Course Code: 18CS0527 **R23**

SIDDARTHA INSTITUTE OF ENGINEERING AND TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
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QUESTION BANK (DESCRIPTIVE)

Subject with Code: DISTRIBUTED SYSTEMS (23CS1219) **Course & Branch**: B.Tech - CCC
Regulation: R23 **Year & Sem:** IV-B.Tech & I-Sem

UNIT –I
INTRODUCTION TO DISTRIBUTED SYSTEMS

1	**a**	Define a Distributed System. Mention any two goals of distributed systems.	**[L1, CO1]**	**[2M]**
	b	List any two characteristics of distributed systems and briefly explain one.	**[L2, CO1]**	**[2M]**
	c	Give two examples of distributed systems used in everyday life.	**[L2, CO1]**	**[2M]**
	d	Explain the concept of resource sharing in distributed systems with an example.	**[L3, CO1]**	**[2M]**
	e	Differentiate Physical Models and Architectural Models of distributed systems.	**[L4, CO1]**	**[2M]**
2	a) Explain the concept and goals of distributed systems. b) Describe the characteristics and applications of distributed systems.		**[L2, CO1]** **[L2, CO1]**	**[5M]** **[5M]**
3	a) Explain different types of distributed systems with suitable examples. b) Discuss various challenges faced in distributed systems.		**[L2, CO1]** **[L2, CO1]**	**[5M]** **[5M]**
4	a) Illustrate resource sharing in distributed systems with neat examples. b) Explain Physical, Architectural and Fundamental Models of distributed systems.		**[L3, CO1]** **[L2, CO1]**	**[5M]** **[5M]**
5	a) Discuss the importance of transparency in distributed systems. b) Compare centralized, decentralized and distributed systems		**[L2, CO1]** **[L4, CO1]**	**[5M]** **[5M]**
6	a) Explain the evolution and current trends in distributed systems. b) Evaluate the advantages and limitations of distributed systems.		**[L2, CO1]** **[L5, CO1]**	**[5M]** **[5M]**
7	a) Explain system models used in distributed systems. b) Describe different architectural models with suitable diagrams.		**[L2, CO1]** **[L2, CO1]**	**[5M]** **[5M]**
8	a) Illustrate the working of a distributed system using a real-world example. b) Analyze the challenges in designing distributed systems.		**[L3, CO1]** **[L4, CO1]**	**[5M]** **[5M]**
9	a) Evaluate the importance of scalability and transparency in distributed systems. b) Design a simple distributed system for an online library.		**[L5, CO1]** **[L6, CO1]**	**[5M]** **[5M]**
10	a) Explain resource sharing mechanisms in distributed systems. b) Compare different system models used in distributed computing.		**[L2, CO1]** **[L4, CO1]**	**[5M]** **[5M]**
11	a) Justify the need for distributed systems in modern computing environments. b) Design the architecture of a distributed online banking system.		**[L5, CO1]** **[L6, CO1]**	**[5M]** **[5M]**

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UNIT –II
COMMUNICATION AND DISTRIBUTED SYSTEM ARCHITECTURES

1	**a**	Define Inter-Process Communication (IPC).	**[L1, CO2]**	**[2M]**
	b	What is Remote Procedure Call (RPC)?	**[L2, CO2]**	**[2M]**
	c	Mention any two Internet protocols used in distributed systems.	**[L2, CO2]**	**[2M]**
	d	Differentiate Client–Server and Peer-to-Peer architectures.	**[L3, CO2]**	**[2M]**
	e	What is Middleware? Mention one service provided by middleware.	**[L4, CO2]**	**[2M]**
2	a) Explain networking concepts used in distributed systems. b) Discuss LAN, MAN and WAN with suitable examples.		**[L2, CO2]** **[L2, CO2]**	**[5M]** **[5M]**
3	a) Explain Client–Server Architecture with diagram. b) Describe Peer-to-Peer Architecture with applications.		**[L2, CO2]** **[L2, CO2]**	**[5M]** **[5M]**
4	a) Explain Inter-Process Communication techniques. b) Discuss the working of Remote Procedure Call (RPC).		**[L2, CO2]** **[L2, CO2]**	**[5M]** **[5M]**
5	a) Explain Remote Method Invocation (RMI) architecture. b) Compare RPC and RMI.		**[L2, CO2]** **[L4, CO2]**	**[5M]** **[5M]**
6	a) Explain middleware architecture and services. b) Evaluate the importance of middleware in distributed systems.		**[L2, CO2]** **[L5, CO2]**	**[5M]** **[5M]**
7	a) Explain networking issues in distributed systems. b) Discuss Internet protocols used in distributed communication.		**[L2, CO2]** **[L2, CO2]**	**[5M]** **[5M]**
8	a) Illustrate message passing using IPC. b) Analyze Client–Server and Peer-to-Peer architectures.		**[L3, CO2]** **[L4, CO2]**	**[5M]** **[5M]**
9	a) Evaluate middleware services for distributed applications. b) Design a client–Server application architecture.		**[L5, CO2]** **[L6, CO2]**	**[5M]** **[5M]**
10	a) Explain communication mechanisms in distributed systems. b) Compare different networking architectures used in distributed systems.		**[L2, CO2]** **[L4, CO2]**	**[5M]** **[5M]**
11	a) Justify the need for middleware in distributed applications. b) Design an online distributed chat application using Client–Server architecture.		**[L5, CO2]** **[L6, CO2]**	**[5M]** **[5M]**

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UNIT –III
OPERATING SYSTEM SUPPORT, VIRTUALIZATION, WEB SERVICES AND SECURITY

1	a	What is Operating System Virtualization?	**[L1, CO3]**	**[2M]**
	b	Define RESTful Web Service.	**[L2, CO3]**	**[2M]**
	c	What is JSON?	**[L2, CO3]**	**[2M]**
	d	Mention one application of Web Services.	**[L3, CO4]**	**[2M]**
	e	What is Kerberos Authentication?	**[L3, CO4]**	**[2M]**
2	a) Explain Operating System support for distributed systems. b) Discuss OS-level virtualization.		**[L2, CO3]** **[L2, CO3]**	**[5M]** **[5M]**
3	a) Explain Service-Oriented Architecture (SOA). b) Describe RESTful Web Services.		**[L2, CO3]** **[L2, CO3]**	**[5M]** **[5M]**
4	a) Explain APIs and JSON with examples. b) Discuss applications of Web Services.		**[L2, CO3]** **[L2, CO3]**	**[5M]** **[5M]**
5	a) Explain cryptographic algorithms used in distributed systems. b) Compare symmetric and asymmetric encryption techniques.		**[L2, CO3]** **[L4, CO3]**	**[5M]** **[5M]**
6	a) Explain Digital Signatures with neat diagram. b) Discuss Kerberos authentication protocol.		**[L2, CO3]** **[L2, CO3]**	**[5M]** **[5M]**
7	a) Explain Operating System architecture for distributed systems. b) Describe virtualization techniques used in distributed environments.		**[L2, CO4]** **[L2, CO4]**	**[5M]** **[5M]**
8	a) Illustrate REST API communication using JSON. b) Analyze Web Services and SOA.		**[L3, CO4]** **[L4, CO4]**	**[5M]** **[5M]**
9	a) Evaluate the role of security in distributed systems. b) Design a secure web service architecture.		**[L5, CO4]** **[L6, CO4]**	**[5M]** **[5M]**
10	a) Explain applications of Web Services b) Compare REST and SOAP Web Services.		**[L2, CO4]** **[L4, CO4]**	**[5M]** **[5M]**
11	a) Justify the need for authentication in distributed systems. b) Design a secure API-based distributed application.		**[L5, CO4]** **[L6, CO4]**	**[5M]** **[5M]**

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UNIT –IV
NAMING, DISTRIBUTED FILE SYSTEMS AND DISTRIBUTED TRANSACTIONS

1	a	Define URI and URL.	**[L1, CO5]**	**[2M]**
	b	What is Name Resolution?	**[L2, CO5]**	**[2M]**
	c	Define Namespace.	**[L2, CO5]**	**[2M]**
	d	What is HDFS?	**[L3, CO5]**	**[2M]**
	e	What is Two-Phase Commit Protocol?	**[L4, CO5]**	**[2M]**
2	a) Explain Naming Services in distributed systems. b) Describe DNS architecture and working.		**[L2, CO5]** **[L2, CO5]**	**[5M]** **[5M]**
3	a) Explain Directory Services and Namespace b) Discuss URI and URL with suitable examples.		**[L2, CO5]** **[L2, CO5]**	**[5M]** **[5M]**
4	a) Explain HDFS architecture. b) Describe features of Distributed File Systems.		**[L2, CO5]** **[L2, CO5]**	**[5M]** **[5M]**
5	a) Explain distributed transactions. b) Compare pessimistic and optimistic concurrency control.		**[L2, CO5]** **[L4, CO5]**	**[5M]** **[5M]**
6	a) Explain locking mechanisms for concurrency control. b) Describe the Two-Phase Commit Protocol.		**[L2, CO5]** **[L2, CO5]**	**[5M]** **[5M]**
7	a) Explain distributed deadlocks and their handling techniques. b) Discuss Name Resolution process in distributed systems.		**[L2, CO5]** **[L2, CO5]**	**[5M]** **[5M]**
8	a) Illustrate HDFS data storage process. b) Analyze different concurrency control mechanisms.		**[L3, CO5]** **[L4, CO5]**	**[5M]** **[5M]**
9	a) Evaluate the performance of distributed file systems. b) Design a distributed file storage architecture.		**[L5, CO5]** **[L6, CO5]**	**[5M]** **[5M]**
10	a) Explain atomic commit protocols. b) Compare DNS and Directory Services.		**[L2, CO5]** **[L4, CO5]**	**[5M]** **[5M]**
11	a) Justify the importance of concurrency control in distributed transactions. b) Design a transaction management system for distributed banking.		**[L5, CO5]** **[L6, CO5]**	**[5M]** **[5M]**

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UNIT –V
FAULT TOLERANCE, TIME SYNCHRONIZATION AND DISTRIBUTED ALGORITHMS

1	a	Define Logical Clock.	**[L1][CO6]**	**[2M]**
	b	What is Lamport Logical Clock?	**[L2][CO6]**	**[2M]**
	c	Define Fault Tolerance.	**[L2][CO6]**	**[2M]**
	d	What is Replication?	**[L3][CO6]**	**[2M]**
	e	Define Consistency Model.	**[L4][CO6]**	**[2M]**
2	a) Explain Clock Synchronization in distributed systems. b) Discuss Lamport Logical Clock algorithm.		**[L2][CO6]** **[L2][CO6]**	**[5M]** **[5M]**
3	a) Explain Vector Clock with suitable example. b) Describe Mutual Exclusion algorithms.		**[L2][CO6]** **[L2][CO6]**	**[5M]** **[5M]**
4	a) Explain Leader Election algorithms. b) Discuss Fault Tolerance techniques.		**[L2][CO6]** **[L2][CO6]**	**[5M]** **[5M]**
5	a) Explain Replication techniques. b) Compare Lamport Clock and Vector Clock.		**[L2][CO6]** **[L4][CO6]**	**[5M]** **[5M]**
6	a) Explain Recovery mechanisms in distributed systems. b) Discuss Consistency Models.		**[L2][CO6]** **[L2][CO6]**	**[5M]** **[5M]**
7	a) Explain distributed algorithms with examples. b) Describe logical clock synchronization techniques.		**[L2][CO6]** **[L2][CO6]**	**[5M]** **[5M]**
8	a) Illustrate Lamport Logical Clock algorithm with an example. b) Analyze replication strategies used in distributed systems.		**[L2][CO6]** **[L2][CO6]**	**[5M]** **[5M]**
9	a) Evaluate different fault tolerance mechanisms. b) Design a distributed leader election algorithm for a network.		**[L5][CO6]** **[L6][CO6]**	**[5M]** **[5M]**
10	a) Explain recovery mechanisms after node failures. b) Compare different consistency models used in distributed systems.		**[L2][CO6]** **[L4][CO6]**	**[5M]** **[5M]**
11	a) Justify the importance of synchronization in distributed systems. b) Design a fault-tolerant distributed system for an online reservation system.		**[L5][CO6]** **[L6][CO6]**	**[5M]** **[5M]**

Prepared by:

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