



SARVAJANIK UNIVERSITY
Sarvajani College of Engineering and Technology
Bachelor of Technology



Year: B. Tech II (Semester IV)

Subject Name: Fundamentals of Blockchain

Subject Code: BTEA19455

Type of course: Minor (Group: Blockchain Technology)

Prerequisite (if any): Information Security, Cryptography, Computer Network

Rationale:

- The students should be able to understand a broad overview of the essential concepts of blockchain technology.
- To familiarize students with Bitcoin protocol followed by the Ethereum protocol – to lay the foundation necessary for developing applications and programming.
- Students should be able to learn about different types of blockchain and consensus algorithms.

Teaching and Examination Scheme:

| Teaching Scheme | | | | Theory Marks | | | Practical Marks | | Total |
|-----------------|---|---|---|--------------|-----|-----|-----------------|-----|-------|
| L | T | P | C | TEE | CA1 | CA2 | TEP | CA3 | |
| 3 | 0 | 0 | 3 | 60 | 25 | 15 | 0 | 0 | 100 |

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests) CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

| Sr. No. | Contents | Total Hours |
|---------|--|-------------|
| 1. | Module 1: Basics: The Double-Spend Problem, Byzantine Generals' Computing Problems, Public-Key Cryptography, Hashing, Distributed Systems, Distributed Consensus. | 07 |
| 2. | Module 2: Technology Stack: Blockchain, Protocol, Currency. Bitcoin Blockchain: Structure, Operations, Features, Consensus Model, Incentive Model. | 10 |
| 3. | Module 3 : | 10 |





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| | Ethereum Blockchain: Smart Contracts, Ethereum Structure, Operations, Consensus Model, Incentive Model. | |
| 4. | Module 4 : Tiers of Blockchain Technology: Blockchain 1.0, Blockchain 2.0, Blockchain 3.0, Types of Blockchain: Public Blockchain, Private Blockchain, Semi-Private Blockchain, Sidechains. | 07 |
| 5. | Module 5 : Types of Consensus Algorithms: Proof of Stake, Proof of Work, Delegated Proof of Stake, Proof Elapsed Time, Deposit-Based Consensus, Proof of Importance, Federated Consensus or Federated Byzantine Consensus, Practical Byzantine Fault Tolerance. Blockchain Use Case: Supply Chain Management. | 11 |

Suggested Specification table with Marks (Theory): (For B. Tech only)

| Distribution of Theory Marks | | | | | |
|------------------------------|---------|---------|---------|---------|---------|
| R Level | U Level | A Level | N Level | E Level | C Level |
| 20 | 20 | 10 | 10 | - | - |

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (Revised Bloom’s Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

| Sr no | Title of book /article | Author(s) | Publisher and details like ISBN | Year of publication | Publication Edition |
|-------|---|----------------------|-------------------------------------|---------------------|-------------------------|
| 1 | Essentials of Bitcoin and Blockchain | Kirankalyan Kulkarni | Packt Publishing. | | |
| 2 | Blockchain for Dummies | Tiana Laurence | John Wiley & Sons | 2019 | 2 nd Edition |
| 3 | Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by, | Imran Bashir | Packt Publishing | 2017 | |
| 4 | Blockchain: Blueprint for a New Economy by, Media | Melanie Swan | Shroff Publisher O’Reilly Publisher | 2015 | 1 st Edition |





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|---|--|-----------------------|--|--|--|
| 5 | Mastering Bitcoin: Programming the Open Blockchain | Andreas Antonopoulos. | | | |
|---|--|-----------------------|--|--|--|

Course Outcomes: At the end of the course, students would be able to:

| Sr. No. | CO statements |
|---------|---|
| CO-1 | Explain the basic notion of distributed systems. |
| CO-2 | Use the working of an immutable distributed ledger and trust model that defines blockchain. |
| CO-3 | Illustrate the essential components of a blockchain platform. |

List of Open learning website:

- <https://www.coursera.org/specializations/blockchain>.
- <https://nptel.ac.in/courses/106105184/>
- Introduction to Blockchain Technology and Applications, https://swayam.gov.in/nd1_noc20_cs01/preview