Paper Code : DBS:602
Paper Name: Distributed Systems

Teaching Hours (Per Week)		Examination Scheme		
TH. (hours)	Pr. (hours)	Internal	External	Total
		Th. (marks)	Th. (marks)	
4		30	70	100 (marks)

Lectures = 68

UNIT 1: Introduction to Distributed Systems **14 Hrs**

DEFINITION OF A DISTRIBUTED SYSTEM, GOALS (Connecting Users and Resources, Transparency, Openness, Scalability), HARDWARE CONCEPTS (Bus-Based Multiprocessors, Switched Multiprocessor, Bus-Based Multicomputer Systems, Switched Multicomputer Systems), SOFTWARE CONCEPTS (Distributed Operating Systems, Network Operating Systems, Middleware, Multiprocessor Timesharing Systems)

UNIT 2: COMMUNICATION in Distributed Systems **14 Hrs**

Introduction, Layered Protocols (Physical Layer, Data link layer, Network layer, Transport layer, Session layer, Presentation layer, Application layer), Asynchronous Transfer Mode Networks (What is ATM?, ATM Physical layer, ATM adaptation Layer, ATM Switching, Implication of ATM on Distributed Systems), The Client-Server model (Clients and Servers, Examples of Client-Server, Client-Server Architectures, Addressing, Block versus Non blocking Primitives, Buffered versus Unreliable Primitives, Implementing the Client-Server Model), Remote Procedure Call (Basic RPC Operation, Parameter Passing, Dynamic Binding, RPC Semantics in the presence of Failures, Implementation Issues, Problem Areas), Group Communication, Design Issues, Group Communication in ISIS)

UNIT 3: Synchronization in Distributed Systems **14 Hrs**

Introduction, Clock Synchronization (Physical Clocks, Logical Clocks, Clock Synchronization Algorithm, Use of Synchronized Clocks), Mutual Exclusion (A centralized Algorithm, A Distributed Algorithms, A Token Ring Algorithm, A comparison of the three Algorithms), Election Algorithms (The Bully Algorithm, A Ring Algorithm), Atomic Transactions (Introduction, The Transaction Model, Implementation, Concurrence Control), Dead Locks in Distributed Systems (Distributed Deadlock Detection, Distributed Deadlock Prevention)

UNIT 4: Processes and Processor in Distributed Systems **13 Hrs**

Introduction, Threads (Introduction, Thread usage, Design Issues for Thread packages, Implementing a Threads Package), System Models (The workstation Model, Using Idle Workstation, The Processor pool model, A Hybrid Model), Processor Allocation (Allocation Models, Design Issues for Processor Allocation Algorithms, Implementation issues for Processor Allocation Algorithms), Scheduling in Distributed Systems, Fault Tolerance (Component Fault, System Failures, Synchronous versus Asynchronous Systems, Use of Redundancy, Fault Tolerance using Active Replication, Agreement in Fault Systems), Real-Time Distributed Systems (What is Real-Time System?, Design Issues, Real-Time Communication, Real-Time Scheduling)

UNIT 5: Distributed File Systems **13 Hrs**

Introduction, Distributed File System Design (The File Service Interface, The Directory Server Interface, Semantics of File Sharing), Distributed File System Implementation (File Usage, System Structure, Caching, Replication, An Example: Sun's Network File System, Lessons Learned), Trends in Distributed File Systems (New Hardware, Scalability, Wide Area Networking, Mobile Users, Fault Tolerence, Multimedia)

Text Book:

1. Tanenbaum S Andrew, "Distributed Operating Systems", Pearson Education Asia
2. Singhal Mukesh, Shivaratri G Niranjan, "Advanced Concepts in Operating Systems , Distributed Database and Multiprocessor Operating Systems", McGrew-Hill, Inc.

Reference Books:

1. Tanenbaum S Andrew, "Distributed Systems Principles and Paradigms", Prentice Hall of India