

CS7T4C

**4/4 B.Tech. FIRST SEMESTER  
DISTRIBUTED SYSTEMS  
Elective – I**

**Credits: 4**

**Lecture: 4 periods/week**

**Tutorial: 1 period /week**

**Internal assessment: 30 marks**

**Semester end examination: 70 marks**

---

**Course Context and Overview:** This course introduces students to the principles, design, and implementation of distributed systems. The lectures focus primarily on the principles and design of distributed systems, and cover communication, distributed storage, naming, synchronization, fault tolerance, peer-to-peer systems and data centers.

---

**Prerequisite: Operating Systems, Data Communication.**

**Objectives:**

The main objective of this course is to understand the hardware and software issues in modern distributed systems. Students will also learn distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems. Examples from current popular distributed systems such as peer-to-peer (P2P) systems will be analyzed.

**Learning Outcomes:**

At the end of this course student will be able to:

1. Design distributed systems with appropriate architectures.
2. Able to represent inter process communication.
3. Analyze the characteristics of operating system and file system in distributed environment.
4. Monitor and coordinate the communication between processes and transactions in a distributed system

**UNIT-I**

**Introduction Of Distributed System:** Goals, Types of Distributed systems.

**Architectures:** Architectural Styles, System architectures, Self management in distributed systems.

**UNIT-II**

**Processes:** Threads, Virtualization, Clients, Servers, Code Migration, Software Agents.

**UNIT-III**

**Communication:** Fundamentals, Remote Procedure Call, Message Oriented Communication, Stream-Oriented Communication, Multicast Communication.

## UNIT IV

**Naming:** Names, Identifiers and Addresses, Flat Naming, Structured Naming, Attribute-Based Naming

**Synchronization:** Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning of nodes, Election Algorithms.

## UNIT V

**Consistency and Replication:** Introduction, Data-Centric Consistency Models, Client-Centric Consistency Models, Replica Management, Consistency Protocols, Examples.

## UNIT-VI

**Fault Tolerance:** Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.

## UNIT-VII

**Security:** Introduction, Secure channels, Access Control, Security Management

## UNIT-VIII

**Distributed Object-Based Systems:** Architecture, Object servers, Binding Clients to Objects, Parameter passing, CORBA, Synchronization, Entity Consistency, Replicated invocations, Fault tolerant CORBA & Java, Security for Remote objects..

### Learning Resources

#### TEXT BOOKS:

- 1) Distributed Systems – Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 2/e, PHI.

#### REFERENCES:

1. Distributed Systems Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair, 4/e, PEARSON.
2. Distributed Operating Systems Concepts and Design, Pradeep K. Sinha, PHI.