S8 KTU 2019

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S8 (R,S)(FT/WP) Examinations April 2026 (2019 Scheme)

Course Code: CST428

Course Name: BLOCK CHAIN TECHNOLOGIES

Max. Marks: 100 **Duration: 3 Hours**

PART A

Answer all questions, each carries 3 marks.

		Marks
1	Define Digital Signatures and list their primary objectives in cryptography.	(3)
2	Explain the avalanche effect in hash functions and its significance in ensuring security.	(3)
3	Differentiate between centralized, decentralized, and distributed ledger technologies.	(3)
4	List the advantages of using a private blockchain over a public blockchain for a consortium of banks.	(3)
5	Explain the concept of a 51% attack on a blockchain network and its potential impact.	(3)
6	Explain the role of the Genesis Block in the Bitcoin blockchain.	(3)
7	Identify three potential security vulnerabilities in Smart Contracts.	(3)
8	Discuss how blockchain can enhance transparency in government services.	(3)
9	Explain the concept of Gas in Ethereum and how transaction costs are calculated.	(3)
10	Describe the usage of `mapping` and `struct` in Solidity with a simple example.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	a)	Explain the SHA-256 algorithm. Describe the message padding and parsing process.	(7)
	b)	Discuss Elliptic Curve Cryptography (ECC). Why is it preferred over RSA for blockchain applications despite similar security levels?	(7)

OR

12	a)	Illustrate the working of Distributed Hash Tables (DHT) and their role in peer-to-peer networks.	(7)

b) Explain the RSA digital signature algorithm. How does the verification process confirm the authenticity of the message? (7)

Module II

13 a) Describe the elements of a block in a blockchain. Explain the significance of the block header. (7)

b) Analyze the different types of blockchain (Public, Private, Consortium) with examples and suitable use cases for each. (7)

OR

14 a) Explain the concept of decentralization. Discuss the routes to decentralization as applied in blockchain ecosystems. (7)

b) Discuss the limitations of blockchain technology regarding scalability and energy consumption. (7)

Module III

15 a) Explain the Raft consensus algorithm. How does it handle leader election and log replication? (7)

b) Compare Crash Fault Tolerance (CFT) and Byzantine Fault Tolerance (BFT) algorithms. (7)

OR

16 a) Describe the structure of a Bitcoin transaction. Explain the roles of inputs, outputs, and scripts. (7)

b) Illustrate the concept of Wallets in Bitcoin. Differentiate between Hot and Cold wallets. (7)

Module IV

17 a) Define Decentralized Autonomous Organizations (DAO). Explain the structure and governance mechanism of a DAO. (7)

b) Discuss the integration of Blockchain with Artificial Intelligence. How can blockchain improve data integrity for AI models? (7)

OR

18 a) Explain the role of Oracles in blockchain. Differentiate between hardware and software oracles. (7)

b) Elaborate on the application of blockchain technology in the Finance sector, specifically for cross-border payments. (7)

Module V

19 a) Explain the Ethereum Virtual Machine (EVM) architecture. How does it ensure platform independence? (7)

b) Develop a Solidity smart contract for a Simple Banking System. Include functions to deposit, withdraw, and check balance. (7)

OR

20 a) Describe the concept of Events and Logging in Solidity. How are they useful for DApp front-ends? (7)

b) Develop a Solidity smart contract for a Crowdfunding Campaign. The contract should accept contributions and allow the owner to withdraw only if the goal is met. (7)

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