COURSE FILE

FUNDAMENTALS OF BLOCKCHAIN TECHNOLOGY (COM-602)

B.E. -6TH SEMESTER

ACADEMIC YEAR (2023-24)

Sukhmeet Kour

Assistant Professor

Department of Computer Science and Engineering

Department of Computer Science and Engineering

Model Institute of Engineering & Technology (Autonomous)

Kot Bhalwal, Jammu - 181122

www.mietjmu.in

SYLLABUS

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
COM-602	Fundamentals of Blockchain Technology	PCC	**4**	**3**	**1**	0	50	100	150

COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	Articulate the history, types and applications of Blockchain.
CO2	Explain the Blockchain architecture in context of different crypto currency.
CO3	Comprehend different consensus algorithms and justify their appropriateness for different applications.
CO4	Gain appreciation of different decentralized applications over Blockchain frameworks.
CO5	Formulate solutions using Blockchain technology for real world applications.

Unit-I

Introduction to Blockchain: Introduction to Block chain – History, Definition, Distributed Ledger, Blockchain Categories – Public, Private, Consortium, Blockchain Network and Nodes, Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain and Types of Blockchain, Uses of Blockchain

(8 Hours)

Unit-II

Blockchain Architecture: Abstract Models for Blockchain - GARAY model - RLA Model. Multichain: Objective of Multichain, Features, Operation of Bitcoin Blockchain, Blockchain Architecture – Block, Hash, Distributed P2P, Fundamentals of Bitcoin, Ethereum and other popular crypto currencies

(8 Hours)

Unit-III

Consensus: Importance of Consensus mechanism, Proof of Work (Pow), Proof of Stake (PoS), Byzantine Fault Tolerance (BFT), Proof of Authority (PoA) and Proof of Elapsed Time (PoET). Scalability aspects of Blockchain consensus protocols.

(8 Hours)

Unit- IV

Blockchain Decentralized Applications: Characteristics of Decentralized application, De-Fi (Decentralized Finance) Applications and use-cases, Smart contracts and decentralized oracle networks (DONs).

(8 Hours)

Unit-V

Block Chain- Case Studies: Case studies on applications of Blockchain technology in real world applications

(8 Hours)

Text Books

S.No.	Name of the Books	Author	Publisher Name	Edition (Pub. yr.)
1	Blockchain Technology From theory to Practice	Sudeep Tanwar	Springer	1st (2022)
2.	Blockchain Technology: Concepts and Applications	Kumar Saurabh, Ashutosh Saxena	Wiley	1st (2020)

Reference Books

S.No.	Name of the Books	Author	Publisher Name	Edition (Pub. Yr.)
1	Bitcoin and Cryptocurrency Technologies	Arvind Narayanan, Joseph Bonneau	Princeton University Press	1st (2016)

COURSE PLAN

Unit-I Introduction to Blockchain		
S.No	**Topics**	**Recommended Books**
1	History, Definition of Blockchain, Distributed Ledger	Book 2, Ch.1
2	Blockchain Categories- Public, Private, Consortium	Book 1, Ch.1
3	Blockchain Network and Nodes, Peer-to-Peer Network, Mining Mechanism	Book 1, Ch.1
4	Generic elements of Blockchain	Book 2, Ch.1
5	Features and types of Blockchain	Book 2, Ch.1
6	Uses of Blockchain	Book 2, Ch.1
7	Mining Mechanism	Book 2, Ch.2
Unit-II Blockchain Architecture		
8	Abstract Models for Blockchain- GARAY model and RLA model	Book 1, Ch.2
9	Multichain: Objectives and features	Book 1, Ch.2
10	Features and Operation of Bitcoin Blockchain	Book 1, Ch.1
11	Blockchain Architecture	Book 2, Ch.1
12	Fundamentals of Bitcoin	Book 2, Ch.2
13	Popular Crypto currencies.	Book 2, Ch.2
14	Explain Ethereum with examples	Book 1, Ch.2
15	Popular cryptocurrency	Book 2, Ch.2
Unit-III Consensus		
16	Importance of Consensus mechanism	Book 2, Ch.3
17	Proof of Work (POW)	Book 2, Ch.2
18	Proof of Stake (POS)	Book 2, Ch.3
19	Byzantine Fault Tolerance (BFT)	Book 2, Ch.2
20	Proof of Authority (POA)	Book 2, Ch.3
21	Proof of Elapsed Time (POET)	Book 2, Ch.2
Unit-IV Blockchain Decentralized Applications		
22	Characteristics of Decentralized applications	Book 2, Ch.3
23	De-Fi (Decentralized Finance)	Book 1, Ch.4
24	Applications and use cases	Book 1, Ch.4
25	Centralized & decentralized	Book 2, Ch.3
26	Smart contracts	Book 1, Ch.3
27	Decentralized oracle network	Book 2, Ch.3
28	Characteristics of Decentralized application	Book 1, Ch.3
Unit-V Blockchain Case Studies		
29	Introduction to Blockchain	Book 2, Ch.8
30	Case Studies	Book 1, Ch.8
31	Case studies on applications of blockchain technology	Book 2, Ch.8
32	Applications of Blockchain	Book 1, Ch.8

ADDITIONAL WEB RESOURCES

1.	**MOOC:** Blockchain technology https://data-flair.training/blogs/blockchain-tutorial/:- https://www.classcentral.com/course/youtube-web3-blockchain-fundamentals-mooc-53192
2.	**NPTEL:** Fundamental of Blockchain: - https://archive.nptel.ac.in/noc/courses/noc20/SEM2/noc20-mg67/

GRADING AND ASSESSMENT

- **Sessional Test**: 50 marks
- **Assignment**: 10 marks
- **Attendance**: 5 marks
- **Final Examination**: 100 marks

COURSE POLICIES

- **Attendance**: Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity**: MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions**: Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**

  Monday (12:05 PM - 12:55 PM)
  Friday (12:05 PM - 12:55 PM)

- **Contact Information**
  sukhmeet.cse@mietjammu.in