Department of Computer Science and Engineering

Central Institute of Technology Kokrajhar

Mid Semester Examination

B. Tech

Course Title: **Blockchain Technology** Course Code: **UCSE812**

Session: **Jan-Jun, 2025** Full Marks: **100** Time: **3:00** hrs

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Figure in the margin indicates full marks.

Question Number 1 is Compulsory and Answer any 3 questions from the rest!

1 [A]. Fill in the blanks 2 x 10 = 20

i. A blockchain is essentially a decentralized, distributed _____ that is shared among the nodes of a computer network.

ii. Each block in a blockchain contains a timestamp and a link to the previous _____.

iii. _____ is the process of validating and adding new transactions to the blockchain.

iv. The cryptographic hash of a block ensures _____ of the data within it.

v. Smart _____ are self-executing contracts with the terms of the agreement directly written into code.

vi. _____ algorithms are used to secure the blockchain and prevent double-spending.

vii. A _____ blockchain requires permission to join and participate in the network.

viii. The first widely adopted application of blockchain technology was the cryptocurrency _____.

ix. A _____ is a digital representation of an asset or value that can be traded and managed on a blockchain.

x. The immutability of a blockchain means that once data has been recorded, it is extremely difficult to _____ or alter.

[B] Multiple choice questions 2 x 10 = 20

i. Which of the following is a core characteristic of blockchain technology?
(a) Centralized control
(b) Single point of failure
(c) Immutability
(d) Lack of transparency

ii. What is the primary purpose of a hash in a blockchain?
(a) To encrypt the entire block of data
(b) To uniquely identify a block and verify its integrity
(c) To speed up transaction processing
(d) To reward miners for their work

iii. Which consensus mechanism is known for its high energy consumption?
(a) Proof-of-Stake (PoS)
(b) Proof-of-Work (PoW)

(c) Proof-of-Authority (PoA)
(d) Delegated Proof-of-Stake (DPoS)

iv. What is the role of a "nonce" in the Proof-of-Work consensus mechanism?
(a) To validate transactions
(b) To link the current block to the previous one
(c) To find a specific hash that meets the network's difficulty target
(d) To distribute rewards to miners

v. In a blockchain network, who typically holds a copy of the entire ledger?
(a) A central authority
(b) Only the miners
(c) All participating nodes
(d) The developers of the blockchain

vi. What is a key advantage of using blockchain for supply chain management?
(a) Reduced transparency
(b) Increased risk of counterfeiting
(c) Enhanced traceability and accountability
(d) Slower transaction speeds

vii. Which of the following is an example of a public blockchain?
(a) Hyperledger Fabric
(b) R3 Corda
(c) Ethereum
(d) A private corporate blockchain

viii. What does "DeFi" stand for in the context of blockchain?
(a) Decentralized Finance
(b) Digital Economy Framework
(c) Distributed Financial Infrastructure
(d) Data Encryption and Forwarding Initiative

ix. What is the term for a proposed change to a blockchain's protocol?
(a) Fork
(b) Block
(c) Chain
(d) Ledger

x. Which of the following is NOT a typical application of blockchain technology?
(a) Cryptocurrency
(b) Secure voting systems
(c) Traditional centralized databases
(d) Digital identity management

2 a. What is the difference between physical and digital assets in Blockchain? 5 x 4 = 20
b. What is the double-spending problem in the context of digital assets?
c. Why was direct exchange (barter) historically problematic?
d. What are some characteristics of "good money"?

3 a. As per Blockchain physical tokens inherently trustless or not? 5 x 4 = 20

b. What is the role of ledgers in traditional exchange of value?
c. What are some problems associated with centralized authorities managing digital assets on the internet?
d. What are some challenges in achieving consensus in distributed systems?

4 a. What is a hash function? 5 x 4 = 20
b. What are the key properties of hash functions?
c. How are blocks in a blockchain chained together?
d. Why is the chaining of blocks using hashes considered tamper-proof?

5 a. What is "mining" in the context of blockchain? 5 x 4 = 20
b. What is the purpose of the Nonce in the mining process?
c. How is a new block accepted into the blockchain?
d. What is the incentive for nodes to participate in mining?

6 a. What is asymmetric encryption? 5 x 4 = 20
b. How does asymmetric cryptography help ensure only the intended recipient can read a transaction?
c. How does asymmetric cryptography help verify the sender of a transaction?
d. Explain any one asymmetric encryption algorithm.

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