GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: PG

Branch: Artificial Intelligence and Data Science

Subject Code: ME02095051

Course/Subject Name: Blockchain Technology & Applications

WEF Academic Year	2024-25
Semester	2
Category of the Course	Professional Elective Course

Prerequisite:	Basic understanding of computer fundamental concepts and programming.
Rationale	• The course provide an insight of blockchain technology and concepts. • The course focus on to gain the knowledge about the practical use of blockchain applications.

Course Outcome:

After completion of the Course, Students will be able to:

No	Course Outcomes	RBT Level*
01	Understand the fundamental concepts of blockchain technology.	UN
02	Apply the blockchain for business applications.	AP
03	Apply the blockchain technology for real time applications.	AP
04	Analyse the various available private blockchain platforms.	AN
05	Evaluate various blockchain challenges for real world applications.	EL

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

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)	
03	00	02	04	70	30	20	30	150

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Course Content:

Unit	Course 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.	6	10
2	**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.	8	20
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.	8	20
4	**Private Blockchain Platforms:** Categories of Blockchain, Private Blockchain Use Cases, Private Blockchain Technology,AlphaPoint Distributed Ledger Platform, Chain Core, Corda, Domus Tower, The Elements Project, HydraChain, Hyperledge, Stellar.	7	20
5	**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.	8	20
6	**Blockchain in real world applications:** Blockchain in the Financial Technology Space, Blockchain in the Sharing Economy, Blockchain and Real Estate, Blockchain and Identity, Blockchain and the Practice of Law, Blockchain and Betting	8	10
	TOTAL	**45**	**100**

Suggested Specification Table with Marks (Theory):

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

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

Reference/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.
2. Blockchain Enabled Applications by Vikram Dillon, David Metcalf, Max Hooper, Apress.
3. Hands-On Blockchain with Hyperledger, Nitin Gaur et al., Packt Publishing.

(b) Open source software and website

- Course-related online MOOCs on NPTEL/SWAYAM platform.
- Recently Published papers/articles in reputed journals.

Suggested Course Practical List:

- The practical work will be carried out based on the content covered during the academic sessions**.**

List of Laboratory/Learning Resources Required: Programming development environment (open source is encouraged) related to the course content.

Suggested Project List: The subject teacher has to assign the relevant project work to the students in individual/team.

Suggested Activities for Students: The subject teacher has to assign the outcome based activities to the students in individual/team.

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