



VIT
Vellore Institute of Technology

Final Assessment Test – November 2024

Course: BCSE324L - Foundations of Blockchain Technology

Class NBR(s): 1401/1404

Slot: G2+TG2

Time: Three Hours

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Assume you are designated as a software architect and responsible for designing a blockchain based system for food processing industry. Discuss in detail about how food industry is benefited by using blockchain and outline the layers of blockchain architecture and discuss the challenges related to scalability, data privacy and inter operability.
2. Discuss in detail about the significance of consensus algorithms in blockchain technology and provide a detailed explanation of the consensus mechanism used in Byzantine fault-tolerant algorithms.
3. Explain the concept of Distributed Ledger Technology (DLT) and how it differs from traditional databases. Also, discuss its potential advantages and applications in various industries.

4. **Scenario:**

A car insurance company decides to implement a smart contract to automate the claim process to its customers. When an accident occurs, the contract triggers the claim settlement if specific conditions are met (e.g., police report filed, accident verification from IoT sensors, etc.).

- a) Describe how a smart contract could be implemented for the insurance claim process with respect to the above scenario.
- b) What challenges could arise in terms of trust, data integrity, and real-time data inputs from external sources? How would you address these issues?

5. **Scenario:**

A Decentralized Autonomous Organization (DAO) has a community treasury of 10,000 Ether, and its members vote on proposals to decide how to allocate these funds. A new proposal suggests funding a high-risk venture with the potential for high returns. However, there are concerns among some members about the safety of the investment and the transparency of the proposed venture.

- a) Discuss in detail about how should the DAO design its governance mechanism to ensure responsible decision-making in high-risk fund allocation?
- b) What safeguards or mechanisms can be implemented to prevent mismanagement of funds?

- ✓ 6. Describe in detail about Aragon Stack and its role in decentralized governance. How does Aragon leverage smart contracts, decentralized applications (dApps), and the Ethereum blockchain to enable decentralized organizations? Also explain how they interact to facilitate decentralized decision-making and dispute resolution.
- ✓ 7. Identify the core components of the blockchain ecosystem and how they interact with each other to create a decentralized environment.
- ✓ 8. Examine the importance of Ethereum token standards in the growth of non-fungible tokens (NFTs) and how ERC-721 and ERC-1155 tokens have contributed to the development of NFT ecosystems, and provide examples of popular NFT marketplaces.
- ✓ 9.a) Justify the concept of data integrity in high-performance blockchain systems (Financial Application) with respect to blockchain mechanisms such as hashing, Merkle trees, and cryptographic signatures across decentralized networks.

OR

- 9.b) Consider an application of patient health record management system, evaluate how blockchain enhances data security, interoperability, and patient privacy, along with any challenges faced during adoption with necessary system diagram.
- ✓ 10.a) Imagine a scenario where a consortium of pharmaceutical companies and healthcare providers is looking to implement a blockchain solution for tracking the supply chain of prescription medications. The goal is to enhance transparency, traceability, and security in the distribution of pharmaceuticals to prevent counterfeit drugs from entering the market. As a blockchain developer, how would you design a smart contract for the above scenario?

OR

- 10.b) Design a smart contract for E-voting system by implementing the following functionalities
- a) Handling multiple candidates
 - b) To ensure that each voter can vote only once
 - c) Voting period – Start time and End time of polling
 - d) Ensure that votes are kept anonymous while still maintaining transparency.

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