(3 Hours)   **(Total Marks: 80)**

N.B.:   1. Question No. 1 is compulsory.

       2. Answer any three out of the remaining questions.

       3. Assume suitable data if necessary.

       4. Figures to the right indicate full marks.

Q1.   **Attempt the following (any 4):**   **(20)**

     a. Distinguish between public, private, and consortium blockchain.

     b. Explain the concept of double spending with a suitable example.

     c. Compare hot wallets and cold wallets.

     d. What is a Merkle tree? Explain the structure of a Merkle tree.

     e. Write a program in solidity to find the second largest element in an array.

Q2.   **Attempt the following:**

     a. With a suitable diagram, explain the structure of a block header with a list of transactions. **(10)**

     b. State and explain different types of cryptocurrencies.   **(10)**

Q3.   **Attempt the following:**

     a. Describe the concept of state machine replication. How is a smart contract represented as a state machine?   **(10)**

     b. Explain Hyperledger Fabric v1 architecture.   **(10)**

Q4.   **Attempt the following:**

     a. Describe the architecture on Ethereum.   **(10)**

     b. Write a program in solidity to implement single inheritance.   **(10)**

Q5.   **Attempt the following:**

     a. Explain RAFT consensus mechanism for a private blockchain.   **(10)**

     b. Explain fixed and dynamic arrays in solidity with suitable examples.   **(10)**

Q6.   **Write short notes on (any 2):**   **(20)**

     a. Ripple

     b. UTXO model of Bitcoin

     c. Corda

     d. Blockchain for DeFi

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