Department: Information Science and Engineering	Course Type: Core
Course Title: Blockchain Essentials & DApps	Course Code: 14ISE745
L-T-P: 4-0-1	Credits: 04
Total Contact Hours: 52 hrs	Duration of SEE: 3 hrs
SEE Marks: 50	CIE Marks: 50

Course Outcomes:
- Student will be able to illustrate the Blockchain terminologies with its applications.- L2
- Student will be able to analyze the working principles of Blockchain   -L2
- Student will be Able to comprehend the principles and methodologies used in Bitcoin –L2
- Student will be Able to create Ethereum Network, Wallets, Nodes, Smart contract & DApps – L4
- Student will be Able to develop Blockchain Based Application Architecture using Hyperledger –L3
- Student will be Able to illustrate the Smart Contract Lifecycle –L2

Teaching Methodology:
- Black board teaching/Power Point Presentations
- Hands-on Training
- Course Projects.

. Assessment Methods:
- Three internals, 30Marks each will be conducted and the Average of best of two will be taken.
- Rubrics evaluation for the Course Project will be conducted for 20 marks.
- Final examination, of 100 Marks will be conducted and will be evaluated for 50 Marks.

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
CO1	3													2
CO2	3	2												2
CO3	3	2												2
CO4	2	2	3		2		2		2	2		2		2
CO5	2	2	3		2		2		2	2		2		2
CO6	3													2
14IS71	3	2	3		2		2		2	2		2		2

Course Content

UNIT-1   10Hours

Distributed systems, CAP theorem, Byzantine Generals problem, Consensus. The history of blockchain, Introduction to blockchain, Various technical definitions of blockchains, Generic elements of a blockchain, Features of a blockchain, Applications of blockchain technology, Tiers of blockchain technology, Consensus in blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain

UNIT-II   11 Hours

Decentralization using blockchain, Methods of decentralization, Blockchain and full ecosystem decentralization, Smart contract, Decentralized organizations, Decentralized autonomous organizations, Decentralized autonomous corporations, Decentralized autonomous societies Decentralized applications, Platforms for decentralization,

Cryptographic primitives : Symmetric cryptography , Asymmetric cryptography , Public and private keys Hash functions: Compression of arbitrary messages into fixed length digest,Easy to compute, Pre-image resistance, Second pre-image resistance,Collision resistance,Message Digest (MD),Secure Hash Algorithms (SHAs), Merkle trees, Patricia trees, Distributed hash tables (DHTs), Digital signatures, Elliptic Curve Digital signature algorithm (ECDSA)

UNIT-III   10Hours

Bitcoin, Bitcoin definition, Transactions, The transaction life cycle, The transaction structure, Types of transaction, The structure of a block , The structure of a block header, The genesis block, The bitcoin network, Wallets, Smart Contracts-History, Definition, Ricardian contracts, Smart contract templates, Oracles, Smart Oracles, Deploying smart contracts on a blockchain, The DAO

UNIT-IV   11Hours

Ethereum 101, Introduction, Ethereum clients and releases, The Ethereum stack, Ethereum blockchain, Currency (ETH and ETC), Forks, Gas, The consensus mechanism, The world state, Transactions, Contract creation transaction, Message call transaction, Elements of the Ethereum blockchain , Ethereum virtual machine (EVM), Accounts, Block, Ether, Messages, Mining, The Ethereum network

Hands-on: Clients and wallets -Geth

UNIT-V   10Hours

Hyperledger, Hyperledger as a protocol, Fabric, Hyperledger Fabric, Sawtooth lake, Corda

TEXTBOOKS

1. Imran Bashir. "Mastring BlockChain", Packt

REFERENCEBOOKS

1. Mastering Bitcoin: Programming the Open Blockchain Paperback – 2017
by Andreas M. O'rielly