Nepal College of Information Technology

Level: Bachelor	Semester: Fall	Year	: 2025
Programme: BE SE (VII)		Full Marks	: 70
Course: Distributed System and Cloud Computing		Time	: 2 Hrs.

Attempt all the questions.

1. a) What are the major consequences of a distributed system? Explain the characteristics features of a distributed system. 8

   b) What do you mean Distributed System Architectures? Elaborate the concept of a decentralized approach. 7
2. a) Why do we need Interprocess communication? Explain different IPC mechanisms in distributed systems. 7

   b) How does traditional RPC lack access transparency? Explain the detail of RPC semantics in the presence of failure? What are the mechanisms to handle orphan messages? 8
3. a) Differentiate token based mutual exclusion algorithm and non-token based mutual exclusion algorithm. Compare Lamports and Ricart Agarwala algorithm for distributed mutual exclusion. 8

   b) Describe the need for an election algorithm. Explain Chang and Robert's (Ring based) election algorithm with suitable example. 7
4. a) Explain the different approaches of fault tolerance. Explain cold failover, warm failover, and hot failover. 7

   b) Mention the Centralized and Distributed deadlock detection algorithm. Differentiate between Path-pushing and Edge-chasing algorithms with examples. 8
5. a) What is a Distributed File System (DFS)? Explain the design goals and challenges of distributed file systems.

   b) Compare GFS and HDFS with respect to architecture, consistency model, fault tolerance, and use cases.
6. a) What do you mean by elasticity in cloud computing? Explain how auto-scaling and load balancing contribute to achieving elasticity and high availability in cloud platforms.

   b) Compare monolithic architecture, microservices architecture, and serverless architecture with respect to scalability, deployment, and fault isolation.
7. Write short notes on: (Any Two) 2x5
   a) Byzantine Generals Problem
   b) CAP theorem in NoSQL databases
   c) Kubernetes and Docker Swarm.