

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).
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Q.1 (Compulsory) — Multiple Choice Questions

(2 Marks each × 7 = 14 Marks)

(i) Which consensus protocol is primarily associated with Permissioned Blockchains in the syllabus context?

- (A) Proof of Work (PoW)
- (B) PBFT (Practical Byzantine Fault Tolerance)
- (C) Proof of Burn
- (D) Dogecoin Protocol

(ii) The "Fabric SDK" allows interaction between the client application and which component?

- (A) The Mining Rig
- (B) The Hyperledger Fabric Network
- (C) The Bitcoin Exchange
- (D) The Central Bank

(iii) In the syllabus, "Settlements" and "KYC" are sub-topics of which unit?

- (A) Unit I
- (B) Unit II
- (C) Unit IV
- (D) Unit V

(iv) Which of the following is NOT a layer in the Design Primitives of Blockchain?

- (A) Protocols
- (B) Consensus

- (C) Social Media Integration
- (D) Permissions
- (v) Digital Identity and Land Records are applications of Blockchain for:
- (A) Financial Software Systems
- (B) Government
- (C) Supply Chain Finance
- (D) Insurance
- (vi) The "Double Spending Problem" was a key motivation for the history of:
- (A) Relational Databases
- (B) Digital Money
- (C) Cloud Computing
- (D) Artificial Intelligence
- (vii) A "Hash" function transforms arbitrary data into a:
- (A) Variable length string
- (B) Fixed-size string (digest)
- (C) Picture
- (D) Private Key
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SECTION B (Theory Questions)

(Answer any FOUR. Each question carries 14 Marks)

Q.2

- (A) Describe the function of the basic crypto primitives: Hash and Digital Signature in securing the Block Chain. [7M]
- (B) Elaborate on the working principle of Proof of Work (PoW) and discuss Scalability aspects in Block Chain consensus protocols. [7M]

Q.3

- (A) Describe the key components of Hyperledger Fabric and their roles in achieving consensus. [7M]
- (B) Discuss the concept of Hyperledger Fabric II and its advancements beyond basic Chain Code. [7M]

Q.4

- (A) Discuss the specific roles of Blockchain in Settlements and KYC (Know Your Customer). [7M]
- (B) Explain how Block Chain technology is transforming Trade/Supply Chain Finance and Invoice Management. [7M]

Q.5

(A) Discuss the critical role of Block Chain for Government, specifically in managing Public Distribution System / Social Welfare Systems. [7M]

(B) Elaborate on the various applications of Block Chain in Insurance. [7M]

Q.6

(A) Explain the Design Primitives of Blockchain: Protocols, Security, Consensus, and Permissions. [7M]

(B) Differentiate between Permissioned and Permissionless Block Chains with examples. [7M]

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

(A) Chain Code (Smart Contracts)

(B) Basic Consensus Mechanisms (other than PoW)

(C) Provenance of Goods

(D) Privacy design primitive

(E) Digital Signature ensuring non-repudiation



SOLUTIONS & ANSWER KEY (PAPER 2)

MCQ Answer Key:

- (i) B (PBFT - implied by syllabus context of Permissioned chains)
- (ii) B (The Hyperledger Fabric Network)
- (iii) C (Unit IV)
- (iv) C (Social Media Integration)
- (v) B (Government)
- (vi) B (Digital Money)
- (vii) B (Fixed-size string)

Theory Hints (Model Answers based on IQs):

- **Q2(A):** Hash = Integrity (One way function). Signature = Authenticity + Non-repudiation.
- **Q2(B):** PoW = Computational effort. Scalability issue = Low throughput, high latency.
- **Q3(A):** Components: Peers (Endorsing/Committing), Orderers, CA, Clients.
- **Q3(B):** Fabric II enhancements: Fabric Private Chaincode (FPC), improved lifecycle management.
- **Q4(A):** Settlements: Removing intermediaries. KYC: Shared digital identity to reduce cost.
- **Q4(B):** Finance: Automating letters of credit. Invoice: Preventing duplicate financing (double spending).
- **Q5(A):** PDS: Tracking subsidies, reducing leakage, ensuring goods reach beneficiaries.
- **Q5(B):** Automating claims, fraud detection via smart contracts.
- **Q6(A):** Protocol (Rules), Security (Crypto), Consensus (Agreement), Permissions (Access).
- **Q6(B):** Permissionless (Bitcoin, slow, public) vs Permissioned (Fabric, fast, private).
- **Q7:** Refer to "Quick Revise" and Short Questions section of IQ file.