**25CAP212B/22CAP319BN**

**PSG COLLEGE OF ARTS & SCIENCE**
(AUTONOMOUS)

**MCA DEGREE EXAMINATION MAY 2026**
(Second Semester)

Branch – **COMPUTER APPLICATION**

**MAJOR ELECTIVE COURSE – I 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 | A cryptographic hash function produces output of_____<br>(i) Variable length<br>(ii) Fixed length<br>(iii) Infinite length<br>(iv) Random length | K1 | CO1 |
| | 2 | Digital signatures link transactions to_____<br>(i) Hardware (ii) Owner's private key<br>(iii) Exchange rate (iv) Block size | K2 | CO1 |
| 2 | 3 | Hot storage keys are stored_____<br>(i) Offline (ii) In block<br>(iii) In mining pool (iv) Online | K1 | CO2 |
| | 4 | Distributed consensus ensures_____<br>(i) Single decision maker<br>(ii) Lower fees<br>(iii) Faster mining<br>(iv) Agreement among nodes | K2 | CO2 |
| 3 | 5 | Mining hardware efficiency is measured by_____<br>(i) Block size<br>(ii) Hash rate<br>(iii) Wallet speed<br>(iv) Signature size | K1 | CO3 |
| | 6 | Bitcoin scripts enforce spending conditions by_____<br>(i) Encrypting the block<br>(ii) Increasing hash rate<br>(iii) Requiring valid signatures<br>(iv) Connecting to exchanges | K2 | CO3 |
| 4 | 7 | Decentralized mixing differs from centralized mixing because it _____<br>(i) Avoids trusted intermediaries (ii) Uses banks<br>(iii) Eliminates block chain (iv) Reduces block size | K1 | CO4 |
| | 8 | Consensus disputes in Bitcoin may lead to_____<br>(i) Wallet failure<br>(ii) Reduced fees<br>(iii) Hard forks<br>(iv) Mining shutdown | K2 | CO4 |
| 5 | 9 | Ethereum differs from Bitcoin mainly because it supports___<br>(i) Smart contracts<br>(ii) Faster mining<br>(iii) Centralized control<br>(iv) Gold backing | K1 | CO5 |
| | 10 | In sidechain architecture, assets move between chains using_____<br>(i) Central bank approval<br>(ii) Two-way peg mechanism<br>(iii) Mining competition<br>(iv) Hard fork activation | K2 | CO5 |

**Cont...**

## 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 role of cryptographic hash functions in cryptocurrencies. | K2 | CO1 |
| | | (OR) | | |
| | 11.b. | Describe the basic working of a simple cryptocurrency. | | |
| 2 | 12.a. | Demonstrate how distributed consensus works in a block chain by giving a practical example. | K3 | CO2 |
| | | (OR) | | |
| | 12.b. | Apply knowledge of currency exchange markets to explain how the value of cryptocurrencies is determined. | | |
| 3 | 13.a. | Analyze a Bitcoin transaction and explain how inputs, outputs, and signatures are linked to prevent double spending. | K4 | CO3 |
| | | (OR) | | |
| | 13.b. | Examine the task of a Bitcoin miner and analyze how mining hardware affects transaction validation. | | |
| 4 | 14.a. | Evaluate the effectiveness of Bitcoin's anonymity model in protecting user privacy. | K5 | CO4 |
| | | (OR) | | |
| | 14.b. | Assess whether decentralized mixing provides stronger privacy guarantees than centralized mixing. | | |
| 5 | 15.a. | Propose a framework for atomic cross-chain swaps between two different cryptocurrencies. | K6 | CO5 |
| | | (OR) | | |
| | 15.b. | Formulate a strategy to improve interoperability between Bitcoin and selected altcoins. | | |

## 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 | Explain hash pointers and data structures in block chain, using an example to show how they maintain data integrity. | K2 | CO1 |
| 2 | 17 | Apply splitting and sharing key techniques to illustrate how a multi signature wallet prevents unauthorized access. | K3 | CO2 |
| 3 | 18 | Analyze the formation and functioning of mining pools and explain their effect on decentralization and mining rewards. | K4 | CO3 |
| 4 | 19 | Assess the effectiveness of de-anonymization attacks and recommend measures to improve user privacy. | K5 | CO4 |
| 5 | 20 | Develop a merge-mining model that allows a small altcoin to benefit from Bitcoin's mining power. | K6 | CO5 |

Z-Z-Z END