DEPARTMENT OF COMPUTER SCIENCE ENGINEERING
(CYBER SECURITY)

Curriculum and Syllabus for Minor Degree Programme

Name of the Minor Degree	**Blockchain and Cyber Security**
Minor Degree Offering Department	**Cyber Security**
Eligible Departments	**All branches except Cyber Security**

Sl. No.	Course Category	Course Code	Course Title	L	T	P	Credits
1	MD	U23MDCB01	Fundamentals of blockchain	2	0	2	3
2	MD	U23MDCB02	Blockchain architecture design	3	0	0	3
3	MD	U23MDCB03	Cybersecure Blockchain Performance	2	0	2	3
4	MD	U23MDCB04	Resilient Business with Blockchain	3	0	0	3
5	MD	U23MDCB05	Secure Fintech Ecosystems	3	0	0	3
6	MD	U23MDCB06	Blockchain And Cryptocurrency	2	0	2	3
						TOTAL CREDITS	**18**

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U23MDCB01	FUNDAMENTALS OF BLOCKCHAIN	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To comprehend and analyze the basic concepts of blockchain.
- To demonstrate the blockchain technologies and mechanisms.
- To apply blockchain technologies in financial applications.

UNIT I **BASICS OF BLOCKCHAIN** **6**

Distributed Database, Two General Problem, Byzantine General Problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, and Zero Knowledge Proof.

UNIT II **TECHNOLOGY STACK** **6**

Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.

UNIT III **DISTRIBUTED CONSENSUS** **6**

Nakamoto consensus Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

UNIT IV **CRYPTOCURRENCY** **6**

History, Distributed Ledger Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin.

UNIT V **CRYPTOCURRENCY REGULATION** **6**

Stakeholders, Roots of Bitcoin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy. Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.

30 PERIODS

PRACTICAL EXCERCISES:

1. Creating and Building Up Bitcoin Wallet, Namecoin.
2. Ethereum Wallet.
3. Building a Private Ethereum Network and Deploying Smart Contract.
4. Ethereum Smart Contract.
5. Creating and Building Up Crypto Token.
6. Creating a Business Network using Hyperledger.
7. Building and Deploying multichain private Blockchain.

30 PERIODS

30 PERIODS

TOTAL: 60 PERIODS

TEXTBOOKS

1 Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction",1st Edition, Princeton University Press, 2016.

2 Kumar Saurabh, Ashutosh Saxena, "Blockchain Technology: Concepts and Applications", 1st Edition, John Wiley & Sons, 2020.

REFERENCES:

1 Tiana Laurence, "Blockchain for Dummies", 2nd Edition John Wiley & Sons, 2019.

2 Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger", 1st Edition Yellow paper, 2014.

3 Imran Bashir, "Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and Popular Blockchain framework", 1st Edition Packt Publishing, 2017.

ONLINE RESOURCES:

1 https://www.coursera.org/specializations/blockchain.

2 https://nptel.ac.in/courses/106105184/

3 https://swayam.gov.in/nd1_noc20_cs01/preview 4

COURSE OUTCOMES:

Upon the completion of the course, the students will be able to

CO1 Explain the core principles of blockchain.

CO2 Describe the blockchain network structures, consensus mechanisms, and the lifecycle of blockchain applications.

CO3 Analyze various consensus algorithms and security implications.

CO4 Describe the history and functioning of cryptocurrencies like Bitcoin and Ethereum.

CO5 Explain the legal, economic, and regulatory aspects of cryptocurrency, assess its societal impacts.

CO-PO-PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	-	-	-	-	-	-	-	-
CO2	2	2	1	1	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	2	2	2	1	-	-	-	-	-	-	-	-
CO5	2	2	2	1	-	-	-	-	-	-	-	1

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U23MDCB02	BLOCKCHAIN ARCHITECTURE DESIGN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To comprehend the foundational concepts of blockchain architecture, including and consensus protocols.
- To develop working knowledge of Hyperledger Fabric, including its components and blockchain in trade.
- To Analyze the role of blockchain in government systems.

UNIT I **ARCHITECTURE** **9**

Digital Money to Distributed Ledgers, Design Primitives: Protocols, Security, Consensus, Permissions, Privacy. Blockchain Architecture and Design: Basic crypto primitives: Hash, Signature,) Hashchain to Blockchain, Basic consensus mechanisms.

UNIT II **CONSENSUS** **9**

Requirements for the consensus protocols-Proof of Work (PoW)-Scalability aspects of Blockchain consensus protocols Permissioned-Blockchains: Design Goals-Consensus protocols for Permissioned Blockchains.

UNIT III **HYPERLEDGER FABRIC** **9**

Decomposing the consensus process-Hyperledger fabric components-Chaincode Design and Implementation. Beyond Chaincode: fabric SDK and Front End, Hyperledger composer tool.

UNIT IV **FINANCIAL SOFTWARE AND SYSTEMS** **9**

Blockchain in Financial Software and Systems (FSS): Settlements, KYC-Capital Markets-Insurance- Blockchain in trade/supply chain: Provenance of goods-visibility-trade/supply chain finance-invoice management discounting.

UNIT V **BLOCKCHAIN CRYPTOGRAPHY** **9**

Blockchain for Government: Digital identity-land records and other kinds of record keeping between government entities-public distribution system social welfare systems. Blockchain Cryptography- Privacy and Security on Blockchain.

TOTAL: 45 PERIODS

TEXTBOOKS

1 Udit Agarwal, Vinay Rishiwal," Blockchain Architecture Design", 1st Edition, S.K. Kataria & Sons, 2024.

2 Imran Bashir, "Mastering Blockchain: Inner workings of blockchain, from cryptography and decentralized identities, to DeFi, NFTs and Web3", 4th Edition, Packt Publishing Ltd, 2023.

REFERENCES

1 Chris Burniske, Jack Tatar," Cryptoassets: The Innovative Investor's Guide to Bitcoin and Beyond: Theory and Politics of Ambiguity", Tata McGraw Hill, 2017.

2 Melanie Swa, "Block chain: Blueprint for a new economy", 1st Edition, O'Reilly Media, 2015.

3 Elad Elrom, "The Blockchain Developer: A Practical Guide for Designing, Implementing, Publishing, Testing, and Securing Distributed Blockchain-based Projects ", 1st Edition, Apress Publications, 2019.

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ONLINE RESOURCES:

1 https://onlinecourses.swayam2.ac.in/aic21_ge01
2 https://www.blockchain.com/
3 https://www.coursera.org/specializations/blockchain

COURSE OUTCOMES:

Upon the completion of the course, the students will be able to

CO1 Describe the basic understanding of Blockchain architecture along with its primitive.
CO2 Explain the requirements for basic protocol along with scalability aspects.
CO3 Design the consensus process using both frontend and backend.
CO4 Apply Blockchain techniques for different use cases like Finance, Trade Supply and Government activities.
CO5 Analyze blockchain-based solutions for secure and transparent digital identity management, land record systems, and other government applications.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	-	-	-	-	-	-	-	-
CO2	2	2	1	1	-	-	-	-	-	-	-	-
CO3	3	3	3	3	-	-	-	-	-	-	-	-
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CO5	3	3	2	2	-	-	-	-	-	-	-	-

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U23MDCB03	CYBERSECURE BLOCKCHAIN PERFORMANCE	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To comprehend Security and Performance Challenges in Blockchain Systems
- To demonstrate Tools and Techniques for Blockchain Optimization.
- To Examine Real-World Applications of Blockchain Technology.

UNIT I **SECURITY ISSUES** **6**

Blockchain Related Issues, Higher-Level Language (Solidity) Related Issues, EVM Bytecode Related Issues, Real-Life Attacks on Blockchain Applications/Smart Contracts, Trusted Execution Environments.

UNIT II **SECURITY TOOLS FOR SMART CONTRACTS** **6**

Working, Advantages, And Disadvantages of Tools- Oyente, Securify, Maian, Manticore, Mythril, SmartCheck, Verx. Secure KeyManagement, Quantum Resilience Keys.

UNIT III **PERFORMANCE RELATED ISSUES** **6**

Transaction Speed, Transaction Fees, Network Size, Complexity, Interoperability Problems, Lack of Standardization. Lack of Supportive Regulations Related to Blockchain Applications.

UNIT IV **PERFORMANCE IMPROVEMENTS** **6**

Off-Chain State Channels, Sidechains, Parallels Chains, Concurrent Smart Contract Transactions, Sharding Technique and Its Benefits, Atomic Swaps Between Smart Contracts.

UNIT V **BLOCKCHAIN APPLICATIONS** **6**

Decentralized Cryptocurrency, Distributed Cloud Storage, E-Voting, Insurance Claims, Cross-Border Payments, Asset Management, SmartAppliances.

PRACTICAL EXCERCISES: **30 PERIODS**

1. Enhancing User Security in Blockchain Applications.
2. Implement Node Security in Blockchain Applications.
3. Denial of Service Attacks, Eclipse Attacks, Replay Attacks, Routing Attacks, Sybil Attacks.
4. Enhance Securing Digital Payment Transactions.
5. Enhance Smart contract security.
6. Blockchain Network Configuration and Security Best Practices.
7. Consensus Mechanism Vulnerabilities and Mitigation.

TEXTBOOKS: **30 PERIODS**
TOTAL: 60 PERIODS

1 Andrea Antonopoulos and Gavin Wood "Mastering Ethereum: Building Smart Contracts and Dapps", 1st Edition, O'Reilly Publisher, 2018.

2 SachinShetty, Charles A. Kamhoua, Laurent L. Njilla, "Blockchain for Distributed Systems Security", 1st Edition, John Wiely & Sons, 2019.

REFERENCES:

1 Rahul Neware, Brajesh Kumar, Parag Rastogi, Harshal Patil, "Blockchain Security", 1st Edition, Book Rivers (India), 2022.

2 Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", 1st Edition, Princeton University Press, 2016.

3 YassineMaleh, Mohammad Shojafar, MamounAlazab, ImedRomdhani, "Blockchain for Cybersecurity and Privacy: Architectures Challenges and Applications", 1st Edition, Taylor & Francis Ltd., 2020.

ONLINE RESOURCES:

1 https://www.edx.org/course/blockchain-for-business

2 https://www.coursera.org/lecture/blockchain-security-foundational-concepts

3 https://www.coursera.org/learn/blockchain-security

COURSE OUTCOMES:

Upon the completion of the course, the students will be able to

CO1 Explain the security perspective of blockchain technology.

CO2 Apply security techniques related to blockchain.

CO3 Apply blockchain technology to provide solutions for Interoperability problems.

CO4 Analyze the performance of blockchain.

CO5 Design blockchain for various use cases.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	-	-	-	-	-	-	-	-
CO2	3	2	1	2	-	-	-	-	-	-	-	-
CO3	3	2	1	2	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-

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U23MDCB04	RESILIENT BUSINESS WITH BLOCKCHAIN	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To provide knowledge about the evolution of blockchain, its principles, and its role in transforming industries, including finance, supply chain, and healthcare.
- To equip an understanding of how blockchain can enhance data analytics, secure data storage, and address challenges in cybersecurity and cloud computing.
- To real-world use cases, evaluate the impact of blockchain on processes, and address scalability challenges through on-chain and off-chain solutions.

UNIT I INTRODUCTION TO BLOCKCHAIN AND BUSINESS APPLICATIONS 9

Evolution of blockchain, creation, Growth, Rise of crypto currencies, Blockchain Principles, Qualities, Popular blockchain platforms, Brief history of money, Impact of blockchain: Financial sector, internet.

UNIT II FINANCIAL SERVICES& GOVERNMENT PUBLIC SECTORS 9

Blockchain and Smart Contracts, Transparency in government services, Land Right Management, real world use cases, Manufacturing & Industrial: Blockchain for Supply chain, Logistics, IOT, Health Care and Life Sciences: Recordkeeping, Pharmaceuticals, Public health.

UNIT III DATA MANAGEMENT AND CYBER SECURITY 9

Data management: Blockchain for big data, CCT, Cloud based blockchain, Monetizing Big data, Blockchain and Big Data Analytics, Challenges, Blockchain for Gaming, Blockchain and cyber security.

UNIT IV IMPLEMENTING BLOCKCHAIN IN ENTERPRISES 9

Identifying opportunities and threats, People and partners, Determining use cases and impact on processes, Conceptual model of implementation, New Business applications of blockchain: Smart Cities, Digital Medicine, M2M Transactions.

UNIT V CURRENT ISSUES 9

Issues faced, Solutions for scalability issues, On-chain solutions: Proof of stake, sharding Off-chain solutions: Payment or state channels, Plasma Truebit, Next generation blockchain projects, A case study: The exciting world of blockchain.

TOTAL: 45 PERIODS

TEXTBOOKS

1 Mohsen Attaran, Angappa Gunasekaran, "Applications of Blockchain Technology in Business: Challenges and Opportunities ",1st Edition, Packt Publishing, 2019.

2 Peter Lipovyanov, "Blockchain for Business 2019: A user-friendly introduction to blockchain and its Business Application", 1st Edition, Packt Publishing, 2019.

REFERENCES

1 Bashir, Imran. "Mastering Blockchain: A Deep Dive into Distributed Ledgers, Consensus Protocols, Smart Contracts, DApps, Cryptocurrencies, Ethereum", 3rd Edition, Packt Publishing, 2020.

2 Daniel Drescher, "Blockchain Basics", 1st Edition, A press Publishers, 2017.

3 Grincalaitis, Merunas. "Mastering Ethereum: Implement Advanced Blockchain Applications Using Ethereum-Supported Tools, Services, and Protocols", 1st Edition, Packt Publishing, 2019.

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ONLINE RESOURCES:

1 https://www.coursera.org/learn/blockchain business/home/welcome

2 https://www.edx.org/professionalcertificate/linuxfoundationx-blockchain-for-business

3 https://onlinecourses.swayam2.ac.in/aic21_ge01

COURSE OUTCOMES:

Upon the completion of the course, the students will be able to

CO1 Summarize the concept of blockchain cryptocurrency.

CO2 Explain the various blockchain functionalities.

CO3 Analyze Blockchain for Big data.

CO4 Apply Blockchain technology in various business domains of financial and commodities.

CO5 Design new Business application for the Blockchain.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	-	-	-	-	-	-	-	-
CO2	2	2	1	1	-	-	-	-	-	-	-	-
CO3	3	2	1	2	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-
CO5	3	3	3	3	-	-	-	-	-	-	-	-

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U23MDCB05	SECURE FINTECH ECOSYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To comprehend the Fundamentals of Cryptocurrencies and Blockchain-Based Offerings.
- To Analyze Decentralized Finance (DeFi) and Decentralized Markets.
- To Examine Blockchain Regulations and Banking Applications.

UNIT I INTRODUCTION **9**

Concept, Cryptocurrency Mining, Uses of Cryptocurrencies, Tokens, Token vs Crypto Coin, Concept of ICOs (Initial Coin Offerings), Benefits of Using ICOs, STOs (Security token offerings), ICO vs STO, Cryptocurrency wallets.

UNIT II DECENTRALIZED FINANCE **9**

Concept, Benefits and Risks Associated with DeFi, Centralized vs Decentralized finance, DeFi Projects, DeFi future trends.

UNIT III DECENTRALIZED MARKETS **9**

Concept of Decentralized markets, impact of decentralization on financial market, Decentralized Exchanges (DEX), Security, control and privacy concerns related to DEX, Liquidity and Usability of DEX, best DEXs for trading, Fund Management and Trading logic of DEX, Concept of Decentralized Web.

UNIT IV BLOCKCHAIN AND CRYPTOCURRENCY REGULATIONS **9**

Introduction, History Stance of the Government, Judicial Approach to Cryptocurrency, Possible Reasons for Ban, Virtual Currency Regulations, Global Perspective of Regulations on Blockchain, Future needs for Regulations.

UNIT V BANKING AND BLOCKCHAIN **9**

Cross-Border Payments Using Blockchain and Its Benefits, Study of blockchain platforms used for cross-border payments, Impact of Blockchain on Banking Services. Stable Coin: Concept, Uses and Types of Stable Coins, Case-Study: Tether and Libra Coins.

TOTAL :45 PERIODS

TEXTBOOKS

1 Steve Brown, "The Innovation Ultimatum", John Wiley & Sons ,2020.

2 Antony Lewis, "The Basics of Bitcoins and Blockchains: An Introduction to Cryptocurrencies and the Technology that Powers Them (Cryptography, Crypto Trading, Digital Assets, NFT)", Mango Media, 2018.

REFERENCES

1 Susanne Chishti, Tony Craddock, Robert Courtneidge, "The Paytech Book - The Payment Technology Handbook for Investors, Entrepreneurs and Fintech Visionaries", 1st Edition, John Wiley & Sons, 2019.

2 Arvind Narayanan, Joseph Bonneau, Edward Felten, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction",1st Edition, Princeton University, 2016.

3 Kiran Mehta, Renuka Sharma, Poshan Yu, "Revolutionizing Financial Services and

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Markets Through FinTech and Blockchain" ,1st Edition, IGI Global, 2023.

ONLINE RESOURCES:

1 https://www.coursera.org/specializations/blockchain
2 https://nptel.ac.in/courses/106105184/
3 https://swayam.gov.in/nd1_noc20_cs01/preview 4

COURSE OUTCOMES:

Upon the completion of the course, the students will be able to

CO1 Explain the basic notion of distributed systems.
CO2 Summarize the working of an immutable distributed ledger and trust model that defines blockchain.
CO3 Explain the essential components of a blockchain platform.
CO4 Summarize the blockchain cryptocurrency regulations.
CO5 Apply blockchain in various domains.

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	-	-	-	-	-	-	-	-
CO2	2	2	1	1	-	-	-	-	-	-	-	-
CO3	2	2	1	1	-	-	-	-	-	-	-	-
CO4	2	2	1	1	-	-	-	-	-	-	-	-
CO5	3	2	1	2	-	-	-	-	-	-	-	-

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CHENNAI - 6

U23MDCB06	BLOCKCHAIN AND CRYPTOCURRENCY	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES

- To comprehend Blockchain Fundamentals and Cryptocurrency Concepts.
- To demonstrate Blockchain Consensus Mechanisms and DeFi.
- To Apply Blockchain Technologies to Real-World Use Cases.

UNIT I INTRODUCTION 6

A basic crypto currency, Creation of coins, Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay.

UNIT II BITCOIN AND CRYPTOCURRENCY 6

Concept, Benefits and Risks Associated with DeFi, Centralized vs Decentralized finance, DeFi Projects, DeFi future trends.

UNIT III BITCOIN CONSENSUS 6

Bitcoin Consensus, Proof of Work (PoW)- Hashcash PoW, Bitcoin PoW, Attacks on PoW, monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases.

UNIT IV HYPERLEDGER FABRIC & ETHEREUM 6

Architecture of Hyperledger fabric v1.1- chain code- Ethereum: Ethereum network, EVM, Transaction fee, Mist Browser, Ether, Gas, Solidity.

UNIT V BLOCKCHAIN APPLICATIONS 6

Smart contracts, Truffle Design and issue- DApps- NFT. Blockchain Applications in Supply Chain Management, Logistics, Smart Cities, Finance and Banking, Insurance, etc- Case Study.

30 PERIODS

PRACTICAL EXERCISES:

1 Install and understand Docker container, Node.js, Java and Hyperledger Fabric, Ethereum and perform necessary software installation on local machine create instance on cloud to run.
2 Create and deploy a blockchain network using Hyperledger Fabric SDK for Java Set up and initialize the channel, install and instantiate chain code, and perform invoke and query on your blockchain network.
3 Interact with a blockchain network. Execute transactions and requests against a blockchain network by creating an app to test the network and its rules.
4 Deploy an asset-transfer app using blockchain. Learn app development within a Hyperledger Fabric network.
5 Use blockchain to track fitness club rewards. Build a web app that uses Hyperledger Fabric to track and trace member rewards.
6 Car auction network: A Hello World example with Hyperledger Fabric Node SDK and IBM Blockchain Starter Plan. Use Hyperledger Fabric to invoke chain code while storing results and data in the starter plan.

30 PERIODS

TOTAL: 60 PERIODS

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TEXT BOOKS:

1 Bashir and Imran, "Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks",1st Edition, Packt Publishing, 2017.

2 Andreas Antonopoulos, "Mastering Bitcoin: Unlocking Digital Cryptocurrencies", 1st Edition, O'Reilly Media, 2015.

REFERENCES

1 Saravanan Krishnan, Valentina Emilia Balas, E. Golden Julie, "Handbook of Research on Blockchain Technology", 1st Edition, Academic Press Inc, 2020.

2 Daniel Drescher, "Blockchain Basics", 1st Edition, Apress, 2017.

3 Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Blockchain", Public library Edition, Packt Publishing,2018.

ONLINE RESOURCES:

1 https://www.coursera.org/specializations/blockchain

2 https://nptel.ac.in/courses/106104220

3 https://onlinecourses.nptel.ac.in/noc19_cs63/preview

COURSE OUTCOMES:

Upon the completion of the course, the students will be able to

CO1 Summarize the emerging abstract models for Blockchain Technology.

CO2 Explain the concepts, benefits, risks, and future trends of Decentralized Finance (DeFi).

CO3 Comprehend the various Bitcoin consensus mechanisms along with their security challenges, mining concepts, and permissioned blockchain use cases.

CO4 Apply hyperledger Fabric and Ethereum platform to implement the Block chain Application.

CO5 Apply blockchain technology in real-world applications by designing smart contracts with Truffle and developing decentralized applications (DApps).

CO – PO – PSO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	-	-	-	-	-	-	-	-
CO2	2	2	1	1	-	-	-	-	-	-	-	-
CO3	2	2	1	1	-	-	-	-	-	-	-	-
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CO5	3	2	1	2	-	-	-	-	-	-	-	-

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