

Branch Name:	Information Technology
Program Code:	ET105
Course Title:	Distributed Computing
Course Code:	2ET1050601T
Pre-requisite Course:	Data Structure and Algorithm, Operating System, Computer Network

Course Objectives: This course content enables to understand importance of Distributed Computing, The work of Operating System is different in the distributed environment. Student should understand Message passing, RPC, Synchronization, Load Balancing. Migration of processes, Deadlock management etc in distributed environment.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topics	Total Hours	Weightage (%)
1	Concepts of Distributed Systems & Network Communication: Introduction, Distributed computing models, Software concepts, Design issues in distributed systems, Client-server model, WWW 1.0 and 2.0, LAN and WAN technologies, OSI Model and Internet protocols, ATM, Protocols for Distributed systems.	04	10
2	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	08	25
3	Remote Communication: Introduction, RPC basics, RPC implementation, RPC Communication and Other issues, Sun RPC, RMI basics, RMI Implementation, Java RMI	05	10
4	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, Deadlocks in Distributed systems, Deadlocks in Message communication	08	20
5	Distributed System Management: Resource management, Task management approach, Load balancing approach, Load sharing approach, Process Management, Process migration, threads, fault tolerance	06	15
6	Distributed Shared Memory: Concepts, Hardware DSM, Design issues in DSM systems, Implementation issues, Heterogeneous and other DSM systems,	03	10
7	Naming: Overview, Features, Basic concepts, System oriented names, Object locating mechanisms, Issues in designing human oriented names, Name caches, Naming and security, DNS	04	10

Reference Books:

1. Distributed Computing, Sunita Mahajan and Seema Shah, Oxford University Press, 2010
2. Distributed Systems: Principles and Paradigms, 2007, Taubenbaum
3. Distributed Systems: Concepts and Design, G. Coulouris, J. Dollimore, and T. Kindberg, 2012, Pearson Education
4. Distributed Computing, Fundamentals, Simulations and Advanced topics, 2nd Edition, 2006, Hagit Attiya and Jennifer Welch, Wiley India

E-Resource / Web Links:

1. en.wikipedia.org/wiki/message_passing
2. <http://www.cs.rutgers.edu/~pxk/rutgers/notes/clocks/index.html>
3. <https://www.cs.uic.edu/~ajayk/DCS-Book>
4. <http://nptel.ac.in/courses/106106107/>

Course Learning Outcomes (CLO):

Course Outcomes	Description	Bloom's Taxonomy Level
COL1	Understand distributed systems, Know various types of transparencies which Distributed OS should provide	1.Remembering 2.Understanding
COL2	Understand and analyse Message passing models and Understand RPC and implement it using manual or automatic stub generation	1.Remembering 4. Analyze 5. Creating
COL3	Know synchronization issues ,Analyze various election algorithms, Analyze various consistency and replication protocols and methods	2. Understanding 4. Analyze
COL4	Recognize security threats and apply cryptography methods for security in Distributed Computing	1.Remembering 3. Applying 2.Understanding
COL5	Understand various types of Distributed Computing	1.Remembering 2.Understanding

Mapping of CLO with PO and PSO :

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(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	PSO1	PSO2
CLO1		L		L									H	
CLO2		M												M
CLO3	L	L	M	H	L				L		M		M	
CLO4		M	H		L				L		H		H	H
CLO5	L		L			M								H

H: High, M: Medium, L: Low