Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 11183

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

Fifth Semester

Computer Science and Engineering

CS3551 — DISTRIBUTED COMPUTING

(Common to: Computer Science and Design/Computer Science and Engineering (Artificial Intelligence and Machine Learning)/Computer Science and Engineering (Cyber Security)/Computer and Communication Engineering/Artificial Intelligence and Data Science/Information Technology)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What controls the read and write operations in message passing concepts of distributed systems?

2. Define synchronous and asynchronous execution.

3. How is correctness and complexity defined in FIFO channel?

4. List any four characteristics of distributed computation.

5. State the principle of Wait-for-Graph.

6. Compare the different models of deadlock.

7. Write the role of memory consistency model.

8. List the issues in failure recovery.

9. What represents scalability and elasticity in a cloud platform? Brief.

10. Define replication and give an example.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss the factors that affect the design issues and state the challenges faced in distributed computing compared to the client server model.

Or

(b) Discuss in detail about the synchronous and asynchronous send and receive communication primitives.

12. (a) Elaborate on vector time and scalar time in terms of total ordering, two rules R1 and R2, etc. Also discuss on the various factors that contribute towards distributed systems, and the properties, processes related to Global states in distributed system.

Or

(b) Describe the various orderings like FIFO, non-FIFO, casual order, synchronous order in message paradigm.

13. (a) State the four performance metrics used to measure the mutual exclusion algorithms. Explain how Lamport's algorithm achieves mutual exclusion and is also fair. Prove and Illustrate with an example.

Or

(b) Explain Knapp's classification of distributed deadlock detection algorithms with all strategies of deadlock.

14. (a) Describe the various characteristics and the principle of Koo–Toueg coordinated check pointing algorithm and compare with other check pointing algorithms.

Or

(b) Describe the properties of consensus problem and state the algorithm to solve the consensus problem using a strong failure detector and explain.

15. (a) State the procedures involved in load balancing in cloud? Discuss in detail about dynamic load balancing with its benefits and limitations.

Or

(b) Elaborate on compute services and application services.

PART C — (1 × 15 = 15 marks)

16. (a) A cosmetic company has variety of products at its store. To target customers all over the country and want to sell its products through online. Select an appropriate deployment model and service model to set up a cloud environment in the website of the cosmetic company. Elaborate on all issues and processes of the model selection with suitable architecture.

Or

(b) Detecting deadlocks in distributed systems, particularly when resources are shared across multiple processes is a challenge and the significant use of Resource Allocation Graphs (RAGs), where processes and resources are represented as nodes, and edges signify requests and allocations. Sketch the architecture and Explain in detail how Chandy-Misra-Haas Algorithm works with AND and OR model to effectively solve in detecting deadlocks in a distributed environment. State its benefits and limitations.