Computer Science Worksheet 3 – Detailed Answers

Topic: Digital Currency and Cryptocurrency

Section A: Multiple Choice (5 marks)

1. **Answer: (b) It exists only in electronic form**

   o Digital currency has no physical form (like cash or coins) and operates purely through digital systems like online banking or mobile wallets.

2. **Answer: (b) Blockchain**

   o Cryptocurrencies like Bitcoin rely on blockchain technology, a decentralized ledger that records all transactions securely.

3. **Answer: (c) Decentralization and transparency**

   o Cryptocurrencies eliminate central authorities (like banks), making transactions transparent and resistant to single-point failures.

4. **Answer: (b) To validate transactions and add blocks to the blockchain**

   o Mining involves solving complex mathematical problems to verify transactions and maintain the blockchain's integrity.

5. **Answer: (b) Because altering a block changes its hash and breaks the chain**

   o Each block contains a unique hash. Tampering alters this hash, making the entire chain invalid unless all subsequent blocks are also modified—a near-impossible task.

Section B: Short Answer (10 marks)

6. **Definitions:**

   o **Digital Currency (1 mark):**
   Electronic money without physical form, used for online transactions (e.g., PayPal balances, bank deposits).

   o **Fiat Currency (1 mark):**
   Government-issued currency (e.g., USD, INR) not backed by commodities but by trust in the issuing authority.

7. **Digital vs. Cryptocurrency (2 marks):**

   o Digital currency is centralized (controlled by banks/governments), while cryptocurrency is decentralized (operated by a peer-to-peer network via blockchain).

8. **Central Bank's Role (2 marks):**

- o Central banks regulate traditional digital currencies, ensuring stability, issuing currency, and overseeing interbank transactions.

9. **Uses of Digital Currency (2 marks):**

   1. Online shopping (e.g., Amazon purchases).

   2. Peer-to-peer payments (e.g., Venmo transfers).

10. **Genesis Block (1 mark):**

   - o The first block in a blockchain, serving as the foundation with no prior hash reference.

11. **Proof of Work (PoW) (1 mark):**

   - o PoW requires miners to solve complex puzzles to validate transactions, making tampering computationally impractical.

Section C: Structured Questions (10 marks)

12. **Blockchain Security (4 marks):**

13. **Hash Value Security:** Each block's hash depends on its data and the previous block's hash. Altering a block changes its hash, requiring recalculation of all subsequent blocks—a resource-intensive process.

14. **Distributed Ledger:** The blockchain is replicated across thousands of nodes. To alter a transaction, a hacker must control >50% of the network simultaneously, which is virtually impossible.

15. **Cryptocurrency Mining (4 marks):**
    a) **Definition:** Mining involves validating transactions by solving cryptographic puzzles, adding verified blocks to the blockchain, and earning rewards (e.g., Bitcoin).
    b) **Security Contribution:** Miners compete to validate transactions, ensuring only legitimate blocks are added. This decentralized verification prevents fraud.
    c) **Disadvantage:** High energy consumption due to intensive computational power required for mining.

16. **Digital vs. Cryptocurrency (2 marks):**

Feature	Digital Currency	Cryptocurrency
Control	Centralized (by banks/governments)	Decentralized (no central authority)
Technology	Traditional banking systems	Blockchain technology