



School: .....Campus: .....

Academic Year: ..... Subject Name: ..... Subject Code: .....

Semester: ..... Program: ..... Branch: ..... Specialization: .....

Date: .....

## Applied and Action Learning

(Learning by Doing and Discovery)

### Name of the Experiment: Hash Your First Block – Blockchain Basics and Setup

#### \*Objectives/Aim :

- The goal is to learn how hashing works in blockchain by actually building a simple blockchain and mining the first block.
- This helps us understand how data is turned into a unique code (a hash) and how blocks are linked together securely.
- If any data is changed, the hash changes too, making tampering easy to detect and helping maintain the trust and integrity of the blockchain.

#### \*Software Used

- Laptop
- <https://andersbrownworth.com/blockchain/block> browser-based learning site for research

#### \*Theory/Concept

- A **blockchain** is a special kind of database made up of a chain of blocks.
- Each **block** is like a container that stores a group of transactions or data in the blockchain.
- Each block has important info like block number, data, timestamp, nonce, and the hash of the previous block
- **Cryptographic Hash Functions** are special mathematical functions that take any input (like a block's data) and turn it into a fixed-length string of characters called a hash. They are one-way, meaning we can't reverse the hash to get the original data.
- **Hashes of Blocks** : When a block's data is put through a cryptographic hash function, it produces a unique hash. This hash acts like the block's digital fingerprint and is used to verify the block's integrity.
- **Mining** is finding a nonce that makes a block's hash meet specific conditions (like leading zeros). It involves trial and error and secures the blockchain by preventing easy block changes.

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*\* As applicable according to the experiment.  
Two sheets per experiment (10-20) to be used.*

## \*Procedure :

### Mine a block on blockchain :

**Step 1 :** The process starts with a verified block, shown by its green color. This block is either the first block (called the "genesis block") or one that was mined earlier. Its hash begins with four zeros (0000f...), meeting the rule for a valid block. At first, the data field in this block is empty with Nonce value 72608.

**Step 2 :** By inserting data (e.g Genesis Block) in the data field we will observe a change in the hash value of the block and the block becoming red which indicates that the block is invalid as it does not start with four 0's

**Step 3 :** In order to make the block a valid one with the inserted new data we need to mine the block which will provide us with a new Nonce. The system will try different Nonce values until it finds one that when combined with the rest of the block's data, produces a valid hash.

**Step 4 :** Finally after mining we get a new Nonce with a valid hash which ultimately creates a valid block in our block chain as indicated with green colour

## \* Implementation Phase: Final Output

**Block:** # 1

**Nonce:** 72608

**Data:**

**Hash:** 0000f727854b50bb95c054b39c1fe5c92e5ebcfa4bcb5dc279f56aa96a365e5a

Mine

**Block:** # 1

**Nonce:** 72608

**Data:** Genesis Block

**Hash:** 250be35ddb1cc1cde27e62f4ff9baeab831f133ede8bec160e89828c9c0675b1

Mine

**Block:** # 1

**Nonce:** 121719

**Data:** Genesis Block

**Hash:** 000095866454aa705404015cec483ef7bf8a3f3dad4976967111c7641b1a5cdb

Mine

## ASSESSMENT

| Rubrics   | Full Mark | Marks Obtained | Remarks |
|---|-----------|----------------|---------|
| Concept   | 10        |                |         |
| Planning and Execution/Practical<br>Simulation/ Programming | 10        |                |         |
| Result and Interpretation                                   | 10        |                |         |
| Record of Applied and Action Learning                       | 10        |                |         |
| Viva  | 10        |                |         |
| <b>Total</b>  | <b>50</b> |                |         |

***Signature of the Student :***

***Name :***

***Regn. No. :***

***Signature of the Faculty :***

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Two sheets per experiment (10-20) to be used***