| MCA 409 Blockchain Technology | |
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| **Teaching Scheme**<br>Lectures: 3 hrs/Week<br>Tutorials: 1 hr/Week<br><br>Credits: 4 | **Examination Scheme**<br>Class Test – 12 Marks<br>Teachers Assessment – 6 Marks<br>Attendance – 12 Marks<br>End Semester Exam – 70 Marks |

**Prerequisite:**Advanced Computer Networks, Cryptography and Network Security.

**Course Objectives:**

1. To aware studentswith blockchain technology.
2. To understand the foundational constructs, benefits and opportunities of blockchain technology.
3. To understand the applications of blockchain technology.
4. To evaluate the risks and challenges in implementing blockchain technology.
5. To understand the concept of cryptocurrency.
6. To know about the Hyperledger Fabric.

**Detailed Syllabus:**

**Unit-1**

**Introduction to Blockchain:** History of centralized services,trusted third party for transactions, understand the difference between centralized, decentralized and distributed peer to peer networks,why Block chain?, Types of Blockchain.

**History of Bitcoins:** How and when Blockchain and Bitcoin started. Milestone on the development of bitcoin, Problem area of Bitcoin, relation to Bitcoin, requirement of block chain in a business environment, sharing economy, requirements deep dive, Internet of value.

**Unit-2**

**Consensus**: Mechanism, Types of Consensus Mechanism, Consensus in Blockchain. Decentralization: Disintermediation and Contest Driven Decentralization, Routes to Decentralization, Full Ecosystem Decentralization, Smart Contracts, Decentralized Organizations, Platforms for Decentralization.

**Unit-3**

**Blockchain Applications and USE case**: Business drivers of blockchain, Digital currency and finance (including ICOs and alternative funding), Identity, Supply Chain, Healthcare, Ownership and property rights Governance and compliance.

**Unit-4**

**Blockchain Challenges and Constraints:** Blockchain risks, Technological challenges, standards Scalability issues, Security and privacy, Legal and regulatory problems, Social and cultural constraints.

**Unit-5**

**Ethereum:** Ethereum network, EVM, Transaction fee, Mist, Ether, gas, Solidity - Smart contracts, Truffle, Web3, Design and issue Cryptocurrency, Mining, DApps, DAO.

**Unit-6**

**Introduction to Hyperledger Fabric:** What is Hyperledger, Why Hyperledger, Where can

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| Hyperledger be used, Hyperledger Architecture, Membership, Blockchain, Transaction, Chaincode, Hyperledger Fabric, Features of Hyperledger, prerequisiteof Fabric installation |
| **Suggested Readings:**<br>1. A. Narayanan, J. Bonneau, E. Felten, A. Miller & S. Gold feder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press, 2016.<br>2. B. Singhal & G. Dhameja Beginning Blockchain: A Beginner's Guide to Building Blockchain Solutions, Apress 2018.<br>3. D. Mohanty, Blockchain - From Concept to Execution, BPB Publications, 2018.<br>4. Imran Bashir, Mastering Blockchain, 2nd Edition, Packt Publishing, 2018. |

**Course Outcomes:**

After completing the course, students will be able to:

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| **1.**Understand what and why of Blockchain. |
| **2.** Explore the major components of Blockchain. |
| **3.**Understand various challenges and constraints of Blockchain. |
| **4.**Learn about Bitcoin, Cryptocurrency and Ethereum. |
| **5.**Identify a use case for a Blockchain application. |
| **6.** Learn about Hyper ledger Fabric model and its Architecture. |