MCAE315: BLOCK CHAIN MANAG3EMENT

Hours/Week: 3 I.A. Marks: 30
Credits: 3 Exam. Marks: 70

Course Learning Objectives: Students will try to learn

1. Basics of block chain management and Fundamentals of the design principles of Bitcoin and Ethereum.
2. Advantages of Block chain over distributed computing.
3. Solutions of soft computing algorithms for optimization.
4. Designing, building and deploying smart contracts and distributed applications.

Course Outcomes: After completing the course, the students will be able to,

CO1: Understand the fundamentals of the design principles of Bitcoin and Ethereum.
CO2: Explain the Simplified Payment Verification protocol.
CO3: Interact with a block chain system by sending and reading transactions.
CO4: Evaluate the solutions of soft computing algorithms for optimization.
CO5: Design build and deploy smart contracts and distributed applications.
CO6: Easily Analyze regulations of crypto currency.
CO7: Evaluate roots of bitcoin and the applications of crypto currency.

UNIT-I

9 Hrs.

Basics of Block Chain Management, Distributed Database, Two General Problem, Byzantine General Problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete, Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

UNIT-II

9 Hrs.

Blockchain: Introduction, Advantage over Conventional Distributed Database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public Blockchain.

UNIT-III

9 Hrs.

Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate. Crypto currency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin.

UNIT-IV

9 Hrs.

Crypto Currency Regulations: Stakeholders, Roots of Bit Coin, Legal Aspects-Crypto Currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain.

REFERENCE BOOKS:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press, 2016.
2. Antonopoulos, Mastering .Bitcoin: Unlocking Digital Cryptocurrencies
3. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
4. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger," Yellow paper.2014.
5. Nicola Atzei, Massimo Bartoletti, and TizianaCimoli, A survey of attacks on Ethereum smart contracts.