Roll Number: _____ Name: _____

Thapar Institute of Engineering & Technology, Patiala
(Deemed to be University)
Department of Electronics & Communication Engineering
EST- Written Test

BE-ENC, TSLAS	**Course: UEC635 Blockchain Technology**
Maximum Marks: 45	**Date: May 23rd, 2023**
Time: 03 Hours	**Faculty Name: Dr. Shashikant**

NOTE: * Attempt all five questions
** Assume any missing information.

Q1.	a. Consider a scenario where a company called "EcoFoods" (sources organic fruits and vegetables) aims to provide transparency and traceability in its supply chain (farmers, distributors, and retailers) using blockchain technology. Discuss how it can be done in context of features provided by blockchain technology. b. Discuss why and how Proof of Work (PoW) and Proof of Stake (PoS) consensus mechanisms are used in blockchain. In which blockchain networks these are used? Also highlight the main differences between two.	(5) (5)
Q2.	a. Transaction in hyperledger fabric reflects the business activity in the fabric network. What are all the steps involved in hyperledger transaction flow? Draw the flowchart/diagram describing all key elements present in the flow. b. Seafood industry wants to use Hyperledger Fabric to solve/improve the fisheries management, from the fisherman to the restaurant. In a hypothetical scenario, the following will be the actors/stakeholders: - • Fisherman, who sustainably and legally catches fishes. • Regulators, who verify that the fishes have been legally and sustainably caught. • Restaurant owner (A), who will serve as the end-user. • Another restaurant owner (B) to whom as well, the fisherman can sell fishes. Design the solution to above problem taking into consideration roles of stakeholders, MSP and overall architecture.	(5) (5)
Q3.	a. Draw the flowchart of mining algorithm and discuss difficulty level. b. Explain the process of constructing a Merkle tree for a block containing six transactions. How does a Merkle tree enable efficient verification of individual transactions within a large block in a blockchain?	(5) (5)

Q4.	a. What are the key differences between public, external, internal, and private functions in Solidity, and when would you choose to use each type? Explain with examles. b. Write a Solidity function that takes a uint256 key and string value as parameters and adds the key-value pair to a mapping called "dataMap". c. What is a smart contract and concept of gas on Ethereum network?	(5) (3) (2)
Q5.	a. Implement a Solidity contract for a simple voting system where each address can vote for a candidate. Write a function that allows an address to cast a vote for a specific candidate. b. Extend the previous Voting contract to include a function that returns the vote count for a given candidate. c. Enhance the Voting contract to include a function that determines the winner of the election. The winner is the candidate with the highest number of votes.	(2) (1) (2)

********** All the Best
****