GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering
Level: UG
Course / Subject Code : PEC-04/
Course / Subject Name : BlockChain Application, Security and Investigation

w. e. f. Academic Year:	A.Y. 2024-25
Semester:	VI
Category of the Course:	Professional Core Course

Prerequisite:	Cryptography
Rationale:	This course provides an in-depth understanding of block chain technology, focusing on security aspects and investigative techniques. Students will learn about the fundamental principles of block chain, common security vulnerabilities, best practices for securing blockchain applications, and methods for investigating block chain-related incidents.

Course Outcome:
After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
1	Understand the concepts of blockchain technology. ht..	U
2	Apply the blockchain for technology, legal and governance applications	Ap
3	Analyze the various private blockchain platforms that are accessible.	An
4	Evaluate various blockchain challenges for real world applications.	E
5	Apply blockchain technologies other than financial applications.	Ap

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
4	0	2	5	70	30	20	30	150

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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	**Introduction:** Introduction to Blockchain, Types of Blockchain - Public Blockchains, Consortium Blockchains, Private Blockchains. Blockchain Implementations - Bitcoin, Namecoin, Ripple, Ethereum, Blockchain Collaborative Implementations - Hyperledger, Corda, Categories of Blockchain, Private Blockchain Use Cases, Private Blockchain Technology,AlphaPoint Distributed Ledger Platform, Chain Core, Corda, Domus Tower, The Elements Project, HydraChain, Hyperledger, Stellar, Consensus: Consensus Mechanism and Types,	12	30
2.	**Decentralization:** Decentralization using blockchain, Blockchain and full ecosystem decentralization, Smart contract , Decentralized organizations and platforms for decentralization.	05	10
3	**Blockchain Technology, Legal and Governance Use Cases :** Web 3.0, Distributed Storage Systems, Distributed Computation, Decentralized Communications, Cryptocurrencies as Legal Tender, Blockchain and Privacy Laws, Blockchain and Privacy Laws, Smart Contract, Smart Contract Design, Decentralized Autonomous Organizations.	07	20
4	**Blockchain Challenges :** Blockchain Governance Challenges, Bitcoin Blocksize Debate, Blockchain Technical Challenges, Bugs in the Core Code, Denial-of-Service Attacks, Security in Smart Contracts, Scaling, Sharding.	06	10
5.	**Blockchain Business Use Cases:** Currency and Tokens, Cryptocurrency, Digital Tokens, Financial Services Use Cases viz. 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, Smart Contracts on the Blockchain.	07	20
6.	**Non-Financial Application of Blockchain:** Internet of things: physical, device, Network, Management and Application layers – IoT blockchain Experiment- government: Border control, voting, citizen Identification – health- finance: Insurance, post –trade, financial crime prevention media	06	10

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**30**	**20**	**20**	**10**	**10**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

1. Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions by Joseph J. Bambara and Paul R. Allen, McGraw-Hill Education. 2018
2. Hands-On Blockchain with Hyperledger, Nitin Gaur et al., Packt Publishing. 2018
3. Mark Gates, "Block chain: Ultimate guide to understanding block chain, bitcoin, crypto currencies, smart contracts and the future of money", Wise Fox Publishing and Mark Gates 2017
4. Blockchain Technology By Chandramouli Subramanian, Asha George, Abhilash K A and Meena Karthikeyan , Universities Press Publication
5. Blockchain Blueprint for a New Economy, By Melanie Swan,O'Reilly Publication
6. Blockchain For Dummies By Tiana Laurence, Wiley Publication

(b) Open source software and website:

Link https://onlinecourses.nptel.ac.in/noc22_cs44/preview

List of Open Source Software/learning website:

1. NPTEL & MOOC courses titled blockchain technology
2. blockgeeks.comguide/what-is-block-chain-technology https://nptel.ac.in/courses/106105184/

List of Suggested Experiment :

1) Simple Dapps development using javascript and Web3
2) Develop a smart contract search engine.
3) Application on smart contract hacks and vulnerabilities.
4) Deploying blockchain – based DDoS Protection.
5) IoT Application development using blockchain
6) E-Voting application development using blockchain
7) Insurance Application Development using blockchain
8) Health sector application development using blockchain
9) Transcript verification application development using block chain
10) Peer-reviewing application development using Blockchain

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