GUJARAT TECHNOLOGICAL UNIVERSITY

Syllabus for
Master of Business Administration (Information Technology)
4th Semester
Subject Name: Blockchain Management (BM)
Subject Code: 1549614

With effective from academic year 2020-21

About Blockchain:

A Blockchain is a permanent, sequential list of transaction records distributed over a network. Each block in the chain contains a hash of the previous block, along with a timestamp and transaction data. This makes the Blockchain inherently resistant to attack or manipulation. Blockchain technology is ideal for recording various types of transactions where data is sensitive or targeted by hackers for unauthorized duplication or other fraudulent activity. Bitcoin and other cryptocurrencies use Blockchain technology to record transactions. Blockchain for business applications can include recording of contracts, medical records, monetary transactions and much more.

1. Learning Outcomes:

Learning Outcome Component	Learning Outcome (Student will be able to)
Business Environment and Domain Knowledge (BEDK)	• *Develop* understanding of basics of Blockchain & Cryptocurrency technology • *Develop* understanding of various types of Blockchain technology.
Critical Thinking, Business Analysis, Problem Solving and Innovative Solutions (CBPI)	• *Provide* feasible technological solutions by analyzing the Prevailing business system and applying the tools of system reengineering
Global Exposure and Cross-Cultural Understanding (GECCU)	• *Develop* a global perspective regarding various types of Blockchain systems, algorithms & cryptocurrency.
Social Responsiveness and Ethics (SRE)	• *Construct* a strong ethical framework for evaluating information related ethical & legal dilemmas frequently encountered by businesses.
Effective Communication (EC)	• *Determine* methods for evaluating the effectiveness and efficiency of a Blockchain system. • *Develop* various requirements document, written in clear and concise business language, and present it to a business entities.
Leadership and Teamwork (LT)	• *Acquire* leadership skills to work as a mediator for designing systems right from conceptualization to implementation.

LO–PO Mapping:

Correlation Levels:

1 = Slight (Low); 2 = Moderate (Medium); 3 = Substantial (High), "-" = no correlation

Subject Code: 1539605	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
LO1: *Develop* understanding of basics of Blockchain & Cryptocurrency technology & *Develop* understanding of various types of Blockchain technology.	**2**	**3**	**-**	**1**	**1**	**-**	**-**	**1**	**2**

LO2: *Provide* feasible technological solutions by analyzing the Prevailing business system and applying the tools of system reengineering	**2**	**2**	**3**	**2**	**1**	**1**	**-**	**2**	**1**
LO3: *Develop* a global perspective regarding various types of Blockchain systems, algorithms & cryptocurrency.	**-**	**2**	**2**	**1**	**3**	**1**	**1**	**2**	**-**
LO4: *Construct* a strong ethical framework for evaluating information related ethical & legal dilemmas frequently encountered by businesses.	**-**	**1**	**1**	**-**	**2**	**1**	**3**	**-**	**1**
LO5: *Determine* methods for evaluating the effectiveness and efficiency of a Blockchain system & *Develop* various requirements document, written in clear and concise business language, and present it to a business entities.	**1**	**1**	**-**	**3**	**1**	**2**	**-**	**1**	**2**
LO6: *Acquire* leadership skills to work as a mediator for designing systems right from conceptualization to implementation.	**1**	**2**	**3**	**1**	**-**	**3**	**1**	**2**	**2**

2. Course Duration: The course duration is of **40 sessions of 60 minutes each**.

3. Course Contents:

Module No.	Contents	No. of sessions	70 Marks (External Evaluation)
I	**Fundamentals of Blockchain:** Introduction, Origin of Blockchain, Blockchain solution, Components of Blockchain, Blocks in Blockchain, Limitations and Challenges of Blockchain **Blockchain Types and Consensus Mechanism:** Introduction, Decentralization and Distribution, Types of Blockchain, Consensus Protocol **Cryptocurrency – Bitcoin, Altcoin, Token:** Introduction, Bitcoin and the Cryptocurrency, Cryptocurrency Basics, Types of Cryptocurrency, Cryptocurrency usage	**10**	**18**
II	**Public Blockchain System:** Introduction, Public Blockchain, Popular public	**10**	**18**

	Blockchain, The Bitcoin Blockchain, Ethereum Blockchain **Smart Contracts:** Introduction, Smart Contract, Characteristics of a Smart Contract, Types of Smart contracts, Types of Oracles, Smart Contracts in Ethereum, Smart Contracts in Industry		
III	**Private Blockchain System:** Introduction, Key characteristics of Private Blockchain, Private Blockchain Examples, Smart Contract in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain	**10**	**18**
IV	**Consortium Blockchain:** Introduction, Key characteristics of Consortium Blockchain, Hyperledger platform, Overview of Ripple, Overview of Corda **Cryptocurrency Regulations:** Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy	**10**	**16**
V	**Practical:** • Students should gain understanding & prepare a brief report on any one or two applications of Blockchain i.e.: Education, Health care, Agriculture, Supply Chain management, Banking, Smart cities, Land registration etc. • Students are expected to learn Ethereum, Hyperledger & Corda tools	**NA**	**30 Marks (CEC)**

4. Pedagogy:

- ICT enabled Classroom teaching
- Industrial/Cotemporary Case study
- Practical/live assignments
- Interactive classroom discussions
- Ethereum, Hyperledger & Corda based training

5. Evaluation:

Students shall be evaluated on the following components:

A.	**Internal Evaluation**	**(Internal Assessment-50 Marks)**
	• Continuous Evaluation Component	30 marks
	• Classroom Presence & Participation	10 marks
	• Class Quiz	10 marks
B.	**Mid-Semester Examination**	**(Internal Assessment-30 Marks)**
C.	**End–Semester Examination**	**(External Assessment-70 Marks)**

6. Reference Books:

1. Blockchain Technology By Chandramouli Subramanian, Asha George, Abhilash K A and Meena Karthikeyan , Universities Press Publication
2. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press, July 2016
3. Blockchain Blueprint for a New Economy, By Melanie Swan, O'Reilly Publication
4. Blockchain For Dummies By Tiana Laurence, Wiley Publication
5. Blockchain Technology - Concepts and Applications: Kumar Saurabh, Ashutosh Saxena, First Edition, Wiley
6. Imran Bashir , Mastering Blockchain 2nd Edition, , Packt Publication
7. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.
8. Bikramaditya Singhal, Gautam Dhameja and Priyansu Sekhar Panda, Beginning Blockchain, A Beginner's Guide to Building Blockchain Solutions, Apress, 2018
9. EladElrom, The Blockchain Developer, A Practical Guide for Designing, Implementing, Publishing, Testing, and Securing Distributed Blockchain-based Projects, Apress, 2019
10. Merunas Grincalaitis, "Mastering Ethereum: Implement Advanced Blockchain Applications Using Ethereum-supported Tools, Services, and Protocols", Packt Publishing.
11. Dr. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger," Yellow paper 2014
12. Joseph Bonneau et. al., SoK: Research perspectives and challenges for Bitcoin and cryptocurrency, IEEE Symposium on security and Privacy, 2015.
13. Aljosha Judmayer Nicholas Stifter Katharina Krombholz Edgar Weippl, Blocks and Chains, Introduction to Bitcoin, Cryptocurrencies, and their Consensus Mechanisms, 2017
14. Mastering Bitcoin, Programming the Open Blockchain, Andreas M. Antonopoulos, 2017
15. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
16. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
17. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts

7. List of Journals/Periodicals/Magazines/Newspapers/Web resources, etc.

1. Journal of Blockchain Research
2. Blockchain Frontier Technology
3. Ledger
4. The Journal of High Technology Management Research

8. MOOC:

- Prof. Sandip Chakraborty & Dr. Praveen Jayachandran, "Blockchain Architecture Design And Use Cases", IIT Kharagpur & IBM, MOOC, NPTEL: https://onlinecourses.nptel.ac.in/noc19_cs63/preview
- Prof. Sandeep K. Shukla, "Introduction to Blockchain Technology and Applications", IIT Kanpur, MOOC, NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs01/preview