

Programme Name & Branch
 Course Code and Course Name
 Faculty Name(s)
 Class Number(s)
 Date of Examination
 Exam Duration

: B.Tech. Information Technology
 : BITE402L - Distributed Computing
 : Dr.Senthilkumar T, Dr.Yogaraj
 : VL2025260502141, VL2025260502141
 : 27.01.2026
 : 90 minutes

General instruction(s):

- Answer All Questions (M - Max mark; CO - Course Outcome; BL - Bloom's Taxonomy: 1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)

Course Outcomes

- Identify the core concepts of distributed systems: the way in which several machines correctly solve problems in an efficient, reliable and scalable way.
- Analyze the core architectural concepts to meet the challenges in implementing distributed systems.
- Examine important approaches in distributed systems to support synchronization and fault tolerance.

Q. No	Question	M	CO
1.	In designing a cloud storage system, one of the major challenges is to hide the complexity of resource management from users. Explain how transparency acts as a challenge in distributed systems. Discuss the types of transparency and the difficulties involved in achieving them in large-scale cloud storage. Additionally, explain the challenges posed by heterogeneity in such systems.	10	1
2.	In a global video conferencing system, multiple participants located in different regions communicate using audio and video streams over a network with variable delays and unsynchronized clocks. Explain the interaction model flow for this system, describing how processes coordinate by exchanging messages, the effects of communication delays, latency, and jitter on synchronization, and the challenges posed by the absence of a global clock. Discuss how distributed algorithms ensure consistent ordering of events, and how the assumptions of synchronous versus asynchronous systems influence the design and reliability of the conferencing service. Illustrate your explanation with examples of message flow and process coordination.	10	1
3.	A client written in Java (big-endian) communicates with a server written in C++ (little-endian) over a network. The client sends a structured message containing integers, floating-point numbers, and strings. Explain why external data representation is required in this scenario. Describe how marshalling and unmarshalling solve the problem of heterogeneity. Illustrate your answer using a suitable example.	10	2



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SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2025-2026

SLOT: A2+TA2

4.	A distributed online banking system allows clients to transfer funds, check balances, and view transaction histories. Each client sends requests to a central server, which executes the requested operation and sends a reply. Network messages may be lost, delayed, or duplicated, and clients may retransmit requests if replies are not received within a timeout period. Explain how a request-reply protocol operates in this scenario. In your answer, discuss: - The flow of messages using the <code>doOperation</code>, <code>getRequest</code>, and <code>sendReply</code> primitives. - How message identifiers ensure that replies are matched to the correct requests. - Techniques to handle lost or duplicate messages, including the use of idempotent operations and reply histories. - Differences between using UDP and TCP as the underlying transport for the request-reply protocol. - How the protocol ensures reliable communication and client-server synchronization despite network failures.	10	2	3
5.	In a distributed travel booking system, clients interact with multiple web services for flights, hotels, and car rentals. Explain how SOAP enables these clients to communicate with the web services reliably. Discuss how SOAP uses XML envelopes, headers, and body elements to encapsulate request and reply messages, and how the protocol supports both synchronous request-reply and asynchronous document exchanges. Describe the roles of client proxies, skeletons, and dispatchers in processing SOAP messages, and explain how SOAP messages can be transmitted over different transport protocols such as HTTP, SMTP, or TCP. Highlight how SOAP handles faults, message identifiers, and security features to ensure correct and secure communication between clients and services.	10	3	3