BCSE326L	BLOCKCHAIN ARCHITECTURE DESIGN	L	T	P	C
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Pre-requisite	**NIL**	**Syllabus version**			
		1.0			

Course Objectives

1. To provide the knowledge on Blockchain architecture.
2. To understand the design of Blockchain transaction and security issues.
3. To study about various use Cases in Blockchain.

Course Outcome

After completion of this course, the student shall be able to:
1. Understand the requirements of the fundamentals of Blockchain.
2. Identify and apply the concept of Bitcoin.
3. Recognize the underlying technology of transactions, blocks and proof-of-work.
4. Gain a deep insight into Bitcoin network, Bitcoin miners and Bitcoin transactions.
5. Design and explore the applications of Blockchain.

Module:1	**Fundamentals of Blockchain**	**6 hours**

Blockchain: Importance and features – Layers of Blockchain: application layer, execution layer, semantic layer, propagation layer, consensus layer – Types of Blockchain – Blockchain in practical use today – Blockchain governance challenges – Blockchain technical challenges.

Module:2	**Blockchain for Enterprise**	**6 hours**

Blockchain Components and Concepts - Block Header and Identifiers - Linking Blocks in the Blockchain - Mining and Consensus: Aggregating transactions into Blocks - Mining the Block - Validating and Assembling of Blocks, Selecting Chains of Blocks.

Module:3	**Transactions and Bitcoin Network**	**6 hours**

Transactions: Lifecycle, Structure, Inputs and Outputs, Standard Transactions - Bitcoin Network: Network discovery for a new node, Block propagation.

Module:4	**Bitcoin Client**	**8 hours**

Consensus in Bitcoin: Proof of Work (PoW), Mining the Block, Changing the Consensus Rules - Bitcoin Core: Bitcoin core application programming interface, running a bitcoin core node, Alternative clients, libraries and toolkits - Bitcoin Addresses: Implementing Keys and Addresses in Python – Wallets.

Module:5	**Security and privacy practices**	**6 hours**

Security Architecture principles - Technical and inherent risks of the blockchain technology - Attacks on Privacy: Blockchain and non-blockchain based Attacks - Risks and Limitations of Blockchain – User security best practices: physical bitcoin storage, hardware wallets, balancing risk, diversifying risk, multi signature and governance.

Module:6	**Blockchain Architecture and Applications**	**6 hours**

Design methodology for blockchain applications: blockchain application templates, blockchain application development – Ethereum – Solidity - Deploying a sample application: Blockchain and betting – Colored coins – Counterparty.

Module:7	**Blockchain Use Cases**	**5 hours**

Blockchain in Financial Software and Systems - Supply chain and logistics monitoring - Music royalties tracking - Advertising insights - Blockchain implementation for Land Records - Digital content publishing and selling - Digital Supply chain - Medical Record Management System

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

Text Book(s)

1. Bikramaditya Singhal, Gautam Dhameja, Priyansu Sekhar Panda, Beginning Blockchain, A Beginner's Guide to Building Blockchain Solutions, 2018, 1st edition, Apress, New York.
2. Joseph J. Bambara, Paul R. Allen, Blockchain: a practical guide to developing business,

	law and technology solutions, 2018, 1st edition, McGraw-Hill publication, New York.		
Reference Books			
1.	Swan Melanie, Blockchain: Blueprint for a new economy, 2015, 1st edition, O'Reilly Media, United States.		
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