SHORT SYLLABUS

BCSE324L Foundations of Blockchain Technology (3-0-0-3)

Foundations of Blockchain - Distributed Ledger Technology - Public and Private Ledgers - Practitioner Perspective: Keyless Technologies, Transparency as a Strategic Risk - Anatomy of a Smart Contracts - Decentralized Organization - Autonomous Organizations: Aragon, DAOstack - Blockchain Ecosystem - Components in Blockchain Ecosystem - Blockchain Protocols - High Performance Computing - Blockchain storage of Integrity Data.

BCSE324L	FOUNDATIONS OF BLOCKCHAIN TECHNOLOGY	L	T	P	C
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Pre-requisite	**NIL**	**Syllabus version**			
		1.0			

Course Objectives

1. To understand building blocks of Blockchain.
2. To significance of Distributed Ledger Technology and Smart Contract.
3. To exploit applications of Blockchain in real world scenarios and their impacts.

Course Outcomes

After completion of this course, the student shall be able to:

1. Understand Blockchain ecosystem and its services in real world sceneries
2. Apply and Analyze the requirement of Distributed Ledger Technology and Smart Contract
3. Design and Demonstrate end-to-end decentralized applications
4. Acquaint the protocol and assess their computational requirements

Module:1	**Foundations of Blockchain**	**7 hours**

Blockchain Architecture – Challenges – Applications – Blockchain Design Principles -The Blockchain Ecosystem - The consensus problem - Asynchronous Byzantine Agreement - AAP protocol and its analysis - peer-to-peer network – Abstract Models - GARAY model - RLA Model - Proof of Work (PoW) - Proof of Stake (PoS) based Chains - Hybrid models.

Module:2	**Distributed Ledger Technology**	**6 hours**

Origin of Ledgers – Types and Features of Distributed Ledger Technology (DLT) - Role of Consensus Mechanism - DLT Ecosystem - Distributed Ledger Implementations – Blockchain - Ethereum - Public and Private Ledgers – Registries – Ledgers - Practitioner Perspective: Keyless Technologies, Transparency as a Strategic Risk, Transparency as a Strategic Asset, Usage of Multiple IDs - Zero Knowledge Proofs - Implementation of Public and Private Blockchain

Module:3	**Smart Contracts**	**5 hours**

Anatomy of a Smart Contracts - Life Cycle - Usage Patterns - DLT-based smart contracts - Use Cases: Healthcare Industry and Property Transfer.

Module:4	**Decentralized Organization**	**5 hours**

Decentralization versus Distribution - Centralized-distributed (Ce-Di) organizations - Decentralized-distributed (De-Di) organizations - Decentralized Autonomous Organizations: Aragon, DAOstack, DAOhaus and Colony.

Module:5	**Types of Blockchain Ecosystem**	**7 hours**

One-Leader Ecosystem - Joint Venture or Consortia Ecosystems - Regulatory Blockchain Ecosystems - Components in Blockchain Ecosystem: Leaders, Core Group, Active Participants, Users, Third-Party Service Providers - Governance for Blockchain Ecosystems.

Module:6	**Blockchain Protocols**	**6 hours**

Ethereum tokens – Augur - Golem - Understanding Ethereum tokens - App Coins and Protocol Tokens - Blockchain Token Securities Law Framework - Token Economy - Token sale structure - Ethereum Subreddit.

Module:7	**High Performance Computing**	**7 hours**

Integrity of High Performance Systems - Data Provenance - Cluster Construction and Deployment - Mock Workload - Blockchain Software Evaluation - Blockchain storage of Integrity Data.

Module:8	**Contemporary Issues**	**2 hours**
	Total Lecture hours:	**45 hours**

Text Book

1. Dhillon, V., Metcalf, D., and Hooper, M, Blockchain enabled applications, 2017, 1st

	Edition, CA: Apress, Berkeley.		
Reference Books			
1.	Diedrich, H., Ethereum: Blockchains, digital assets, smart contracts, decentralized autonomous organizations, 2016, 1st Edition, Wildfire publishing, Sydney.		
2.	Wattenhofer, R. P, Distributed Ledger Technology: The Science of the Blockchain (Inverted Forest Publishing), 2017, 2nd Edition, Createspace Independent Pub, Scotts Valley, California, US.		
Mode of Evaluation: CAT, written assignment, Quiz, FAT			
Recommended by Board of Studies	04-03-2022		
Approved by Academic Council	No. 65	Date	17-03-2022