SAMPLE PAPERS

DIPLOMA FIFTH SEMESTER EXAMINATION 2025 (JUT)

BLOCK CHAIN TECHNOLOGY

DIPLOMA WALLAH

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Full Marks: 70 marks | Time: 3 Hours

Instructions:

- Question No. 1 is compulsory.
- Answer any **FOUR** questions from the remaining (Q.2 to Q. 7 marks).

Q.1 (Compulsory) — Multiple Choice Questions

(2 Marks each × 7 = 14 Marks)

(i) Which of the following is considered a basic crypto primitive used in Blockchain architecture?

(A) SQL Database

(B) Hash

(C) Cloud Server

(D) TCP/IP

(ii) In the context of Hyperledger Fabric, what tool is primarily used for building decentralized applications?

(A) Hyperledger Composer

(B) Bitcoin Core

(C) Ethereum Virtual Machine

(D) Solidity Studio

(iii) Which design primitive deals with the visibility of data to different participants in a blockchain network?

(A) Scalability

(B) Privacy

(C) Mining

(D) Latency

(iv) The "Hash Chain" concept is primarily responsible for establishing:

(A) High transaction speed

(B) Linkage between blocks

(C) User interface design

(D) External data storage

(v) Which of the following is a component of Hyperledger Fabric architecture?

(A) Miner

(B) Ordering Service

(C) Proof of Stake

(D) Gas Limit

(vi) In Block chain for Government, "PDS" stands for:

(A) Private Data Storage

(B) Public Distribution System

(C) Personal Digital Signature

(D) Public Decentralized Server

(vii) Which unit of the syllabus covers "Invoice management/discounting"?

(A) Unit I

(B) Unit III

(C) Unit IV

(D) Unit II

Q.2

(A) Explain the evolution of digital money to distributed ledgers and describe the Blockchain Architecture and Design in detail. [7M]

(B) Define Consensus Mechanism. Elaborate on the working principle of Proof of Work (PoW) and discuss its key requirements. [7M]

Q.3

(A) Differentiate between Permissioned and Permissionless Block Chains. Explain the Design Goals of Permissioned Block Chains. [7M]

(B) Explain the complete process of Decomposing the Consensus Process in a complex Block Chain system. [7M]

Q.4

(A) What is Chain Code in Hyperledger Fabric? Explain the process of Chain Code Design and Implementation. [7M]

(B) Elaborate on the various applications of Block Chain in Financial Software and Systems (FSS), specifically Settlements and Capital Markets. [7M]

Q.5

(A) Explain how Block Chain technology is transforming the Trade/Supply Chain sector, specifically regarding Provenance of Goods and Visibility. [7M]

(B) Discuss the critical role of Block Chain for Government, detailing its application in Digital Identity and Land Records. [7M]

Q.6

(A) Describe the concepts of Privacy and Security on Block Chain. Explain the role of Block Chain Cryptography in maintaining data integrity. [7M]

(B) What is a Hash Chain? Explain how a Hash Chain leads to the formation of a Block Chain. [7M]

Q.7 Write Short Notes on (Any FOUR): [3.5 × 4 = 14M]

(A) Block Chain vs Distributed Ledger Technology (DLT)

(B) Scalability in Block Chain consensus protocols

(C) Application of Block Chain in Insurance

(D) Significance of KYC in financial sector

(E) Double Spending problem

SOLUTIONS & ANSWER KEY (PAPER 1)

MCQ Answer Key:

(i) B (Hash)

(ii) A (Hyperledger Composer)

(iii) B (Privacy)

(iv) B (Linkage between blocks)

(v) B (Ordering Service)

(vi) B (Public Distribution System)

(vii) C (Unit IV - Trade/Supply chain)

Theory Hints (Model Answers based on IQs):

- **Q2(A):** Discuss double spending problem history. Diagram of blocks connected by hashes. Protocols, Security, Consensus.
- **Q2(B):** PoW requires miners to solve crypto puzzles. Requirements: Agreement, Validity, Termination.
- **Q3(A):** Permissioned (known actors) vs Permissionless (anyone joins). Goals: High performance, Identity management.
- **Q3(B):** Phases: Endorsement, Ordering, Validation/Commit.
- **Q4(A):** Chain Code = Smart Contract in Fabric. Defines assets and transaction logic.
- **Q4(B):** FSS: Faster cross-border payments, reducing intermediaries in Capital Markets.
- **Q5(A):** Provenance: tracking origin. Visibility: Real-time tracking across organizations.
- **Q5(B):** Self-sovereign IDs, Immutable land titles preventing fraud.

- **Q6(A):** Privacy via Zero-Knowledge Proofs or Private Channels. Cryptography: Hashing (integrity) + Signatures (auth).
- **Q6(B):** Data -> Hash -> Next Data -> Next Hash. Predecessor to blockchain structure.
- **Q7:** Refer to "Quick Revise" tables in Important Questions file for definitions.