Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 12-12-2025 **Time:** 01:00pm– 04:00pm

School: SOCSE	**Program:** B. Tech Computer Science and Engineering (CBC)	
Course Code : CBC2509	**Course Name:** Consensus Algorithm and Network Design.	
Semester: V	**Max Marks:**100	**Weightage:** 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**26**	**26**	**24**	**24**	

Instructions:

(i) ***Read all questions carefully and answer accordingly.***

(ii) ***Do not write anything on the question paper other than roll number.***

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	What is decentralization in blockchain?	**2 Marks**	**L1**	**CO1**
2.	Define safety and liveness in consensus.	**2 Marks**	**L1**	**CO1**
3.	List the difference between consistency and fault tolerance.	**2 Marks**	**L1**	**CO1**
4.	Distinguish between PoW and PoS.	**2 Marks**	**L2**	**CO2**
5.	Summarise the purpose of a validator node?	**2 Marks**	**L2**	**CO2**
6.	Describe the advantages of PBFT.	**2 Marks**	**L2**	**CO2**
7.	Interpret sharding.	**2 Marks**	**L3**	**CO3**
8.	Examine the goal of Layer 2 solutions?	**2 Marks**	**L3**	**CO3**
9.	Illustrate two characteristics of P2P network architecture.	**2 Marks**	**L3**	**CO4**
10.	Interpret latency in blockchain communication?	**2 Marks**	**L3**	**CO4**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Describe the requirements of consensus in decentralized systems.	**10 Marks**	**L1**	**CO 1**
		Or			
12.	**a.**	Identify how safety and fault tolerance are ensured in blockchain networks.	**10 Marks**	**L1**	**CO 1**

13.	**a.**	Describe permissionless networks with examples.	**10 Marks**	**L1**	**CO 1**
		Or			
14.	**a.**	Define consistency models in distributed networks.	**10 Marks**	**L1**	**CO 1**

15.	**a.**	Explain PoW mechanism with an example of nonce computation.	**10 Marks**	**L2**	**CO 2**
		Or			
16.	**a.**	Reviw PoS to reduce energy consumption – discuss with Ethereum.	**10 Marks**	**L2**	**CO 2**

17.	**a.**	Describe PBFT's working and its advantages.	**10 Marks**	**L2**	**CO 2**
		Or			
18.	**a.**	Compare PoS, DPoS, and Federated Consensus with real-world platforms.	**10 Marks**	**L2**	**CO 2**

19.	**a.**	Illustrate Raft consensus steps and leader election process.	**10 Marks**	**L3**	**CO 3**
		Or			
20.	**a.**	Examine DAG-based models and their advantages over traditional blockchains.	**10 Marks**	**L3**	**CO 3**

21.	**a.**	Interpret sharding as a scalability mechanism in Ethereum 2.0.	**10 Marks**	**L3**	**CO 3**
		Or			
22.	**a.**	Illustrate ZK-Rollups and Optimistic Rollups for transaction throughput.	**10 Marks**	**L3**	**CO 3**

23.	**a.**	Examine blockchain network topologies suitable for low latency.	**10 Marks**	**L3**	**CO 4**
		Or			
24.	**a.**	Examine trade-offs between throughput and decentralization.	**10 Marks**	**L3**	**CO 4**

25.	**a.**	Illustrate validator and miner roles in transaction finality.	1**0 Marks**	**L3**	**CO 4**
		Or			
26.	**a.**	Illustrate Tendermint and Ethereum in terms of network design and consensus.	**10 Marks**	**L3**	**CO 4**