22CAP319BN

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MCA DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Branch – **COMPUTER APPLICATION**

MAJOR ELECTIVE COURSE – II : BLOCK CHAIN TECHNOLOGY

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	What is the main issue with credit cards when used online? a) Lack of global acceptance b) High transaction speed c) Centralized nature and vulnerability to fraud d) No rewards program	K1	CO1
	2	How do public keys act as identities in a cryptocurrency system? a) They store transaction data b) They serve as a user's address for sending and receiving funds c) They encrypt files on the blockchain d) They are private and confidential	K2	CO1
2	3	Proof of Work is a type of _____ a) Encryption b) Incentive mechanism for validators c) Digital signature d) Transaction fee system	K1	CO2
	4	Why are transaction fees important in blockchain networks? a) They prevent public access b) They incentivize miners and reduce spam transactions c) They increase currency inflation d) They create new wallets	K2	CO2
3	5	Which component connects all Bitcoin users and transactions globally? a) Bitcoin Wallet b) Bitcoin Blockchain c) Bitcoin Network d) Mining Pool	K1	CO3
	6	Why do mining pools exist? a) To share hardware with the public b) To reduce energy usage c) To combine computational resources and share rewards d) To store coins in the cloud	K2	CO3
4	7	What software is used for managing Bitcoin protocol updates? a) Chrome b) Bitcoin Gold c) Bitcoin Core d) EtherScan	K1	CO4
	8	How can Bitcoin transactions be de-anonymized? a) Using hash pointers b) By viewing public keys only c) Through blockchain analysis and linking addresses to identities d) By hiding IP addresses	K2	CO4
5	9	What are Altcoins? a) Alternative digital fiat currencies b) Cryptocurrencies that are not Bitcoin c) Government-issued coins d) Blockchain wallets	K1	CO5
	10	How do sidechains enhance the blockchain ecosystem? a) By increasing anonymity b) By allowing off-chain storage c) By enabling interoperability and feature testing d) By removing transaction fees	K2	CO5

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SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the difference between traditional financial arrangements and cryptocurrency systems. How does the concept of trust differ in these systems?	K2	CO1
		(OR)		
	11.b.	Describe how digital signatures ensure data integrity and non-repudiation. Support your answer with an example scenario.		
2	12.a.	Given a scenario where a centralized payment system is frequently failing due to a single point of failure, apply the concept of decentralization to redesign the system using blockchain principles.	K3	CO2
		(OR)		
	12.b.	A company wants to secure its private key such that no single employee can access it fully. Apply key-splitting techniques to design a secure access mechanism.		
3	13.a.	Apply your understanding of Bitcoin transactions to construct a sample transaction that includes two inputs and one output. Explain how the inputs are verified using previous UTXOs and how the transaction is validated in the Bitcoin network.	K3	CO3
		(OR)		
	13.b.	Compare how CPU, GPU, and ASIC miners would perform on a specific Bitcoin mining task (e.g., solving a hash). Apply hash rate and efficiency metrics to demonstrate why ASICs are preferred in modern mining operations.		
4	14.a.	Analyze how Bitcoin's pseudonymity differs from true anonymity. What risks does this pose to user privacy?	K4	CO4
		(OR)		
	14.b.	Examine how governments around the world have responded to Bitcoin. What regulatory trends have emerged, and how do they affect adoption?		
5	15.a.	Examine the relationship between Bitcoin and altcoins in terms of market dynamics and technical compatibility.	K4	CO5
		(OR)		
	15.b.	Compare any two altcoins in terms of their consensus mechanisms, use cases, and improvements over Bitcoin.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Evaluate the role of hash pointers and linked data structures in ensuring immutability within a blockchain. How do these concepts support tamper-evidence and traceability?	K4	CO1
2	17	Compare and analyze the architectural differences between centralized, decentralized, and distributed systems.	K4	CO2
3	18	Analyze the structure of a Bitcoin transaction by breaking it down into its core components (inputs, outputs, and scripts). Explain the function of each component and how they interrelate to ensure transaction validity within the blockchain.	K4	CO3
4	19	Evaluate the effectiveness of mixing protocols in enhancing transaction privacy. What trade-offs exist between privacy, trust, and usability?	K5	CO4
5	20	Critically analyze the mechanism and benefits of merge mining. How does it impact the security and decentralization of both parent and auxiliary chains?	K4	CO5

Z-Z-Z END