Int. Marks	Ext. Marks	Total Marks		L	T	P	C
40	60	100		3	1	-	3

Pre-Requisites: Data structures and algorithms, advanced programming, fundamentals of computer systems

Course Objectives:
- Provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls.
- Expose students to current technology used to build architectures to enhance distributed Computing infrastructures with various computing principles

UNIT-I: Characterization of Distributed Systems: Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges. System Models: Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

UNIT-II: Inter process Communication: Introduction, The API for the Internet Protocols- The Characteristics of Inter process communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

UNIT-III: Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

UNIT-IV: Operating System Support: Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

UNIT-V: Distributed File Systems: Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays. Coordination and Agreement: Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

UNIT-VI: Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

Course Outcomes:

CO-1	Describe important characteristics of distributed systems and the salient architectural features of such systems.	L2
CO-2	Describe the features and applications of important standard protocols which are used in distributed systems	L2
CO-3	gains the knowledge of inter-process and inter object communication in a distributed environment	L2
CO-4	Understanding the support of Operating systems for distributed systems	L2
CO-5	Develop a familiarity with distributed file systems.	L2
CO-6	Understand about the transactions and deadlocks in distributed environment.	L2

Correlation of COs with POs & PSOs:

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	1	1	1	-	-	-	-	-	-	-	-	1	1	3
CO-2	1	3	3	3	-	-	-	-	-	-	-	-	1	1	3
CO-3	1	3	3	1	-	-	-	-	-	-	-	-	1	1	3
CO-4	1	2	3	2	-	-	-	-	-	-	-	-	1	3	3
CO-5	1	2	3	2	-	-	-	-	-	-	-	-	1	3	1
CO-6	2	3	1	1	-	-	-	-	-	-	-	-	1	2	3

Text Books:

1. Ajay D Kshemkalyani, MukeshSighal, "Distributed Computing, Principles, Algorithms and Systems", Cambridge

2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems- Concepts and Design", Fourth Edition, Pearson Publication

Reference Books:

1. Distributed-Systems-Principles-Paradigms-Tanenbaum PHI