



SRM VALLIAMMAI ENGINEERING COLLEGE

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DEPARTMENT OF CYBER SECURITY

QUESTION BANK



VII SEMESTER

PCY302-PE II CRYPTO CURRENCY AND BLOCK CHAIN TECHNOLOGIES

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UNIT – I INTRODUCTION TO CRYPTO CURRENCY

Bitcoin – Digital keys and addresses: Private and public keys, Base58 check encoding, vanity addresses – Transactions: transaction life cycle, transaction data structure, types of transactions – Mining – Bitcoin Network and Payments – Wallets – Bitcoin Payments

PART – A

Q. No.	Questions	BT Level	Competence
1.	What is cryptocurrency?	BTL1	Remember
2.	Define Bitcoin.	BTL1	Remember
3.	What is a private key?	BTL1	Remember
4.	What is a public key?	BTL1	Remember
5.	Define Base58 check encoding.	BTL1	Remember
6.	What is the purpose of vanity addresses?	BTL2	Understand
7.	What is a Bitcoin transaction life cycle?	BTL2	Understand
8.	List the types of Bitcoin transactions.	BTL1	Remember
9.	Define Bitcoin mining.	BTL1	Remember
10.	What is the function of a Bitcoin wallet?	BTL2	Understand
11.	What is the structure of Bitcoin transactions?	BTL2	Understand
12.	State two advantages of using Bitcoin.	BTL1	Remember
13.	Mention any two limitations of Bitcoin.	BTL1	Remember
14.	What is the role of a digital signature in Bitcoin transactions?	BTL1	Remember
15.	What are Bitcoin payments?	BTL2	Understand
16.	What is Proof of Work in Bitcoin mining?	BTL1	Remember
17.	What is the difference between private and public keys?	BTL4	Analyze
18.	Explain double-spending problem in Bitcoin.	BTL2	Understand
19.	What is the role of miners in the Bitcoin network?	BTL2	Understand
20.	What do you mean by transaction fee in Bitcoin?	BTL2	Understand
21.	Explain how digital wallets work.	BTL3	Apply
22.	What is a Bitcoin block?	BTL1	Remember
23.	What is block confirmation?	BTL2	Understand
24.	What is a UTXO (Unspent Transaction Output)?	BTL2	Understand

PART – B

1.	Explain the concept of Bitcoin and its significance in the digital currency ecosystem.(16)	BTL2	Understand
2.	Illustrate how private and public keys work in Bitcoin transactions. Explain the Base58 check encoding process. (16)	BTL2	Understand
3.	Analyze the structure of a Bitcoin transaction. Explain the life cycle of a transaction with suitable diagrams. (16)	BTL4	Analyze
4.	(i) Compare and contrast different types of Bitcoin transactions. (8) (ii) Provide real-world use cases. (8)	BTL4	Analyze

5.	Describe the process of Bitcoin mining. What are the roles of miners in the Bitcoin network? (16)	BTL2	Understand
6.	Develop a flowchart or pseudocode to represent the transaction lifecycle in the Bitcoin network. (16)	BTL3	Create
7.	(i) Evaluate the efficiency and security of Bitcoin wallets. (8) (ii) What types of wallets exist and how do they differ? (8)	BTL5	Evaluate
8.	Apply the concepts of digital keys to demonstrate how ownership and authentication are ensured in the Bitcoin network. (16)	BTL3	Apply
9.	(i) Explain how Bitcoin payments are initiated and processed. (8) (ii) What are the key steps involved? (8)	BTL2	Understand
10.	Design a secure Bitcoin wallet system architecture and describe how it protects against common attacks. (16)	BTL6	Create
11.	Differentiate between public and private keys with examples. How does cryptography ensure data integrity in Bitcoin? (16)	BTL4	Analyze
12.	Assess the impact of Bitcoin on traditional payment systems. Mention challenges and advantages. (16)	BTL3	Apply
13.	Write a short program or pseudocode to validate a Bitcoin address using Base58 check encoding. (16)	BTL4	Analyze
14.	Discuss in detail the security vulnerabilities in Bitcoin wallets. Suggest methods to mitigate them. (16)	BTL5	Evaluate
15.	(i) Summarize the role of nodes in the Bitcoin network. (8) (ii) How do they facilitate transaction verification? (8)	BTL3	Apply
16.	Construct a table comparing different types of Bitcoin transactions. Mention their purposes and usage scenarios. (16)	BTL4	Analyze
17.	What is the structure of a Bitcoin transaction? Illustrate with an example and describe each field in the structure. (16)	BTL1	Remember

UNIT – II BITCOIN CLIENTS AND APIS

Bitcoin installation: Types of Bitcoin Core clients, setting up a Bitcoin node, source node, bitcoin.conf, setting up a node in testnet, regtest. Alternative coins – Theoretical Foundations - Bitcoin limitations – Name coin – Lite coin – Prime coin.

PART – A

Q. No.	Questions	BT Level	Competence
1.	What is a Bitcoin Core client?	BTL1	Remember
2.	Name any two types of Bitcoin Core clients.	BTL1	Remember
3.	What is a Bitcoin node?	BTL1	Remember
4.	What is the purpose of the bitcoin.conf file?	BTL1	Remember
5.	What is a source node ?	BTL2	Understand
6.	What does testnet mean in Bitcoin?	BTL2	Understand

7.	Define regtest .	BTL2	Understand
8.	Name one use case of regtest network.	BTL1	Remember
9.	What is an Altcoin ?	BTL2	Understand
10.	What are Bitcoin limitations ?	BTL2	Understand
11.	What is Namecoin used for?	BTL2	Understand
12.	Mention one key feature of Litecoin .	BTL2	Understand
13.	What is Primecoin based on?	BTL2	Understand
14.	Mention any one reason for the existence of Altcoins .	BTL1	Remember
15.	What is a blockchain fork ?	BTL1	Remember
16.	Name a lite version of Bitcoin.	BTL1	Remember
17.	What is the block time of Litecoin ?	BTL1	Remember
18.	What is the consensus mechanism of Primecoin ?	BTL2	Understand
19.	Define testnet coins .	BTL2	Understand
20.	What is the maximum supply of Bitcoin ?	BTL2	Understand
21.	Name one configurable parameter in bitcoin.conf.	BTL1	Remember
22.	What is difficulty retargeting ?	BTL1	Remember
23.	What is the main application of Namecoin ?	BTL1	Remember
24.	List any two advantages of using regtest over testnet .	BTL1	Remember
PART – B			
1.	Explain the steps involved in installing a Bitcoin Core client.(16)	BTL2	Understand
2.	Describe the process of setting up a Bitcoin node. Explain the configuration options in bitcoin.conf. (16)	BTL2	Understand
3.	What is a source node? Explain the procedure for building a Bitcoin Core node from source code. (16)	BTL2	Understand
4.	Illustrate how to set up a node in testnet and regtest environments. Compare their advantages. (16)	BTL4	Analyze
5.	Compare and contrast types of Bitcoin Core clients. (16)	BTL4	Analyze
6.	Design a simple guide/manual for new developers to configure and run a Bitcoin node on testnet. (16)	BTL6	Create
7.	Analyze the limitations of Bitcoin and explain how altcoins attempt to overcome them.(16)	BTL4	Analyze
8.	Discuss the theoretical foundations of cryptocurrencies with respect to decentralized architecture and consensus mechanisms. (16)	BTL4	Analyze
9.	(i) Explain the concept of alternative coins (altcoins). (8) (ii) Why do they emerge? What problems do they address? . (8)	BTL2	Understand
10.	Explain the architecture, features, and use cases of Namecoin. (16)	BTL3	Apply

11.	Compare and contrast Bitcoin and Litecoin in terms of technical architecture and applications. (16)	BTL5	Evaluate
12.	Assess the significance of Primecoin in the cryptocurrency ecosystem. What unique approach does it introduce?(16)	BTL5	Evaluate
13.	Illustrate the complete workflow of configuring a source node in Bitcoin. Provide sample configurations. (16)	BTL6	Create
14.	Summarize the key architectural differences between Bitcoin and Primecoin. (16)	BTL4	Analyze
15.	Develop a use case where Litecoin would be more suitable than Bitcoin for a given application. Justify your choice.(16)	BTL5	Evaluate
16.	Explain the impact of Bitcoin's limitations on its scalability and usability. Suggest possible solutions.(16)	BTL5	Evaluate
17.	Design a simple comparison chart of Namecoin, Litecoin, and Primecoin based on consensus, hashing algorithm, transaction speed, and use cases. (16)	BTL6	Create

UNIT III INTRODUCTION TO BLOCK CHAIN AND ETHEREUM

Block Chain - History of Block Chain – Types of Block Chain – Consensus – CAP Theorem and Block Chain – Decentralization using Block Chain. Ethereum network– Components of the Ethereum ecosystem – Programming Languages –Ethereum Development Environment– Development Tools and Frameworks. Illustrative: Setup the Ethereum development environment.

PART – A

Q. No.	Questions	BT Level	Competence
1.	What is Blockchain ?	BTL1	Remember
2.	Define a public blockchain .	BTL1	Remember
3.	Define a private blockchain.	BTL1	Remember
4.	What is a consortium blockchain ?	BTL1	Remember
5.	What is CAP theorem?	BTL1	Remember
6.	List any three components of the CAP theorem .	BTL1	Remember
7.	What is decentralization in Blockchain	BTL2	Understand
8.	Mention one benefit of decentralization.	BTL2	Understand
9.	Define consensus in Blockchain.	BTL1	Remember
10.	Name any two consensus mechanisms.	BTL1	Remember
11.	What is Proof of Work?	BTL2	Understand
12.	What is Proof of Stake?	BTL2	Understand
13.	Mention one application of Blockchain .	BTL1	Remember
14.	What is the purpose of a Blockchain ledger ?	BTL1	Remember
15.	What is Ethereum?	BTL1	Remember
16.	Mention any two Ethereum programming languages.	BTL1	Remember
17.	Name any two components of Ethereum ecosystem.	BTL2	Understand

18.	What is Solidity?	BTL2	Understand
19.	Name any one Ethereum development tool.	BTL1	Remember
20.	What is a smart contract?	BTL2	Understand
21.	Name one Ethereum development framework.	BTL1	Remember
22.	What is a DApp ?	BTL2	Understand
23.	Mention one use case of Ethereum .	BTL2	Understand
24.	What is MetaMask used for?	BTL2	Understand
PART – B			
1.	(i) Explain the origin and evolution of Blockchain technology. (8) (ii) Discuss key milestones that led to modern Blockchain platforms.(8)	BTL2	Understand
2.	Compare and contrast public, private, and consortium blockchains. (16)	BTL4	Analyze
3.	(i) What is the CAP theorem? Explain its components with examples. (8) (ii)Analyze how the CAP theorem applies to Blockchain architecture.(8)	BTL4	Analyze
4.	Describe various consensus mechanisms used in Blockchain. (16)	BTL2	Understand
5.	Analyze the role of decentralization in Blockchain technology. What are its key benefits?(16)	BTL4	Analyze
6.	Evaluate how Blockchain solves the problem of trust in distributed systems. (16)	BTL5	Evaluate
7.	Compare Blockchain and traditional centralized databases. (16)	BTL4	Analyze
8.	Describe the components of the Ethereum ecosystem. (16)	BTL2	Understand
9.	Develop an architecture diagram of an Ethereum-based application and explain its working. (16)	BTL6	Create
10.	(i) Compare the consensus mechanisms of Ethereum and Bitcoin.(8) (ii) Compare their smart contract functionality and blockchain structure. (8)	BTL4	Analyze
11.	Discuss the role of programming languages used in Ethereum development . (16)	BTL2	Understand
12.	Evaluate different Ethereum development frameworks. Which one would you recommend and why? (16)	BTL5	Evaluate
13.	Write a step-by-step guide for setting up an Ethereum development environment. (16)	BTL5	Evaluate
14.	Explain the importance of smart contracts in the Ethereum ecosystem. (16)	BTL2	Understand
15.	Critically analyze the limitations of Ethereum and suggest improvements. (16)	BTL5	Evaluate

16.	(i) Describe the architecture and essential components of a Decentralized Application (DApp). (8) (ii) Develop a simple use case example for a DApp using Ethereum.(8)	BTL6	Create
17.	Analyze the impact of consensus algorithms on the scalability of Ethereum. (16)	BTL4	Analyze

UNIT – IV WEB3 AND HYPERLEDGER

Introduction to Web3 – Contract Deployment – Development Frameworks Hyperledgers a protocol – Reference Architecture – Hyperledger Fabric – SawtoothLake – Corda.

PART – A

Q. No.	Questions	BT Level	Competence
1.	What is Web3 and how is it different from Web2?	BTL1	Remember
2.	Define a smart contract in the context of Web3.	BTL1	Remember
3.	What are the key components of the Web3 stack?	BTL1	Remember
4.	Mention two popular Web3 development frameworks.	BTL1	Remember
5.	What does contract deployment mean in Web3?	BTL1	Remember
6.	Outline the purpose of Ganache in Web3 development.	BTL1	Remember
7.	Explain the significance of Ethereum Virtual Machine (EVM).	BTL2	Understand
8.	Identify the role of MetaMask in the Web3 ecosystem.	BTL2	Understand
9.	List key features of Hyperledger as a protocol.	BTL2	Understand
10.	Define reference architecture in the context of Hyperledger.	BTL2	Understand
11.	Differentiate between Hyperledger Fabric and Sawtooth Lake.	BTL2	Understand
12.	What is Hyperledger Composer Playground?	BTL2	Understand
13.	Compare permissioned and permissionless blockchains.	BTL2	Understand
14.	Mention use cases of Hyperledger Fabric.	BTL1	Remember
15.	List key differences between Corda and Fabric.	BTL1	Remember
16.	What is a business network in Hyperledger Composer?	BTL2	Understand
17.	Name two tools used for deploying smart contracts in Web3.	BTL2	Understand
18.	Why is Solidity commonly used in Web3?	BTL2	Understand
19.	How does Hyperledger ensure transaction privacy?	BTL2	Understand
20.	Outline the function of consensus mechanisms in Fabric.	BTL1	Remember
21.	Describe a scenario where Hyperledger Sawtooth is useful.	BTL1	Remember
22.	What is the role of chaincode in Hyperledger Fabric?	BTL1	Remember
23.	Explain the use of nodes in a Hyperledger Fabric network.	BTL1	Remember
24.	Define asset modeling in Hyperledger Composer.	BTL1	Remember

PART – B			
1.	Explain the architecture of a Web3 application. Illustrate how smart contracts interact with decentralized applications.(16)	BTL2	Understand
2.	Describe the steps involved in developing and deploying a smart contract using Truffle and Ganache.(16)	BTL3	Apply
3.	Compare and contrast Web3 development frameworks such as Hardhat, Truffle, and Brownie in terms of ease of use, deployment, and testing. (16)	BTL4	Analyze
4.	(i) Discuss the evolution from Web1.0 to Web3.0 with use-case examples. (8) (ii) Examine the importance of decentralization in Web3. (8)	BTL4	Analyze
5.	Create a basic Ethereum smart contract in Solidity to record and retrieve user data. Explain its deployment process. (16)	BTL6	Create
6.	Identify the limitations of propositional logic in representing complex knowledge structures. (16)	BTL2	Understand
7.	(i) Analyze the role of consensus algorithms in Hyperledger networks. (8) (ii) Compare RAFT and PBFT used in Hyperledger Fabric. (8)	BTL4	Analyse
8.	Identify and explain the key features that distinguish Hyperledger Fabric, Sawtooth Lake, and Corda from each other. (16)	BTL4	Analyze
9.	Demonstrate how to create and deploy a business network using Hyperledger Composer Playground. Include major steps and components. (16)	BTL3	Apply
10.	(i) Develop a sample asset transaction model in Hyperledger Composer. (8) (ii) Explain how permissions are managed in a Fabric network. (8)	BTL6	Create
11.	Evaluate the role of identity and membership services in Hyperledger Fabric. How do they influence trust and security? (16)	BTL5	Evaluate
12.	Construct a use case where Hyperledger Corda is more appropriate than Fabric or Ethereum. Justify your choice. (16)	BTL3	Apply
13.	(i) Discuss the importance of chain code in smart contract logic execution. (8) (ii) Show how Hyperledger supports modularity in design. (8)	BTL4	Analyze
14.	Outline the reference architecture of Hyperledger and elaborate how it supports enterprise-grade solutions. (16)	BTL2	Understand
15.	Compare and contrast Ethereum and Hyperledger as platforms for decentralized applications in terms of governance, scalability, and permission.(16)	BTL4	Analyze

16.	(i) Identify the challenges of smart contract deployment in real-world applications. (8) (ii) Propose solutions to mitigate those challenges using frameworks. (8)	BTL5	Evaluate
17.	Create a workflow for building and testing a decentralized application using a Web3 framework of your choice.(16)	BTL6	Create
18.	(i) Classify various types of smart contract vulnerabilities. (8) (ii) Suggest methods to detect and prevent them during development. (8)	BTL4	Analyze
19.	Explain the core services provided by Hyperledger Fabric such as endorsement, ordering, and validation. Provide real-world examples.(16)	BTL2	Understand
20.	(i) Demonstrate a real-world supply chain use case using Hyperledger. (8) (ii) Map the components of the use case to Fabric architecture. (8)	BTL3	Apply

UNIT – V BLOCK CHAIN APPLICATIONS

IoT with Block Chain – Block Chain based voting system - Border Control – Medical Record Management System - Alternative Block chains – Kadena – Ripple – Rootstock – Quorum - Scalability – Privacy.

PART – A

Q. No.	Questions	BT Level	Competence
1.	What is the role of blockchain in IoT applications?	BTL1	Remember
2.	Define a blockchain-based voting system.	BTL1	Remember
3.	How can blockchain improve border control processes?	BTL1	Remember
4.	List the key components of a blockchain medical record system.	BTL1	Remember
5.	Mention two advantages of using blockchain in the healthcare industry	BTL2	Understand
6.	Describe how Kadena differs from traditional blockchains.	BTL2	Understand
7.	Compare Ripple with Ethereum in terms of transaction processing.	BTL2	Understand
8.	Explain the main idea behind Rootstock blockchain.	BTL2	Understand
9.	List the features of Quorum blockchain.	BTL2	Understand
10.	What are the key challenges of scalability in blockchain?	BTL2	Understand
11.	Explain how privacy is maintained in blockchain networks.	BTL2	Understand
12.	How does sharding help with blockchain scalability?	BTL2	Understand
13.	What is a private blockchain? Give an example.	BTL1	Remember
14.	How can blockchain prevent medical record tampering?	BTL1	Remember
15.	Compare public and private blockchains.	BTL1	Remember
16.	What is Zero Knowledge Proof in blockchain?	BTL1	Remember
17.	Define consensus in the context of alternative blockchains.	BTL1	Remember
18.	List two use cases of blockchain in national governance.	BTL1	Remember
19.	What are the primary goals of the Ripple network?	BTL2	Understand
20.	Outline the use of smart contracts in Rootstock.	BTL2	Understand

21.	Describe permissioned blockchain and its relevance.	BTL1	Remember
22.	Mention two scalability solutions for blockchain networks	BTL1	Remember
23.	What is the purpose of a sidechain in blockchain?	BTL2	Understand
24.	Identify how blockchain enhances trust in voting systems.	BTL1	Remember
PART – B			
1.	Explain the architecture of IoT systems integrated with blockchain. Provide suitable examples. (16)	BTL3	Apply
2.	Discuss the design and implementation of a blockchain-based voting system. (16)	BTL6	Create
3.	Compare and contrast the functionalities of Kadena, Ripple, and Rootstock.(16)	BTL3	Apply
4.	(i) Analyze the benefits of blockchain in border control applications. (8) (ii) Explain how identity verification is handled in such systems.(8)	BTL6	Create
5.	Develop a use-case scenario for blockchain in a Medical Record Management System.(16)	BTL3	Apply
6.	Describe how scalability issues are addressed in modern blockchain solutions. Include at least two methods.(16)	BTL3	Apply
7.	(i) Differentiate between alternative blockchains and Bitcoin. (8) (ii) Explain how Quorum supports privacy. (8)	BTL4	Analyze
8.	Construct a model for implementing a private medical blockchain. Highlight security aspects (16)	BTL4	Analyze
9.	Evaluate privacy-preserving techniques used in blockchain technologies.(16)	BTL4	Analyze
10.	Illustrate how a sidechain architecture supports scalability and privacy.(16)	BTL5	Evaluate
11.	Compare the consensus mechanisms of Ripple and Kadena. How do they affect performance? (16)	BTL4	Analyze
12.	Develop a system architecture for a border control system using blockchain smart contracts. (16)	BTL5	Evaluate
13.	(i) Discuss the limitations of blockchain in large-scale IoT deployments. (8) (ii) Suggest solutions for overcoming them. (8)	BTL4	Analyze
14.	Identify security risks in blockchain voting systems and recommend countermeasures(16)	BTL3	Apply
15.	Explain the role of smart contracts in managing healthcare data.(13)	BTL4	Analyze
16.	Analyze the trade-off between privacy and transparency in public blockchain networks.(16)	BTL3	Apply

17.	Compare the scalability features of Kadena and Ethereum. Which is more efficient for enterprise use? (16)	BTL4	Analyze
18.	Evaluate the feasibility of implementing a nationwide blockchain voting platform.(16)	BTL4	Analyze
19.	Construct a blockchain-based framework for interoperable medical records across hospitals.(16)	BTL3	Apply
20.	Describe a practical use case where Ripple has improved financial transaction processing. (16)	BTL4	Analyze