

Instructions: All questions are compulsory. Use of non-programmable scientific calculator is allowed.

- Q.1** (a) Describe how Blockchain differs from traditional database systems in terms of structure and data handling. (07)
- (b) Interpret the role of the SHA256 algorithm in Blockchain and explain how it contributes to data security. (07)

OR

- (a) Describe the sequential steps involved in the Blockchain mining process. (07)
- (b) List and explain the key properties of hashing algorithms used in Blockchain. (07)

- Q.2** (a) Apply your understanding of consensus mechanisms to explain how Proof of Stake (PoS) operates in a Blockchain network. (07)
- (b) Discuss how Bitcoin's monetary policy—such as fixed supply and halving events—affects inflation and long-term value. (07)

OR

- (a) Using a hypothetical mining scenario, illustrate how the Timestamp field influences block validation and network synchronization. (07)
- (b) Explain the concept of Mempool and apply it to describe how pending transactions are managed before being added to a block. (07)

- Q.3** (a) Describe how Ethereum differs from the Bitcoin Blockchain in terms of functionality, consensus mechanism, and scripting capabilities. (07)
- (b) List the different types of nodes in the Ethereum network and explain their roles. (07)

OR

- (a) Explain the potential problems that may arise when programming is allowed directly on a Blockchain platform. (07)
- (b) Describe the reasons why a hard-fork may occur in the Bitcoin Blockchain. (07)

- Q.4** (a) What are state variables? How can we initialize state variables in the Solidity language? Explain each method with an example. (07)
- (b) Explain the program structure of the Solidity programming language. (07)

OR

E/258-2

- (a) Discuss the role of bytecode and ABI in the compilation process of a smart contract in the Solidity programming language. (07)
- (b) Discuss how we can declare and initialize an array variable in the Solidity programming language. (07)

Q.5 Define the following terms (Any SEVEN): (14)

- (1) Cold Wallet
- (2) SEGWIT
- (3) Orphan block
- (4) Mutable
- (5) Pure
- (6) Bytecode
- (7) Mining pool
- (8) EVM
- (9) Ethereum Gas
- (10) ABI
- (11) Remix
- (12) Bitcoin Address
