SARVAJANIK UNIVERSITY
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SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Master of Technology

Year: M. Tech. II (Semester – III)

Subject Name: Blockchain Technology **Subject Code:** MTCO24301
Type of course: Professional Elective - III
Prerequisite: Internet Security, Computer Networks, Data Structures

List of Courses where this course will be prerequisite: --

Rationale: Blockchain and Cryptocurrency is vastly discussed now days in all research domains to bring the decentralization. This course is to understand Blockchain and its main application cryptocurrency. Students will learn how this system works and how can they utilize and what application can be build. After successful completion of this course, students will be familiar with blockchain and cryptocurrency concepts. Also they can build their own application using the learned concepts.

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Practical Marks
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	0	2	4	60	25	15	30	20	150

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests. CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Contents:

Unit No	Contents	Hrs
1	BASICS: Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, ZeroKnowledge Proof. Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance,Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete.	4
2	BLOCKCHAIN: Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.	4

3	BITCOIN AND CRYPTOCURRENCY : A basic crypto currency, Creation of coins, Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts , Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay, Consensus introduction, Distributed consensus in open environments-Consensus in a Bitcoin network, Stakeholders, Legal Aspects-Crypto currency Exchange, Black Market	6
4	CONSENSUS ALGORITHMS : Bitcoin Consensus, Proof of Work (PoW)- Hashcash PoW , Bitcoin PoW, Attacks on PoW ,monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Blockchains, Execute contracts- Consensus models for permissioned blockchain-Distributed consensus in closed environment-Paxo RAFT Consensus-Byzantine general problem, Byzantine fault tolerant system-Agreement Protocol, Lamport-Shostak-Pease BFT Algorithm-BFT over Asynchronous systems, Practical Byzantine Fault Tolerance	18
5	HYPER LEDGER FABRIC & ETHERUM: Architecture of Hyperledger fabric v1.1-Introduction to hyperledger fabric v1.1, chain code- Ethereum: Ethereum network, EVM, Transaction fee, Mist Browser, Ether, Gas, Solidity, Smart contracts, Truffle-Design and issue Crypto currency, Mining, DApps, DAO	8
6	APPLICATIONS AND SECURITY: GHOST, Vulnerability, Attacks, Sidechain, Namecoin Global Economy: Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain	5

Reference Books:

Sr No	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks	Basir, Imran		2017	

2	Bitcoin and cryptocurrency technologies: a comprehensive introduction.	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder	Princeton University Press	2016	

Course Outcomes (CO):

Sr. No.	CO statement	Marks % weightage
1	Understand fundamentals of cryptography and apply various cryptography techniques for Blockchain.	25
2	Categorize the various types of Blockchain.	25
3	Understand and analyse the use case of distributed ledger.	25
4	Analyse the working of Smart Contracts.	25

List of Experiments:

Sr. No	Practical
1	Create a Simple Blockchain in any suitable programming language.
2	Use Geth to Implement Private Ethereum Block Chain.
3	Build Hyperledger Fabric Client Application.
4	Build Hyperledger Fabric with Smart Contract.
5	Implement a solidity contract that you can get, increment and decrement the count store in this contract.
6	Implement a solidity contract for inheritance.
7	Implement solidity contract for voting system in which contract will return the winning candidate if voting time is over then
8	Implement a solidity contract for auction.
9	Create Case study of Block Chain being used in real world.
10	Using Python Libraries to develop Block Chain Application.

List of Open learning website:

- NPTEL online course : https://nptel.ac.in/courses/106/104/106104220/