Uka Tarsadia University

B. Tech.
CSE / CSE (AI&ML) / CSE (CC) / CSE (CS) / CE / CE (SE) / IT
Semester VI

Program Elective -IV
BLOCKCHAIN TECHNOLOGIES
IT5053

Effective from December-2024

Syllabus version: 1.00

Subject Code	Subject Title
IT5053	**Blockchain Technologies**

Teaching Scheme				Examination Scheme			
Hours		**Credits**		**Theory Marks**		**Practical Marks**	**Total Marks**
Theory	Practical	Theory	Practical	Internal	External	CIE	
3	0	3	0	40	60	0	100

Objectives of the course:
- To understand the basic concepts of Blockchain fundamentals.
- To understand the concept of Smart Contracts in Blockchain technologies.
- To explore Legal and Governance Use Cases in Blockchain technologies.

Course outcomes:
 Upon completion of the course, the student shall be able
to, CO1: Understand the basic concepts of Blockchain
technologies.CO2: Analyse business use cases in Blockchain
technologies.
CO3: Describe the technology use cases in Blockchain technologies.
CO4: Illustrate legal and governance use cases in Blockchain
technologies.CO5: Understand Blockchain Challenges in Blockchain
technologies.
CO6: Explore recent trends in the field of Blockchain.

Sr. No.	Topics	Hours
	Unit – I	
1	**Introduction to Blockchain:** Introduction to Blockchain, Types of Blockchain– Public Blockchains, Consortium Blockchain, Private Blockchain, Blockchain implementations – Bitcoin, Namecoin, Ripple, Ethereum, Blockchain collaborative implementations – Hyperledger, Corda, Blockchain in practical use.	6
	Unit – II	
2	**Business Use Cases:** Currency and Tokens – Crypto currency, Digital tokens, Financial services use cases – Know Your Customer (KYC) use case, Asset management settlement use case, Insurance claims processing use case, Trade finance (supply chain) use case, Global payments use case, Smart property, Transferring ownership of smart property, Using smart property as collateral, Smart contracts on the Blockchain – The trust problem, Blockchain details.	9

	Unit – III	
3	**Technology Use Cases:** Web Versions 1 and 2, Web 3.0, Distributed storage systems – Interplanetary file system, Swarm, Storj, Distributed computation, Golem – Zennet, Decentralized communications – Existing decentralized communications, Whisper.	8
	Unit – IV	
4	**Legal and Governance Use Cases:** Blockchain changes the legal landscape, The beginning of autonomous law – smart contract, Smart contract design example, Decentralized autonomous organizations.	8
	Unit – V	
5	**Blockchain Challenges:** Blockchain governance challenges – Bitcoinblocksize debate, Blockchain technical challenges – Bugs in the core code, Denial-of-Service attacks, Security in smart contracts, Scaling, Sharding.	8
	Unit – VI	
6	**Recent Trends in the field of Blockchain:** Blockchain interoperability, IoT with Blockchain infrastructure, Tokenization of assets, The rise of NFTs, Metaverse, Blockchain-as-a-Service (BaaS), Blockchain in financial service, Healthcare, Media and entertainment, Government and retail.	6

Text Book:
1. Joseph J. Bambara and Paul R. Allen, "Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions", McGraw-Hill Education.

Reference Books:
1. Bikramaditya Singhal, Gautam Dhameja, and Priyansu Sekhar Panda, "Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions Book", Apress.
2. Vikram Dillon, David Metcalf, Max Hooper, "Blockchain Enabled Applications: Understand the Blockchain Ecosystem and How to Make it Work for You", Apress.
3. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained", 2nd Edition, Packt.

Course objectives and Course outcomes mapping:
● To understand the basic concepts, technology use case and business use case of Blockchain technologies: CO1, CO2, and CO3
● To understand legal, governance use case and Challenges in Blockchain technologies: CO4 and CO5
● To understand advanced technology in field of Blockchain: CO6

Course units and Course outcomes mapping:

Unit No.	Unit Name	Course Outcomes					
		CO1	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
1	Introduction to Blockchain	✓					
2	Business Use Cases		✓				
3	Technology Use Cases			✓			
4	Legal and Governance Use Cases				✓		
5	Blockchain Challenges					✓	
6	Recent trends in the field of Blockchain						✓

Programme outcomes:

PO 1: Engineering knowledge: An ability to apply knowledge of mathematics, science, and engineering.

PO 2: Problem analysis: An ability to identify, formulates, and solves engineering problems.

PO 3: Design/development of solutions: An ability to design a system, component, or process to meet desired needs within realistic constraints.

PO 4: Conduct investigations of complex problems: An ability to use the techniques, skills, and modern engineering tools necessary for solving engineering problems.

PO 5: Modern tool usage: The broad education and understanding of new engineering techniques necessary to solve engineering problems.

PO 6: The engineer and society: Achieve professional success with an understanding and appreciation of ethical behavior, social responsibility, and diversity, both as individuals and in team environments.

PO 7: Environment and sustainability: Articulate a comprehensive world view that integrates diverse approaches to sustainability.

PO 8: Ethics: Identify and demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.

PO 9: Individual and team work: An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give/receive clear instructions.

PO 11: Project management and finance: An ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: A recognition of the need for, and an ability to engage in life-long learning.

Programme outcomes and Course outcomes mapping:

Programme Outcomes	Course Outcomes					
	CO1	CO2	CO3	CO4	CO5	CO6
PO1	✓	✓	✓			
PO2				✓	✓	
PO3	✓	✓	✓			
PO4				✓		
PO5						✓
PO6				✓		✓
PO7	✓	✓	✓			
PO8						✓
PO9					✓	✓
PO10			✓	✓		
PO11		✓			✓	
PO12						✓