

BLOCKCHAIN TECHNOLOGY & APPLICATIONS
(MCAP 3153)

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group - A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**
- (i) Proof of Stake is _____.
(a) A transaction and block verification protocol
(b) A certificate needed to use the blockchain
(c) Both (a) and (b)
(d) None of the above.
- (ii) The term used for a blockchain splits is _____.
(a) A merger
(b) A fork
(c) A division
(d) None of the above.
- (iii) P2P stand for _____.
(a) Private to Public
(b) Password to Private
(c) Peer to Peer
(d) None of the above.
- (iv) The process of creating new bitcoins is known as _____.
(a) Financing
(b) Sourcing
(c) Mining
(d) None of the above.
- (v) _____ is the type of ledger present in Blockchain.
(a) Distributed Ledger
(b) Decentralized Ledger
(c) Both (a) and (b)
(d) None of the above.
- (vi) _____ was the famous Bitcoin exchange from Japan.
(a) Mt. Gox
(b) Bitstamp
(c) Both (a) and (b)
(d) None of the above.
- (vii) IPFS stand for _____.
(a) Interproject File System
(b) Interplanetary Fax System
(c) Interplanetary File System
(d) None of the above

- (viii) Smart contracts are not the legal documents.
(a) Yes (b) No (c) May be (d) Can't say.
- (ix) The private blockchain is faster, cheaper, and requires less energy to operate than a public blockchain.
(a) Yes (b) No (c) May be (d) Can't say.
- (x) How often does Bitcoin ledger reconcile?
(a) Every day (b) Every 3 months
(c) Every 3 Minutes (d) Every 10 Minutes.

Group - B

2. (a) List the steps of SHA 512 hashing algorithm. [(CO1) (Remember/LOCQ)]
(b) State the application of digital signature in blockchain.
[(CO1) (Remember/LOCQ)]
7 + 5 = 12
3. (a) Describe the significance of *Nonce* in the following statement: $H_k = Hash(H_{k-1} || T || Nonce)$. [(CO2)(Understand /LOCQ)]
(b) Explain how does a node in a Blockchain network decide on which block to relay? [(CO2) (Understand /LOCQ)]
(c) What is the average and maximum block propagation delays in a Blockchain network? [(CO2) (Understand /LOCQ)]
5 + 5 + 2 = 12

Group - C

4. (a) Illustrate the concept of distributed consensus with a real life example.
[(CO3)(Apply/IOCQ)]
(b) Distinguish between permissioned and permissionless consensus.
[(CO4)(Analyze/IOCQ)]
7 + 5 = 12
5. (a) Distinguish between proof of work and proof of stake. [(CO4) (Analyze/IOCQ)]
(b) Demonstrate quorum in practical Byzantine fault tolerance.
[(CO3) (Apply/IOCQ)]
6 + 6 = 12

Group - D

6. (a) Test the execution of a Bitcoin script with the help of a simple script.
[(CO4) (Analyze/IOCQ)]
(b) Examine the transaction flooding mechanism in a Bitcoin network.
[(CO4) (Analyze/IOCQ)]
6 + 6 = 12

7. (a) Examine the double spending problem in a Bitcoin network and how it can be handled using Blockchain. [(CO4) (Analyze/IOCQ)]
 (b) What is the theoretical limit for total Bitcoins? [(CO4) (Analyze/IOCQ)]
 (c) How can a node join a Bitcoin P2P network? [(CO4) (Analyze/IOCQ)]

5 + 2 + 5 = 12

Group - E

8. (a) Evaluate - users, miners, cryptocurrency exchanges, trading platforms, wallet providers, coin inventors and offerors as the key players in the cryptocurrency market. [(CO5) (Evaluate/HOCQ)]
 (b) Give your arguments in support of the statement-“There is a need for introducing license requirements for cryptocurrencies”. [(CO5) (Evaluate/HOCQ)]

7 + 5 = 12

9. (a) Write five different applications/ use cases of blockchain. [(CO6) (Create/HOCQ)]
 (b) Develop a Blockchain solution for handling product damage problems in a (ice-cream) supply chain. [(CO6) (Create/HOCQ)]

5 + 7 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	25%	50%	25%

Course Outcome (CO):

- CO1: Recall basic cryptographic mechanisms like encryption, hashing and digital signature required for blockchain
 CO2: Understand blockchain network, mining mechanism, distributed consensus, transactions, anonymity, reward, fork, private and public blockchain
 CO3: Demonstrate different distributed consensus models like proof of work (PoW) and proof of stake (PoS)
 CO4: Examine the working principle of cryptocurrencies like Bitcoin and Ethereum
 CO5: Evaluate the current cryptocurrency regulations, legal aspects, cryptocurrency exchange, black market and global economy
 CO6: Create blockchain applications in the domain of internet of things, e-governance, land registration, medical record management, domain name service, etc.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question

Department & Section	Submission Link
MCA	https://classroom.google.com/c/NDA2MzM1OTg2OTQw/a/NDU2NTAxMjQ1OTk2/details