22CS3E6: BLOCK CHAIN TECHNOLOGY

Course Name	Block Chain Technology			L	T	P	C	CIA	SEE	TM
Course Code	22CS3E6			4	0	0	4	30	70	100
Year of Introduction: 2021	Year of Offering: 2022	Year of Revision: No Revision		Percentage of Revision: 100						
L-Lecture, T-Tutorial, P-Practical, C-Credits, CIA-Internal Marks, SEE-External Marks, TM-Total Marks										

Course Description and Purpose: This course provides a comprehensive overview of blockchain technology, covering its necessity, operational processes, limitations, Bitcoin decentralization, Bitcoin and Ethereum storage and usage, smart contracts, real-world blockchain applications, mining consensus mechanisms, and security considerations.

Course Objectives: Block Chain Technology is a course that illustrates Block Chain Need, Working Process of Block Chain, Limitations of Block Chain Technology, Decentralization of Bitcoin, Storage and usage of Bitcoins, Ethereum and Smart Contracts, Block Chain Applications, Mining Consensus and Bitcoin Security.

Specific objectives include:
1. To understand basic concepts of *Blockchain* & *Limitations*.
2. To learn *How Bitcoin Achieves Decentralization*.
3. To familiar with *How to Store Bitcoins* and *How to Use Bitcoins*.
4. To know *Ethereum and Smart Contracts* and *Blockchain Applications*.
5. To gain knowledge on *Mining Consensus* and *Bitcoin Security.*

Course Outcomes:
Upon successful completion of the course

CO1: Students will have a comprehensive understanding of block chain technology, including its need in addressing core problems, the workings of public and private ledgers, the mechanics of block chain, such as hashing data, user account protection, transaction authorization, and data store security, as well as the limitations of block chain technology and potential avenues for innovation and improvement in the field.

CO2: Students will possess a thorough understanding of how Bitcoin achieves decentralization, including the distinctions between centralized and decentralized systems, the concept of distributed consensus, the mechanics of Bitcoin transactions and scripts, and the role of Bitcoin blocks in maintaining a decentralized ledger, enabling them to grasp the fundamental principles of block chain technology and crypto currency.

CO3: Students will be well-equipped to store and use Bitcoins effectively, understanding various storage methods, including local storage, hot and cold storage, and key management techniques. They will also gain proficiency in using Bitcoins through online wallets, exchanges, payment services, and currency exchange markets, enabling them to navigate the crypto currency ecosystem securely and efficiently.

CO4: Students will have a comprehensive understanding of Ethereum, smart contract programming, and various block chain applications, including Name coin, gas incentives, security considerations, data structures in Ethereum, and applications such as colored coins, Counterparty, payment channels, and state channels, equipping them to design and implement block chain-based solutions for diverse use cases.

CO5: Students will have a deep understanding of mining consensus in block chain networks, including decentralized consensus mechanisms, transaction verification, block mining, and consensus security considerations. Additionally, students will be well-versed in Bitcoin security principles and user best practices for securing crypto currency assets, enabling them to engage with block chain technologies securely and effectively.

UNIT-I (12 Hours)

Why Blockchain is Need: Discovering the Core Problem - Public Ledgers - Block in Blockchain - Public versus Private Blockchain.

How Blockchain Works: Planning the Blockchain - Hashing Data - Identifying & Protecting user Accounts - Authorizing Transactions - Using Data Store - Protecting Data Store - Choosing Transaction History - Paying for Integrity.

Limitations: Seeing the Limitations - Reinventing the Block Chain.

UNIT-II (12 Hours)

How Bitcoin Achieves Decentralization: Centralized versus Decentralization - Distributed Consensus - Bitcoin Transactions - Bitcoin Scripts - Applications of Bitcoin Scripts - Bitcoin Blocks.

UNIT-III (12 Hours)

How to Store Bitcoins: Simple Local Storage - Hot and Cold Storage - Splitting and Sharing Keys.

How to Use Bitcoins: Online Wallets and Exchanges - Payment Services - Transaction Fees - Currency Exchange Markets.

UNIT-IV (12 Hours)

Ethereum and Smart Contracts: Smart Contract Programming Model, Namecoin in Ethereum, Gas Incentives and Security, Data Structures in Ethereum.

Blockchain Applications: Applications from Building Blocks, Colored Coins, Counterparty, Payment Channels and State Channels, Routed Payment Channels.

UNIT-V (12 Hours)

Mining Consensus: Decentralized Consensus - Independent Verification of Transactions - Mining Nodes - Aggregating Transactions into Blocks - Mining the Block - Validating a New Block - Assembling and Selecting Chains of Blocks - Consensus Attacks.

Bitcoin Security: Security Principles - User Security Best Practices.

Prescribed Text Book			
	Author	Title	Publisher
1	Daniel Drescher	Blockchain Basics	A Press, Second Edition, 2017
2	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder	Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction.	Princeton University Press, 2016, Second Edition
3	Andreas M Antonopoulos	Mastering Bitcoin: Unlocking Digital Crypto Currencies	ORELLY,2015

Reference Text Book		
	Author	Title	Publisher
1	Melanie	Blockchain : Blue Print for New Economy	ORELLY,2015

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE
(An Autonomous College in the jurisdiction of Krishna University)
M.Sc.(Computer Science), Third Semester
Course Name: Block Chain Technology
Course Code: 22CS3E6
(w.e.f admitted batch 2022-23)

Time: 3 Hours   Max Marks: 70
SECTION-A
Answer ALL Questions   **(5×4=20Marks)**

1. (a) What is reinventing the Block Chain? (CO1,L1)
                                          (or)
   (b) How to use Data Store? (CO1,L1)

2. (a) Explain Block in Block Chain. (CO2,L2)
                                          (or)
   (b) Explain Script. (CO2,L2)

3. (a) What is Splitting? (CO3,L1)
                                          (or)
   (b) What is Transaction? (CO3,L1)

4. (a) Explain Payment Channel. (CO4,L2)
                                          (or)
   (b) Explain Colored Coin. (CO4,L2)

5.(a) What is Mining Node? (CO5,L1)
                                          (or)
   (b) What are Security Principles? (CO5,L1)

SECTION-B
Answer Five Questions Choosing One Question from Each Unit.
All Questions Carry Equal Marks.   **(5×10=50Marks)**

6. (a) Explain Public Ledger, Public & Private Block Chains. (CO1,L2)
                                          (or)
   (b) Explain identifying and protecting User Accounts and Authorize Transactions. (CO1,L2)

7. (a) Apply Centralized & Decentralized in Bitcoin in applications. (CO2,L3)
                                          (or)
   (b) Build Bitcoin Scripts and their Applications. (CO2,L3)

8. (a) What are Hot & Cold Storages?. Explain in detail. (CO3,L1)
                                          (or)
    (b) How bitcoins are used in online Wallets & Exchanges and payment services? (CO3,L1)

9.   (a) Explain Smart Contract Programming Model & Data Structures in Ethereum.(CO4,L2)
                                          (or)
    (b) Write about Applications from Building Blocks and Colored Coins.(CO4,L2)

10. (a) Explain Mining, Validating, Assembling and Selecting Chains of blocks. (CO5,L5)
                                          (or)
    (b) Explain the Security Principles in Bitcoin Security.(CO5,L5)