Roll Number: _____ Name: _____

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

BE ENC	**Course: UEC635 Blockchain Technology**
Maximum Marks: 45	**Date: August 29th , 2023**
Time: 03 Hours	**Faculty Name: Dr. Shashikant**

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

Q1.	**a.** Explain why and how blockchain uses Proof of Work (PoW) and Proof of Stake (PoS) consensus processes. Which blockchain networks make use of these? Also, emphasize the fundamental contrasts between the two. **b.** Consider a scenario where a company called "XYZ" (sources computers and printers) aims to provide transparency and traceability in its supply chain (consumers, distributors, and retailers) using blockchain technology. Discuss how it can be done in context of features provided by blockchain technology.	**(5)** **(5)**
Q2.	**a.** What are the various steps in the hyperledger transaction flow? Create a flowchart/diagram that describes all of the main aspects in the flow. **b.** Agricultural and food industry wants to use Hyperledger Fabric to solve/improve the crop management, from the farmers to the restaurant. In a hypothetical scenario, the following will be the actors/stakeholders: - • Farmers, who sustainably and legally grow vegetables. • Regulators, who verify that the vegetables have been legally and sustainably grown. • Restaurant owner (A), who will serve as the end-user. • Another restaurant owner (B) to whom as well, the farmers can sell vegetables. Design the solution to above problem taking into consideration roles of stakeholders, MSP and overall architecture.	**(5)** **(5)**
Q3.	**a.** Explain how to build a Merkle tree for a block containing six transactions. How does a Merkle tree in a blockchain enable efficient verification of individual transactions within a huge block? **b.** Create a flowchart for the mining algorithm and discuss the difficulty level.	**(5)** **(5)**

Q4.	**a.** What are the primary distinctions between public, external, internal, and private functions in Solidity, and when would you utilize each? Use examples to demonstrate. **b.** Create a Solidity function that accepts an uint256 key and a string value as parameters and adds the key-value pair to the "AuxiExam" mapping. **c.** What is a smart contract in Ethereum? Highlight its main features.	(5) (3) (2)
Q5.	**a.** Implement a Solidity contract for a simple online auction system where each address bid a value for an item. Write a function that allows an address to bid a value for a specific item. **b.** Extend the previous Auction contract to include a function that returns the count of bids for a given item. **c.** Enhance the Auction contract to include a function that determines the highest bidder with the highest bid value for an item.	(2) (1) (2)

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