B. Tech. Examination, 2026

(Even Semester)

BLOCKCHAIN AND DISTRIBUTED LEDGER TECHNOLOGY

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION – A

1. Attempt all parts of the following : 8×1=8

   (a) What is the primary goal of designing a "memory-hard" algorithm in the context of mining?

   (b) What is the specific advantage of using a merkle patricia tree in a blockchain like ethereum?

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(c) How does a "gas limit" prevent a malicious actor from crashing the network with an infinite loop in a smart contract?

(d) How does a consensus mechanism like proof of work prevent a single actor from creating thousand of "fake" identities to subvert to the network?

(e) What is the primary role of hte ethereum virtual machine (EVM) in executing a smart contract?

(f) What is the fundamental purpose of a "sidechain"?

(g) How does a blockchain-based DNS prevent the "censorship" of web domain by a central authority?

(h) What is the fundamental difference between a centralized exchange (CEX) and a decentralized exchange (DEX) regarding the "legal aspects" of asset custody?

SECTION–B

2. Attempt any two parts of the following : 2×6=12

(a) Provide a comprehensive breakdown of ECDSA (Elliptic Curve Digital Signature Algorithm). How does it provide security with smaller key sizes compared to RSA and how does the use of hash functions ensure the integrity of the signed message?

(b) Explore the concept of anonymity in public blockchain. Is a standard blockchain truly anonymous on merely pseudonymous? Discuss.

(c) (i) Provide an in-depth analysis of Nakamoto consensus.

(ii) Compare and contrast POW and POS in terms of security, decentralization and hardware requirements.

(d) Evaluate the role of cryptocurrencies in the black market. Discuss the evolution of "privacy coins" and "mixers".

SECTION–C

Note :– Attempt all questions. Attempt any two parts from each questions. 8×5=40

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3. (a) Compare and contrast the byzantine generals problem with standard fault tolerance.

   (b) Detail the internal mechanic of the hadoop distributed file system.

   (c) Analyze the architectural differences between a conventional distributed database and a blockchain.

4. (a) Explain the full life of a blockchain application transaction.

   (b) Detail the relationship between the difficulty level and the network's total harsh rate.

   (c) Discuss the energy utilization of proof of work.

5. (a) Provide a detailed technical breakdown of ethereum's construction.

   (b) Describe the GHOST (Greedy Heaviest Observed Subtree) protocol used in ethereum.

   (c) Explain the primary benefit of using a decentralized ledger to manage communication between millions of autonomous IoT devices.

6. (a) Design a theoretical medical record management system using blockchain.

   (b) Discuss the conflicting interests between "innovation" and "consumer protection". How legal aspects vary across different global jurisdictions?

   (c) For a project, analyze a specific bottleneck in current blockchain networks.

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