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NPTEL (https://swayam.gov.in/explorer?ncCode=NPTEL) » Blockchain and its Applications (course)

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Thank you for taking the Week 1 : Assignment 1.

Week 1 : Assignment 1

Your last recorded submission was on 2025-02-02, 20:56 IST Due date: 2025-02-05, 23:59 IST.

1) ***1 point***

Which of the following statements is true regarding the foundational concepts of blockchain and cryptography?

a) Decentralization in blockchain ensures that a single authority controls the network for higher efficiency.
b) SHA-256 is a cryptographic hash function widely used in blockchain due to its fixed output size and collision resistance.
c) A hash chain is a sequence of cryptographic keys used to decode blockchain data.
d) Cryptographic hash ensures that the blockchain data cannot be read by anyone outside the network.

- ○ a.
- ◉ b.
- ○ c.
- ○ d.

2) ***1 point***

An attacker wants to find a collision in a cryptographic hash function with a 256-bit output. What is the approximate number of hash operations required to succeed?

a) 1×2^{128}
b) 0.75×2^{128}
c) 1×2^{256}
d) 0.5×2^{256}

- ◉ a.

Course outline

- About NPTEL ()
- How does an NPTEL online course work? ()
- Week 0 ()
- Week 1 ()
  - Lecture 1 : The Model of Decentralization (unit?unit=17&lesson=18)
  - Lecture 2 : What is Blockchain ?

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- b.
- c.
- d.

3) ***1 point***

A blockchain network uses SHA-256 for its hashing process. If it takes 10^{-6} seconds to compute a single SHA-256 hash, how long would it take (approximately) to compute 2^{128} hashes for a collision attack?

a) 10^{10} years
b) 10^{15} years
c) 10^{20} years
d) 10^{25} years

- a.
- b.
- c.
- (selected) d.

4) ***1 point***

In a decentralized distributed system with 100 participants, which of the following statements is true regarding trust and communication?

a) At least 50 participants must trust each other for the system to function.
b) A central body governing communication among all 100 participants is mandatory.
c) Participants may or may not trust each other, as the system ensures integrity using cryptographic protocols and agreement through consensus protocols.
d) All the 100 participants must trust each other.

- a.
- b.
- (selected) c.
- d.

5) ***1 point***

A blockchain network achieves an average block generation time of 5 minutes under normal conditions. However, due to scheduled maintenance, the network's hash rate is reduced by 50% for 4 hours daily. If the network operates for 12 hours in total (including the maintenance period), how many blocks will be added to the blockchain?

a) 120
b) 200
c) 216
d) 240

- (selected) a.
- b.
- c.

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○ d.

6) ***1 point***

Where are the transaction logs stored in a blockchain network?

a) In a centralized SQL database.
b) On an immutable ledger controlled by a central authority.
c) In metadata tables on each peer.
d) In the distributed ledger of each peer across the network.

○ a.
○ b.
○ c.
◉ d.

7) ***1 point***

Which of the following describes the **avalanche effect** in a cryptographic hash function?

a) Given the same input, the hash function returns a different hash 99.99% of the time.
b) It takes 10^5 attempts to reverse-engineer the original message from the hash.
c) A small change in the input causes a drastic change in the hash, flipping nearly all the bits.
d) The hash function always returns the same hash for the same input.

○ a.
○ b.
◉ c.
○ d.

8) ***1 point***

Which of the following statements accurately describes a **blockchain**?

a) A centralized database where data is stored on a single server.
b) A distributed ledger where data is stored across multiple nodes and is immutable.
c) A system that only stores cryptocurrency transaction data on a single node.
d) A network that uses a single user to control access and updates to the data.

○ a.
◉ b.
○ c.
○ d.

9) ***1 point***

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Which of the following is/are possible use cases of blockchain technology?

a) Cross-border payments
b) Supply chain management
c) Centralized Anti-money laundering tracking system
d) Maintaining data over a single database server

- [x] a.
- [x] b.
- [ ] c.
- [ ] d.

10) ***1 point***

In a blockchain using **SHA-256**, if the hashes of strings A and B are concatenated and then hashed again, what is the length of the final hash?

a) 256 bits
b) 512 bits
c) 128 bits
d) 1024 bits

- (●) a.
- ( ) b.
- ( ) c.
- ( ) d.

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers