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Krishnaaay Thadisaal
AI Roll No. 15
1032210888

Blockchain Technology

Q.1. Features of Blockchain Technology

→ ① Decentralization

No single authority controls the network.
Transactions are verified by multiple nodes.

② Immutability

Once data is recorded on the blockchain, it cannot be altered or deleted.

③ Transparency

Transactions are publicly visible, ensuring accountability & trust.

④ Security

Uses cryptographic hashing mechanisms to prevent fraud and cyberattacks.

⑤ Consensus Mechanisms

Transactions are validated through consensus protocols like proof of work (PoW) or Proof of stake (PoS).

⑥ Smart Contracts:

self executing contracts with predefined rules and conditions.

⑦ Distributed Ledger :-

Every participant in the network has a copy of the entire blockchain.

⑧ Tokenization:

Digital assets can be represented as tokens on the blockchain.

⑧.2 Roles of various stakeholders in blockchain technology.

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- ① Users: Individuals or organizations that initiate transactions on the blockchain.
 - ② Miners/Validators: Nodes that validate transactions and validate blocks on the blockchain.
 - ③ Developers: Build & maintain blockchain protocols.
 - ④ Regulators: Govt bodies that ensure compliance.
 - ⑤ Businesses & Enterprises: Utilize blockchain for supply chain management.
 - ⑥ Crypto Exchanges: Facilitate buying & selling.
 - ⑦ Network Nodes: Maintain integrity of blockchain.
 - ⑧ Government entities: Organizations that manage blockchain updates & decision-making process.

Q.4

Consensus Algorithm in Blockchain Technology

1. → Proof of Work (POW) — Miners compete to solve cryptography puzzles; used in Bitcoin.
2. → Proof of Stake: Validators are chosen based on the number of coins they stake.
3. → Delegated proof of stake (DPoS): Users vote for delegates who validate transactions.
4. → Proof of Authority: Transactions are validated by trusted nodes with known identities.
5. → Practical Byzantine Fault Tolerance (PBFT): Consensus is reached through a majority agreement of nodes.
6. → Proof of Burn (POB): — Validators burn coins to gain mining rights.
7. → Proof of Elapsed Time (PoET) — Nodes wait for a randomized time to get mining rights.
8. → Hybrid POW / POS — Combines POS & POW for better security & energy efficiency.

(P.3) Roles of Hash Algorithms in Blockchain Technology.

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- ① Data Integrity: Hashing ensures that any alteration in data results in a completely different hash value.
 - ② Immutability: Transactions are hashed and linked together, preventing data tampering.
 - ③ Digital Signatures: Used for authentication & verification of transactions.
 - ④ Proof of Work: Miners solve cryptographic puzzles using hash functions to validate transactions.
 - ⑤ Address Generation: Hashing is used to create unique public & private key pairs.
 - ⑥ Merkle Tree: Organizes transactions in a block using hashes, allowing efficient verification.
 - ⑦ Security: Cryptographic hash functions like SHA-256 secure the blockchain from attacks.
 - ⑧ Data Compression: Hashing helps in efficiently storing & retrieving blockchain data.

Q.5

Applications of Blockchain Technology

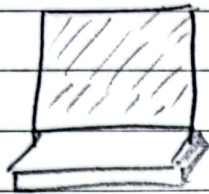
- (1) Cryptocurrencies
- (2) Supply Chain Management
- (3) Healthcare
- (4) Finance & Banking
- (5) Voting Systems.
- (6) Intellectual Property & Copyright
- (7) Real Estate
- (8) Internet of Things (IOT)

Diagram for BT is
Cryptocurrency

→ Coins like Bitcoin & Ethereum use blockchain for secure Transactions.

→ Unlike traditional systems, they rely on peer to peer transactions.

→ Public Blockchains allow anyone to verify transactions.

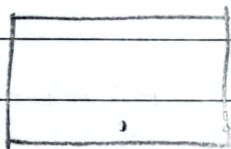


A Transaction is requested



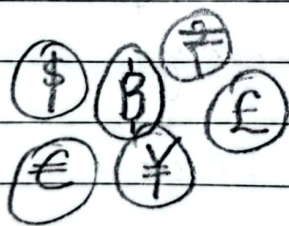
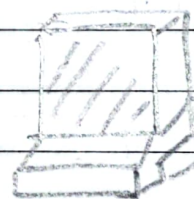
A	B	50
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A block for the transaction is created,



Block sent to every node by validated

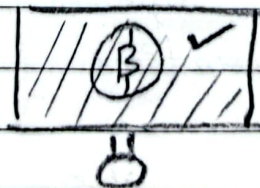
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Nodes get Reward for proof of work

C	D	20
A	B	50
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Block is added to existing Blockchain



Transaction is complete