RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

CSE-Artificial Intelligence and Machine Learning/ Artificial Intelligence and Machine Learning, VIII-Semester
AL 802(A) Block Chain Technologies

Course Objectives:
The objective of this course is to provide conceptual understanding of how block chain technology can be used to innovate and improve business processes. The course covers the technological underpinning of block Chain operations in both theoretical and practical implementation of solutions using block Chain technology.

Unit I Introduction: Overview of Block chain, Public Ledgers, Bitcoin, Smart Contracts, Block ina Block chain, Transactions, Distributed Consensus, Public vs Private Block chain, UnderstandingCryptocurrency to Block chain, Permissioned Model of Block chain, Overview of Securityaspects of Block chain; Basic Crypto Primitives: Cryptographic Hash Function, Properties of ahash function, Hash pointer and Merkle tree, Digital Signature, Public Key Cryptography, A basic
cryptocurrency

Unit II Understanding Block chain with Crypto currency: Bitcoin and Block chain: Creation ofcoins, Payments and double spending, Bitcoin Scripts, Bitcoin P2P Network, Transaction inBitcoin Network, Block Mining, Block propagation and block relay.Working with Consensus in Bitcoin: Distributed consensus in open environments, Consensus in aBitcoin network, Proof of Work (PoW) – basic introduction, HashCashPoW, Bitcoin PoW,Attacks on PoW and the monopoly problem, Proof of Stake, Proof of Burn and Proof of Elapsed Time, The life of a Bitcoin Miner, Mining Difficulty, Mining Pool.

Unit III Understanding Block chain for Enterprises: Permissioned Block chain: Permissionedmodel and use cases, Design issues for Permissioned block chains, Execute contracts, Statemachine replication, Overview of Consensus models for permissioned block chain- Distributedconsensus in closed environment, Paxos, RAFT Consensus, Byzantine general problem,Byzantine fault tolerant system, Lamport-Shostak-Pease BFT Algorithm, BFT overAsynchronous systems.

Unit IV Enterprise application of Block chain: Cross border payments, Know Your Customer(KYC), Food Security, Mortgage over Block chain, Block chain enabled Trade, We Trade –Trade Finance Network, Supply Chain Financing, and Identity on Block chain

Unit V Block chain application development: Hyperledger Fabric- Architecture, Identities andPolicies, Membership and Access Control, Channels, Transaction Validation, Writing smartcontract using Hyperledger Fabric, Writing smart contract using Ethereum, Overview of Rippleand Corda.

References:
1. Melanie Swan, "Block Chain: Blueprint for a New Economy", O'Reilly, 2015
2. Josh Thompsons, "Block Chain: The Block Chain for Beginners- Guide to Block chain
Technology and Leveraging Block Chain Programming"
3. Daniel Drescher, "Block Chain Basics", Apress; 1stedition, 2017
4. Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna Publishing House, Delhi.
5.Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology, Decentralization and
Smart Contracts Explained", Packt Publishing
6. Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts
for Ethereum and Block Chain", Packt Publishing
7. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman
Ramakrishna, "Hands-On Block Chain with Hyperledger: Building Decentralized Applications
with Hyperledger Fabric and Composer", Import, 2018

Course Outcomes:
After the completion of this course, the students will be able to:
1. Understand block chain technology
2. Acquire knowledge of crytocurrencies