|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Roll No. |  |  |  |  |  |  |  |  |  |  |  |  |



**PRESIDENCY UNIVERSITY**

**Bengaluru**

|  |
| --- |
| **End - Term Examinations – JANUARY 2025** |
| **Date:** 06 / 01/ 2025 **Time:** 09:30 am – 12:30 pm |

|  |  |  |
| --- | --- | --- |
| **School:** SOCSE | **Program:** B.Tech - CBC | |
| **Course Code :** CSE2019 | **Course Name :** Foundations of Blockchain Technology | |
| **Semester**: V | **Max Marks**: 100 | **Weightage**: 50% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** |
| **Marks** | **26** | **26** | **24** | **24** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Answer ALL the Questions. 10 x 2 Marks=20 Marks** | | | | |
| **1** | Define the term "permissioned blockchain" as it relates to a consortium blockchain. | **2 Marks** | **L1** | **CO1** |
| **2** | Define the term "distributed ledger" and explain its connection to shared ledgers. | **2 Marks** | **L1** | **CO1** |
| **3** | State one benefit and one limitation of blockchain technology. | **2 Marks** | **L1** | **CO1** |
| **4** | State one characteristic of Proof of Stake (PoS) as a consensus mechanism. | **2 Marks** | **L1** | **CO2** |
| **5** | Mention one benefit of using Proof of Work in blockchain. | **2 Marks** | **L1** | **CO2** |
| **6** | Define the term "Consensus mechanism". | **2 Marks** | **L1** | **CO2** |
| **7** | List the types of digital keys used in Bitcoin. | **2 Marks** | **L1** | **CO3** |
| **8** | Explain the term 'hashrate' in the context of blockchain mining. | **2 Marks** | **L1** | **CO3** |
| **9** | Define Ethereum in simple terms. | **2 Marks** | **L1** | **CO4** |
| **10** | Describe the key features of smart contracts? | **2 Marks** | **L1** | **CO4** |

**Part B**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Answer the Questions Total 80 Marks.** | | | | | |
| **11.** | **a.** | Analyze the significance of the various tiers of Blockchain technology by providing examples of their application. Discuss how these tiers contribute to the overall functionality and scalability of blockchain systems | **10 Marks** | **L2** | **CO1** |
| **b.** | Generalize key features of blockchain, such as decentralization, immutability, transparency, and security, can be applied in a real-world scenario like supply chain management or healthcare. Use specific examples to illustrate their functionality and impact. | **05 Marks** | **L2** |
| **c.** | Discuss the role of Permissioning in a private blockchain and explain how it affects access control, data privacy, and network security. | **05 Marks** | **L3** |
| **or** | | | | | |
| **12.** | **a.** | Explain the generic elements of a blockchain by describing their functions and illustrating their interrelationships with examples. | **10 Marks** | **L2** | **CO1** |
| **b.** | Explain the concept of a Consortium Blockchain and analyze how it benefits organizations by enhancing trust, efficiency, and scalability within a network. Discuss the implications of using a Consortium Blockchain in contrast to other types of blockchains such as Public and Private blockchains. Additionally, provide examples of use cases where Consortium Blockchains have been particularly advantageous. | **10 Marks** | **L4** |
|  |  |  |  |  |  |
| **13.** | **a.** | Explain the different types of consensus mechanisms used in blockchain networks. Discuss the key characteristics, advantages, and disadvantages of Proof of Work (PoW) and Proof of Stake (PoS) consensus algorithms. How do these mechanisms impact the scalability, security, and decentralization of blockchain networks? | **10 Marks** | **L2** | **CO2** |
| **b.** | Analyze the Proof of Authority (PoA) consensus mechanism in blockchain, and evaluate its advantages and limitations in comparison to other consensus mechanisms like Proof of Work (PoW) and Proof of Stake (PoS). | **10 Marks** | **L4** |
| **or** | | | | | |
| **14.** | **a.** | Explain how Proof of Stake addresses the "nothing at stake" problem, a common issue in blockchain consensus mechanisms. | **10 Marks** | **L2** | **CO2** |
| **b.** | Analyze the Proof of Work (PoW) consensus mechanism in blockchain technology. Evaluate its strengths and limitations in terms of security, scalability, and environmental impact. In your answer, compare PoW with at least one other consensus mechanism, highlighting the trade-offs involved. | **10 Marks** | **L4** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **15.** | **a.** | Demonstrate how digital keys and addresses function within cryptographic systems by constructing an example that illustrates their role in ensuring data security and user identity. Additionally, apply these concepts to explain how public and private keys work together to enable secure transactions in a blockchain environment. | **10 Marks** | **L2** | **CO3** |
| **b.** | Classify how a transaction is processed and validated within a blockchain network. Include an explanation of the transaction lifecycle, roles of key participants, and how consensus mechanisms ensure the integrity of transactions | **10 Marks** | **L3** |
| **Or** | | | | | |
| **16.** | **a.** | Investigate the environmental impact of blockchain mining, particularly the energy consumption of mining operations in Proof of Work-based systems. Propose alternative solutions or technologies that could mitigate these environmental concerns while still maintaining blockchain network security and decentralization. | **10 Marks** | **L4** | **CO3** |
| **b.** | Describe the characteristics of hardware, software, and paper wallets, and explain their advantages and disadvantages. | **05 Marks** | **L2** |
| **c.** | Compute the traditional payment systems with the Bitcoin payment system. Highlight the key differences in terms of security, speed, and transaction costs. | **05 Marks** | **L3** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **17.** | **a.** | Demonstrate the implementation of a smart contract by describing its key components and functions. Illustrate its application in a real-world use case, such as supply chain management or digital identity. Explain how the contract executes without manual intervention." | **10 Marks** | **L2** | **CO4** |
| **b.** | Interpret the potential impact of Ethereum on traditional financial systems. Discuss the advantages and disadvantages, and provide a balanced assessment of its future prospects. | **05 Marks** | **L2** |
| **c.** | Identify a specific industry or sector where smart contracts could revolutionize operations. | **05 Marks** | **L3** |
| **Or** | | | | | |
| **18.** | **a.** | Explain the concept of gas in Ethereum transactions and how it helps in maintaining the efficiency and security of the Ethereum network. | **05 Marks** | **L2** | **CO4** |
| **b.** | Show how smart contracts are executed within the Ethereum ecosystem using a specific example. | **05 Marks** | **L3** |
| **c.** | Analyze how the integration of smart contracts within a blockchain system can address the challenges typically faced in managing IPR(Intellectual Property Rights), particularly in terms of copyright enforcement and dispute resolution. | **10 Marks** | **L4** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***