Roll No: 20BCE204
Course Code and Course Name: 2CSDE93 Blockchain Technology
Practical No. 3
Aim: **To perform thorough study and installation of Anaconda 5 0 1 and Python 3 6 and perform proof of work (consensus mechanism Also, notice the changes in mining rewards and nonce requirement.**

```
//imported hash algorithm from the crypto-js package
const SHA256 = require("crypto-js/sha256");

//created a class to represent a Block
class Block{
  constructor(index, timestamp, data, previousHash){
    this.index = index;
    this.timestamp = timestamp;
    this.data = data;
    this.previousHash = previousHash;
    this.hash = this.generateHash();
    this.nonce = 0;
  }

  mine(difficulty) {
    while (!this.hash.startsWith(Array(difficulty).join("0"))) {
        this.nonce++;
        this.hash = this.generateHash();
    }
  }

  generateHash(){
    return SHA256(this.index + this.timestamp + this.nonce +this.previousHash +
JSON.stringify(this.data)).toString()
  }
}

class Blockchain{
    constructor(){
        this.blockchain = [this.createGenesisBlock()];
        this.difficulty = 6;
    }
    createGenesisBlock(){
```

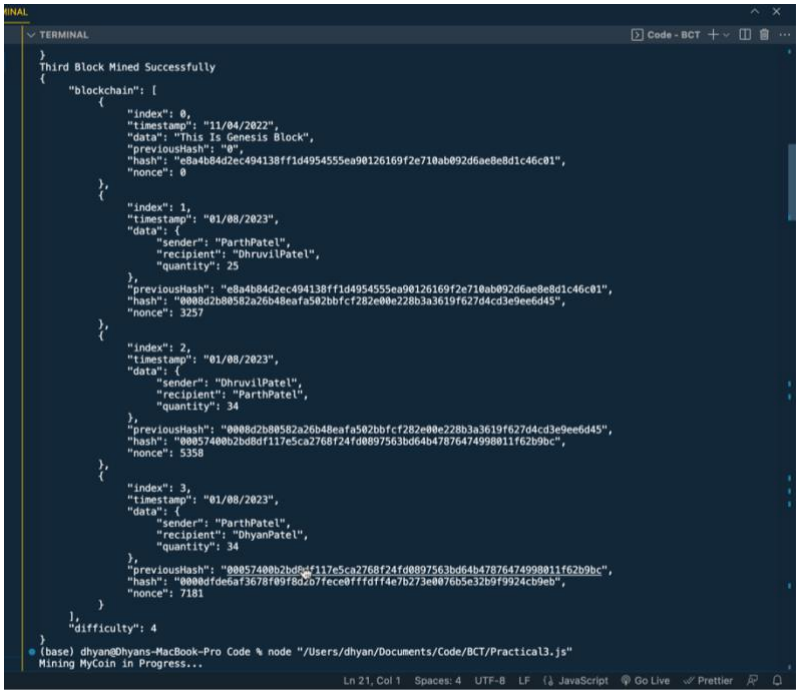
```
        return new Block(0, "11/04/2022", "This Is Genesis Block", "0");
    }
    getTheLatestBlock(){
        return this.blockchain[this.blockchain.length - 1];
    }
    addNewBlock(newBlock){
        newBlock.previousHash = this.getTheLatestBlock().hash;
        newBlock.hash = newBlock.generateHash();
        newBlock.mine(this.difficulty);
        this.blockchain.push(newBlock);
    }
    // testing the integrity of the chain
    validateChainIntegrity(){
        for(let i = 1; i<this.blockchain.length; i++){
            const currentBlock = this.blockchain[i];
            const previousBlock = this.blockchain[i-1];
            if(currentBlock.hash !== currentBlock.generateHash()){
                return false;
            }
            if(currentBlock.previousHash !== previousBlock.hash){
                 return false;
            }
        }
        return true;
    }
}

// Create an instance to test our blockchain
let MyCoin = new Blockchain();
console.log("Mining MyCoin in Progress...");
MyCoin.addNewBlock(
    new Block(1, "08/08/2023", {
        sender: "Dhyan",
        recipient: "Parth",
        quantity: 25
    })
);
console.log("First Block Mined Successfully");
console.log(JSON.stringify(MyCoin, null, 5));
MyCoin.addNewBlock(
```

```
    new Block(2, "08/08/2023", {
        sender: "DhruvilPatel",
        recipient: "ParthPatel",
        quantity: 34
    })
);
console.log("Second Block Mined Successfully");
console.log(JSON.stringify(MyCoin, null, 5));
MyCoin.addNewBlock(
    new Block(3, "08/08/2023", {
        sender: "ParthPatel",
        recipient: "DhyanPatel",
        quantity: 34
    })
);
console.log("Third Block Mined Successfully");
console.log(JSON.stringify(MyCoin, null, 5));
```

Output:

```
(base) dhyan@Dhyans-MacBook-Pro Code % node "/Users/dhyan/Documents/Code/BCT/Practical3.js"
Mining MyCoin in Progress...
First Block Mined Successfully
{
     "blockchain": [
          {
               "index": 0,
               "timestamp": "11/04/2022",
               "data": "This Is Genesis Block",
               "previousHash": "0",
               "hash": "e8a4b84d2ec494138ff1d4954555ea90126169f2e710ab092d6ae8e8d1c46c01",
               "nonce": 0
          },
          {
               "index": 1,
               "timestamp": "01/08/2023",
               "data": {
                    "sender": "ParthPatel",
                    "recipient": "DhruvilPatel",
                    "quantity": 25
               },
               "previousHash": "e8a4b84d2ec494138ff1d4954555ea90126169f2e710ab092d6ae8e8d1c46c01",
               "hash": "0008d2b80582a26b48eafa502bbfcf282e00e228b3a3619f627d4cd3e9ee6d45",
               "nonce": 3257
          }
     ],
     "difficulty": 4
}
Second Block Mined Successfully
{
     "blockchain": [
          {
               "index": 0,
               "timestamp": "11/04/2022",
               "data": "This Is Genesis Block",
               "previousHash": "0",
               "hash": "e8a4b84d2ec494138ff1d4954555ea90126169f2e710ab092d6ae8e8d1c46c01",
               "nonce": 0
          },
          {
               "index": 1,
               "timestamp": "01/08/2023",
               "data": {
                    "sender": "ParthPatel",
                    "recipient": "DhruvilPatel",
                    "quantity": 25
               },
               "previousHash": "e8a4b84d2ec494138ff1d4954555ea90126169f2e710ab092d6ae8e8d1c46c01",
               "hash": "0008d2b80582a26b48eafa502bbfcf282e00e228b3a3619f627d4cd3e9ee6d45",
               "nonce": 3257
          },
          {
```



}
Third Block Mined Successfully
{
"blockchain": [
{
"index": 0,
"timestamp": "11/04/2022",
"data": "This Is Genesis Block",
"previousHash": "0",
"hash": "e8a4b84d2ec494138ff1d4954555ea90126169f2e710ab092d6ae8e8d1c46c01",
"nonce": 0
},
{
"index": 1,
"timestamp": "01/08/2023",
"data": {
"sender": "ParthPatel",
"recipient": "DhruvilPatel",
"quantity": 25
},
"previousHash": "e8a4b84d2ec494138ff1d4954555ea90126169f2e710ab092d6ae8e8d1c46c01",
"hash": "0008d2b80582a26b48eafa502bbfcf282e00e228b3a3619f627d4cd3e9ee6d45",
"nonce": 3257
},
{
"index": 2,
"timestamp": "01/08/2023",
"data": {
"sender": "DhruvilPatel",
"recipient": "ParthPatel",
"quantity": 34
},
"previousHash": "0008d2b80582a26b48eafa502bbfcf282e00e228b3a3619f627d4cd3e9ee6d45",
"hash": "00057400b2bd8df117e5ca2768f24fd0897563bd64b47876474998011f62b9bc",
"nonce": 5358
},
{
"index": 3,
"timestamp": "01/08/2023",
"data": {
"sender": "ParthPatel",
"recipient": "DhyanPatel",
"quantity": 34
},
"previousHash": "00057400b2bd8df117e5ca2768f24fd0897563bd64b47876474998011f62b9bc",
"hash": "0000dfde6af3678f09f8d2b7fece0fffdff4e7b273e0076b5e32b9f9924cb9eb",
"nonce": 7181
}
],
"difficulty": 4
}