Bharatiya Vidya Bhavan's

SARDAR PATEL INSTITUTE OF TECHNOLOGY

(Autonomous Institute Affiliated to University of Mumbai)
Munshi Nagar, Andheri (W), Mumbai – 400 058.

ESE - December 2023

Course Code: OEIT1 /PE

Name of the Course: Blockchain Technology and Applications

Max. Marks: 100   Duration: 100 Minutes

Branch: All   — BE- VII - Com/Etrx/Exte/It

Instructions:
1) All questions are compulsory.
2) Draw neat diagrams.
3) Assume suitable data if necessary but justify the same.

Q. No.	Question	Max. Marks	COs	BL
Q. 1 (a)	Examine the differences between a public permissionless blockchain and a private permissioned blockchain. Discuss the implications of these distinctions in terms of trust, security, and the participant's ability to join the network.	10	CO1	4
Q. 1 (b)	Compare and contrast the life cycle of a blockchain with the traditional software development life cycle. Analyze the key stages and activities involved in each, highlighting the unique challenges and considerations specific to blockchain development.	10	CO3	4
Q. 2 (a)	Evaluate the impact of Bitcoin Improvement Proposals (BIPs) on the evolution of the Bitcoin network. Discuss how BIPs contribute to the improvement of the protocol, addressing issues such as scalability, security, and functionality. Assess the potential challenges associated with the implementation of BIPs.	10	CO1	4
Q. 2 (b)	Analyze the role of z-SNARK (Zero-Knowledge Succinct Non-Interactive Argument of Knowledge) in enhancing privacy and scalability in blockchain. Discuss its advantages and limitations, and compare it with other privacy-preserving techniques used in blockchain technology.	10	CO4	4
Q.3 (a)	Develop a plan for ensuring the scalability of the blockchain system as the company expands its operations. Consider the potential increase in transaction volume and the addition of new participants to the network.	10	CO4	4
Q.3 (b)	Apply your understanding of the Bitcoin halving to predict and explain the potential impact on the Bitcoin ecosystem, considering factors such as miner incentives, block rewards, and overall network security.	10	CO1 ,4	3

OR

	Utilize your knowledge of mining systems (CPU, GPU, FPGA, and ASiC) to recommend an optimal mining setup for an individual looking to start mining Bitcoin, considering factors such as cost, efficiency, and scalability			
Q.4 (a)	Design a new consensus algorithm that addresses the challenges posed by partition faults in a distributed system. Outline the key components, processes, and security measures. Justify your design choices and discuss how your proposed algorithm achieves safety and liveness in the presence of partition faults.	10	CO3 ,4	6
Q.4 (b)	Create a proposal for an enterprise blockchain solution using Hyperledger Fabric, tailored to a specific industry use case. Design the network architecture, define the membership and identity management structure, and outline the necessary steps for deployment and maintenance.	10	CO3	6
Q.5(a)	Utilize your knowledge of Solidity to create a simple smart contract that involves value types, reference types, and global variables. Explain the purpose and functionality of each component in your smart contract. **OR** Design a smart contract in Solidity that involves error handling and events/logging. Include error-checking mechanisms and events that provide transparency and accountability within the contract. Justify your design choices and discuss potential security considerations.	10	CO2	4
Q.5(b)	Design a comprehensive testing plan for a decentralized application (DApp) that relies on multiple smart contracts interacting with each other. Outline the steps involved, including the use of automated testing tools, scenarios for manual testing, and strategies for handling complex interactions between contracts.	10	CO2 ,3	6