| | | | |
|---|---|---|---|
| Course Title: | **Elements of Blockchain Technology** | Semester | I/II |
| **Course Code**: | **BETCK105R/ BETCK205R** | CIE Marks | 50 |
| Course Type (Theory/Practical/Integrated) | Theory | SEE Marks | 50 |
| | | Total Marks | 100 |
| Teaching Hours/Week (L:T:P:S) | 3-0-0-0 | Exam Hours | 03 |
| Total Hours of Pedagogy | 40 hours | Credits | 03 |

**Course Learning Objectives**

CLO1.Explain the fundamentals of blockchain

CLO 2. Understand how blockchain systems work

CLO 3. Discuss the concepts in bitcoin

CLO 4. Demonstrate Ethereum platform

CLO 5. Discuss the blockchain use case

## Module-1:Blockchain Fundamentals(8 hours)

**Blockchain Fundamentals:** Defining Blockchain, Elements of Blockchain, Qualities of Blockchain, Blockchain and Economics, Blockchain Technology, Origins of Bitcoin and Blockchain, Types of Blockchain, Business and Blockchain, Use cases, Ethical issues with Blockchain.

**Applications:** business applications.
**Text Book 1 : Chapter 1: 1.1, 1.2, 1.3,1.4**

**(RBTLevels:L1and L2)**

## Module-2: Storage and Services in Blockchain (8 hours)

**Blockchain Technology:** Blockchain technology stack, monetizing the Blockchain, Blockchain Wallet, Sorting Blocks, Consensus, Blockchain as a Service, IT Use cases for Blockchain-Storage, IPFS, Edge Computing, Web 3.0 and Blockchain, Obstacles in Blockchain.
**Applications:** Blockchain Wallet, cryptocurrency
**Text Book 1 : Chapter 2: 2.1, 2.2, 2.3,2.4, 2.5**
**(RBTLevels:L1and L2)**

## Module-3:Bitcoin and Crypto-assets(8 hours)

**Bitcoin and Crypto-assets**: Introduction to Crypto-assets, Crypto-currencies, Crypto-commodities, Cryptotokens, Bitcoin, Ethereum, Digital Token Exchanges, Financial modelling for cryptocurrencies

**Applications: crypto wallets**
**Text Book 1 Chapter 3: 3.1, 3.2, 3.3, 3.4, 3.5**
**(RBT Levels: L1, L2 and L3)**

## Module-4:Ethereum and Smart Contracts(8 hours)

**Ethereum and Smart Contracts:** Basics of Ethereum, Ethereum Virtual Machine, Ether, Smart Contract, On-chain versus Off-chain versus Side chain, Mining Ethereum

**Applications:** mining etherium currencies

**Chapter 4: 4.1, 4.2, 4.3, 4.4**

**(RBT Levels:L1, L2 and L3)**

## Module-5:Blockchain Use Cases(8 hours)

**Blockchain Use Cases:** Cross-functional Blockchain Use cases – Identity management, Asset Tracking, IoT integration; Functional Area Blockchain Use Cases for Business – Finance, Marketing/Sales.

**Applications:** Insurance, Real Estate, Healthcare.

**Text Book 1 Chapter 5: 5.4, 5.5, 5.6, 5.7**

**(RBT Levels:L2,L3 and L4)**

## Course outcome

**At the end of the course, the student will be able to:**

**CO1:** Demonstrate the application of Blockchain technology in various industrial use cases.

**CO2:** Analyze and evaluate the functionality of Blockchain-based solutions for business applications.

**CO3:** Utilize modern Blockchain tools and platforms, such as Ethereum, to address real-world challenges.

**CO4:** Examine the ethical considerations and responsibilities associated with implementing Blockchain technologies.

**CO5:** Evaluate the societal impact and significance of Blockchain technologies on social security systems.

## Course Assessment and Evaluation Details(both CIE and SEE)

| **Continuous Internal Evaluation: 50 marks** | | | |
|---|---|---|---|
| **Theory Assessment Tool** | **Marks** | **RBT** | **Reduced marks** |
| IAT-1 | 25 | L1& L2 | 25 |
| IAT-2 | 25 | L1,L2 & L3 | |
| Assessment-1(activity based) | 25 | L1,L2 & L3 | 25 |
| Assessment-2(activity based) | 25 | L1,L2 & L3 | |
| **Semester End Examination(SEE):50 marks** | | | |
| **SEE** | **Marks** | | **Reduced marks** |
| Course end examination (Answer any one question from each unit – Internal choice) | 100 | | 50 |

**Activity Based Learning**

**Suggested Activities are:**

1. Seminar
2. Group Discussion
3. Quiz

## Suggested Learning Resources:

**Suggested Learning Resources:**

**Text Book:**

1. Basics of Blockchain – A guide for building literacy in the economics, technology and business of blockchain, Bettina Warburg , Bill Wagner, and Tom Serres, 2019, Animal Ventures LLC, Edition 1.0.

**Reference Books:**

1. Mastering Blockchain – Distributed ledger technology, decentralization and smart contracts, Imran Bashir, 2018, Packt, Second Edition.

## Web links and Video Lectures (e-Resources):

1. http://bitcoinbook.cs.princeton.edu/?_ga=2.8302578.1344744326.1642688462-86383721.1642688462
2. https://nptel.ac.in/courses/106/105/106105184/
3. https://ethereum.org/en/developers/
4. https://developer.ibm.com/components/hyperledger-fabric/tutorials/

**Cos and Pos Mapping(CO-PO mappings are only Indicative)**

| COs | Pos | | | | | | | | | | | | PSO | PSO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 |
| **CO1** | 3 | 3 | 2 | 2 | 3 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 3 | 3 |
| **CO2** | 3 | 3 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 3 |
| **CO3** | 3 | 3 | 3 | 2 | 3 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 3 | 3 |
| **CO4** | 3 | 2 | 0 | 1 | 2 | 2 | 2 | 3 | 0 | 0 | 0 | 2 | 3 | 2 |
| **CO5** | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 1 | 2 | 0 | 2 | 3 | 3 |

Level3-HighlyMapped, Level2-ModeratelyMapped, Level1-LowMapped, Level0-NotMapped