



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CPC803	Parallel and Distributed System	4	-	--	4	-	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10	30	100 (60% Weightage)				

Pre-requisite Course Codes		-
At end of successful completion of this course, student will be able to		
Course Outcomes	CO1	Apply the principles and concept in analyzing and designing the parallel and distributed systems
	CO2	Reason about ways to parallelize problems.
	CO3	Gain an appreciation on the challenges and opportunities faced by parallel and distributed systems.
	CO4	Understand the middleware technologies that support distributed applications such as RPC, RMI and object based middleware.
	CO5	Improve the performance and reliability of distributed and parallel programs.

Module No.	Topics	Ref.	Hrs.
1	<b>Introduction</b> Parallel Computing, Parallel Architecture, Architectural Classification Scheme, Performance of Parallel Computers, Performance Metrics for Processors, Parallel Programming Models, Parallel Algorithms.	1-4	06
2	<b>Pipeline Processing</b> Introduction, Pipeline Performance, Arithmetic Pipelines, Pipelined Instruction Processing, Pipeline Stage Design, Hazards, Dynamic Instruction Scheduling,	1-4	06
3	<b>Synchronous Parallel Processing</b> Introduction, Example-SIMD Architecture and Programming Principles, SIMD Parallel Algorithms, Data Mapping and memory in array processors, Case studies of SIMD parallel Processors	1-4	06
4	<b>Introduction to Distributed Systems</b> Definition, Issues, Goals, Types of distributed systems, Distributed System Models, Hardware concepts, Software Concept, Models of Middleware, Services offered by middleware, Client Server model.	1-4	06
5	<b>Communication</b> Layered Protocols, Remote Procedure Call, Remote Object Invocation, Message Oriented Communication, Stream Oriented	1-4	04



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	Communication		
<b>6</b>	<b>Resource and Process Management</b> Desirable Features of global Scheduling algorithm, Task assignment approach, Load balancing approach, load sharing approach, Introduction to process management, process migration, Threads, Virtualization, Clients, Servers, Code Migration	1-4	<b>06</b>
<b>7</b>	<b>Synchronization</b> Clock Synchronization, Logical Clocks, Election Algorithms, Mutual Exclusion, Distributed Mutual Exclusion-Classification of mutual Exclusion Algorithm, Requirements of Mutual Exclusion Algorithms, Performance measure, Non Token based Algorithms: Lamport Algorithm, Ricart-Agrawala's Algorithm, Maekawa's Algorithm Token Based Algorithms: Suzuki-Kasami's Broadcast Algorithms, Singhal's Heuristic Algorithm, Raymond's Tree based Algorithm, Comparative Performance Analysis.	1-4	<b>08</b>
<b>8</b>	<b>Consistency and Replication</b> Introduction, Data-Centric and Client-Centric Consistency Models, Replica Management. Distributed File Systems Introduction, good features of DFS, File models, File Accessing models, File-Caching Schemes, File Replication, Network File System (NFS), Andrew File System (AFS), Hadoop Distributed File System and MapReduce.	1-4	<b>06</b>
<b>Total</b>			<b>48</b>

## References:

- [1] M.R. Bhujade, "Parallel Computing", 2nd edition, New Age International Publishers 2009.
- [2] Andrew S. Tanenbaum and Maarten Van Steen, "Distributed Systems: Principles and Design" (4th Edition), Addison Wesley/Pearson Education.
- [3] George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems: Concepts and Design" (4th Edition), Addison Wesley/Pearson Education.
- [4] Pradeep K Sinha, "Distributed Operating Systems : Concepts and design", IEEE computer society press