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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech S8 Degree (S,FE) (FT/PT) Examinations September 2026 (2019 Scheme)

Course Code: CST402

Course Name: DISTRIBUTED COMPUTING

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks. Marks

1		Define a distributed system and explain how it relates to computer system components.	(3)
2		List and briefly explain the key design issues in distributed systems	(3)
3		Define logical clocks and list the types of logical time mechanisms used in distributed systems	(3)
4		What are the key assumptions of the Chandy-Lamport snapshot algorithm?	(3)
5		Define mutual exclusion in distributed systems and list its key requirements.	(3)
6		What are the different deadlock handling strategies in distributed systems?	(3)
7		Define Distributed Shared Memory (DSM) and list its advantages	(3)
8		What are consistent and inconsistent states in failure recovery?	(3)
9		Define the Byzantine agreement problem and mention its significance in distributed systems	(3)
10		List the key components of a distributed file system and briefly explain their roles.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	Explain the motivation behind using distributed systems.	(6)
	b)	Discuss different models of distributed computations and their importance in distributed system design.	(8)

OR

12	a)	Describe the concept of the global state of a distributed system and its significance.	(6)
	b)	Illustrate and explain the concept of cuts in a distributed computation, including past and future cones of an event.	(8)

Module II

13	a)	Explain the working of the Ring election algorithm with an example.	(6)
	b)	Discuss the Bully algorithm in detail, highlighting its advantages and disadvantages.	(8)

OR

14 a) Consider a distributed system with three processes (P1, P2, P3) using vector clocks. Show how vector timestamps are updated when the following events occur (6)

P1 sends a message to P2

P2 sends a message to P3

P3 replies to P1

b) Given a distributed system with five processes using the Chandy-Lamport algorithm, illustrate the process of recording a global state when an arbitrary process initiates the snapshot. (8)

Module III

15 a) Compare and contrast Lamport's and Ricart-Agrawala's mutual exclusion algorithms. (8)

b) Explain Lamport's mutual exclusion algorithm with an example. (6)

OR

16 a) Discuss the Suzuki-Kasami token-based mutual exclusion algorithm, including its advantages and disadvantages. (8)

b) Describe the working of Maekawa's quorum-based mutual exclusion algorithm. (6)

Module IV

17 a) Explain Lamport's Bakery Algorithm for mutual exclusion in shared memory systems. (4)

b) Explain checkpointing and rollback recovery techniques in distributed systems. Discuss their significance in failure recovery. (10)

OR

18 a) Describe log-based rollback recovery in distributed systems. (4)

b) Discuss the working of Distributed Shared Memory (DSM) and its challenges in implementation. (10)

Module V

19 a) Explain the consensus problem in synchronous systems and discuss how it handles crash failures. (7)

b) Discuss the architecture of the Sun Network File System (NFS) and its working mechanism. (7)

OR

20 a) Describe the working of the Google File System (GFS) and its advantages in handling large-scale distributed storage (7)

b) Compare and contrast the Andrew File System (AFS) and Sun Network File System (NFS). (7)

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