Mutual exclusion, Election algorithms: Bully algorithm, Ring algorithm, Leader election in rings, anonymous rings, Asynchronous rings, synchronous rings, election in wireless networks.

### UNIT-V:

Deadlock: Deadlocks in distributed systems, Deadlock in Message communication, Distributed Shared Memory: Concepts, Hardware DSM, Design issues in DSM systems, Implementation issues, Heterogeneous and other DSM systems, Naming: Overview, Features, Basic concepts, System oriented names, Object locating mechanisms, Issues in designing human oriented names, Name caches, Naming and security, DNS  
Distributed database system: A Case study.

### RECOMMENDED BOOKS:

1. Distributed Computing, Sunita Mahajan and Seema Shah, Oxford University Press.
2. Distributed Systems: Principles and Paradigms, Taunenbaum .
3. Distributed Systems: Concepts and Design, G. Coulouris, J. Dollimore, and T. Kindberg, Pearson Education.
4. Distributed Computing, Fundamentals, Simulations and Advanced topics, 2nd Edition, Hagit Attiya and Jennifer Welch, Wiley India.

### Learning Outcomes:

After learning the course the students should be able to

1. Understand distributed systems
2. Know various types of transparencies which Distributed OS should provide
3. Understand and analyze Message passing models
4. Understand RPC and implement it using manual or automatic stub generation
5. Know various synchronization issues
6. Know, analyze various election algorithms
7. Implement threads Understand distributed systems
8. Know various types of transparencies which Distributed OS should provide
9. Understand and analysis Message passing models
10. Understand RPC and implement it using manual or automatic stub generation
11. Know various synchronization issues
12. Know, analyze various election algorithms
13. Implement threads
14. Know File systems
15. Compare various Distributed OS