BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : VI**
BRANCH: CSE **SESSION : SP/2025**

SUBJECT: IT353 BLOCKCHAIN TECHNOLOGY

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

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Q.1(a)	Compare Permissioned and Permissionless blockchains across the following dimensions. Provide specific examples where applicable. a) Network Participation – Who can join and validate transactions? b) Consensus Mechanism – Which types are commonly used in each type? c) Transaction Privacy and Data Control – How is data visibility managed? d) Use Cases – Identify real-world applications suited for each type. e) Performance and Scalability – Which is generally more efficient and why?	[5]	1	4
Q.1(b)	Describe the process of signing a transaction in a typical blockchain system. Also Include the roles of the private key and the public key in signing a transaction.	[5]	2	3
Q.2(a)	A Proof of Stake blockchain network has a total of 1,000,000 coins staked. A validator node stakes 25,000 coins and is selected to validate a block. The block reward is 10 coins per block, and block validation occurs every 10 seconds. The network distributes block rewards proportionally based on uptime and staked amount. Validator's uptime is 96% over a 24-hour period. a) How many blocks are validated in 24 hours? [2] b) What is the expected total reward for the validator over the 24-hour period, assuming their share of stake remains constant, and all other nodes have 100% uptime? [3]	[5]	3	3
Q.2(b)	In Proof-of-Work blockchain network, describe a scenario where two miners simultaneously find valid blocks, creating a temporary fork. Illustrate how the blockchain network resolves competing forks and eventually selects the longest valid chain, with the help of a suitable diagram.	[5]	3	4
Q.3(a)	Scenario I: A soft fork is implemented in Bitcoin to restrict the block size to 1 MB. Before the fork, any block size is valid, and after the fork, only blocks with a size ≤ 1 MB are valid according to the new rule. Scenario II: A hard fork is implemented to increase the block size limit. Before the fork, the maximum block size is 1 MB, and after the fork, the maximum block size is 2 MB. Assume a miner mines blocks with transaction signature sizes (case): a) 0.9 MB b) 1.15 MB c) 1.8 MB d) 2.1 MB For each scenario (I and II) and for each case (a–d), Clearly state and justify whether: • New nodes (those updated with the fork) will accept or reject the block. • Old nodes (not updated) will accept or reject the block.	[5]	3	5
Q.3(b)	Given the following UTXOs in a wallet: 0.25 BTC, 0.4 BTC, 0.35 BTC. The user wants to send 0.8 BTC to another address. The transaction fee is 0.005 BTC. a) Which UTXOs should be selected? b) What happens to the UTXOs after this transaction?	[5]	4	3

PTO

Q.4(a)	In Solidity, there are three commonly used methods for transferring Ether between contracts: transfer, send, and call. Describe the working mechanism of each method in terms of Gas stipend limitation and Error handling. And Which method is currently recommended for sending Ether and why?	[5]	4	2
Q.4(b)	In the context of Solidity programming and smart contract security on Ethereum platforms, explain how a reentrancy attack occurs. How can developers prevent or mitigate such attacks? Support your answer with a suitable solidity script.	[5]	4	5
Q.5(a)	In the context of Solidity smart contract development: a) Differentiate between view and pure functions with respect to their access to blockchain state. Support your explanation with one suitable code example for each. b) What are the consequences of incorrectly using these modifiers (e.g., using pure when state is accessed)? c) Discuss the importance of these modifiers from the perspectives of: • Gas optimization • Smart contract design security	[5]	5	2
Q.5(b)	Hyperledger Fabric is known for its modular and configurable architecture. Explain how this design principle enhances the adaptability, scalability, and security of the platform.	[5]	5	4

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