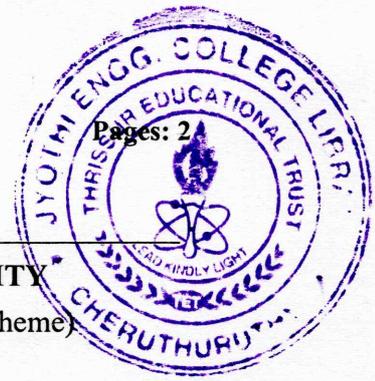


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Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S8 (S) Examination September 2025 (2019 Scheme)

Course Code: CST428

Course Name: BLOCKCHAIN TECHNOLOGIES

Max. Marks: 100

Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks.

		Marks
1	What is the significance of “Merkle root” stored in the block header?	(3)
2	List out the desirable properties for a cryptographic hash function.	(3)
3	Depict the generic structure of a block in blockchain.	(3)
4	Describe how full ecosystem decentralization is possible in blockchain.	(3)
5	Explain the terms Genesis block and coinbase transaction.	(3)
6	What is “hash rate” in Bitcoin? How does it vary with respect to time?	(3)
7	What is a Decentralized Autonomous Organization (DAO)?	(3)
8	Give any two use cases where blockchain and AI can be combined.	(3)
9	Distinguish between ‘mainnet’, ‘testnet’ and ‘privatenet’ in Ethereum blockchain.	(3)
10	Jordan has to pay Taylor 1 ETH. An ETH transfer requires 21,000 units of gas. The base fee is 10 gwei and Jordan also includes a tip of 2 gwei. What will be the gas fee for this transaction? How much ETH will be deducted from Jordan's account?	(3)

PART B

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

Module I

- 11 a) Explain the RSA key generation algorithm. Also show how RSA generates public and private keys from the values $P = 17$ and $Q = 11$. (7)
- b) Illustrate the digital signature generation and verification process. (7)

OR

- 12 a) Explain with a neat block diagram, the steps involved in AES algorithm. (7)
- b) Demonstrate the design of SHA-256 cryptographic hash function and its applications. (7)

Module II

- 13 a) Explain different types of blockchain based on technical and business usage perspective. (7)

- b) Explain how a blockchain accumulates blocks, starting from transaction initiation. (7)

OR

- 14 a) Describe how decentralization of computing or processing power is achieved by a blockchain. (7)
- b) What is consensus mechanism in blockchain? List and explain any four types of consensus mechanisms. (7)

Module III

- 15 a) Explain how Paxos protocol can be used to achieve consensus in crash fault tolerance. (7)
- b) What is a blockchain wallet? Describe any four types of wallets. (7)

OR

- 16 a) Explain various steps in transaction validation with respect to Bitcoin. (7)
- b) Illustrate the working of Practical Byzantine Fault Tolerance (PBFT). (7)

Module IV

- 17 a) Give the significance of oracle in smart contracts. Elaborate different type of oracles deployed in blockchain . (7)
- b) Explain how blockchain can be applied in health sector. (7)

OR

- 18 a) What are DApps? Explain the design aspects of DApps. (7)
- b) Illustrate with a use case, the application of blockchain technology in finance sector (7)

Module V

- 19 a) Explain the architecture and components of Ethereum ecosystem. (7)
- b) Write a smart contract in solidity for simple voting system. (7)

OR

- 20 a) Explain the data types and functions used in Solidity language. (7)
- b) Explain how transactions are processed in Ethereum. Also explain the concept of gas and how does it affect the transaction processing? (7)
