20CS4601C Blockchain Technology

Syllabus

Offering Branches	CSE		
Course Category:	Elective	**Credits:**	3
Course Type:	Blockchain Technology	**Lecture-Tutorial-Practical:**	3-0-0
Prerequisites:	- NIL-	**Continuous Evaluation:**	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Understand the key dimensions of Blockchain Technology	L2
CO2	Apply the principles of Block chain for a given application.	L3
CO3	Apply the features of Ethereum and Hyperledger to develop various applications	L3
CO4	Analyze the given scenario and design a block chain based solution.	L4

Course Content

UNIT-1	Blockchain 101: Distributed systems, History of Blockchain and bitcoin, Introduction to Blockchain, Merkle Trees, Tiers and Types of Blockchain, Features, Benefits and Limitations of Blockchain and Consensus Protocols	CO1,CO2
UNIT-2	Decentralization: Decentralization using Blockchain, Methods of decentralization, Routes to decentralization, Blockchain and full ecosystem decentralization, pertinent Terminology	CO1,CO2,CO4
UNIT-3	Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography Introducing Bitcoin: Overview, Cryptographic keys, transactions, Blockchain, Mining, Digital Signatures, Wallets, Bitcoin Improvement Proposals (BIPs)	CO1,CO2,CO4
UNIT-4	Ethereum 101:Overview,The Ethereum Network, Components of the Ethereum ecosystem, The Ethereum Virtual Machine Smart Contracts: Life Cycle of a Smart Contract, Deploying Smart Contracts Gas, Tokens on Ethereum – ERC20 Token, Ethereum Improvement Proposals (EIPs), DApp and its Full Ecosystem, Operations of a DApp,	CO1,CO3,CO4
UNIT-5	Hyperledger: Overview, Hyperledger Reference Architecture, Hyperledger fabric, Ripple, Storj, Multichain, BigchainDB, Quorum Blockchain-Outside of Currencies: Internet of Things, Government,	CO1,CO3,CO4

	Health, Finance, Media, Aviation, Voting, Identity Management, Stock Trading, Agriculture	
Learning Resources		
Text Books	1. Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Author- Imran Bashir, Packt Publishing Ltd, Third Edition	
Reference Books	1. Bitcoin and Cryptocurrency Technologies, Author- Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder, Princeton University, 2016 2. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas M. Antonopoulos, O'Reilly Media, First Edition, 2014	
e- Resources & other digital material	1. https://www.coursera.org/specializations/blockchain 2. https://nptel.ac.in/courses/106105184/	

20CS4601C - Blockchain Technology

Micro Syllabus

Offering Branches	CSE		
Course Category:	Elective	**Credits:**	3
Course Type:	Blockchain Technology	**Lecture-Tutorial-Practical:**	3-0-0
Prerequisites:	- NIL-	**Continuous Evaluation:**	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Understand the key dimensions of Blockchain Technology	L2
CO2	Apply the principles of Block chain for a given application.	L3
CO3	Apply the features of Ethereum and Hyperledger to develop various applications	L3
CO4	Analyze the given scenario and design a block chain based solution.	L4

Course Content

UNIT-1	Blockchain 101: Distributed systems, History of Blockchain and bitcoin, Introduction to Blockchain: Blockchain architecture, Generic elements of a blockchain, How blockchain works, Merkle Trees, Tiers and Types of Blockchain, Features, Benefits and Limitations of Blockchain , Consensus Protocols, Types of consensus mechanisms	CO1,CO2
UNIT-2	Decentralization: Decentralization using Blockchain, Methods of decentralization, Routes to decentralization, How to Decentralize, Decentralization framework example, Blockchain and full ecosystem decentralization, Storage,Communication,Computing power and decentralization, pertinent Terminology	CO1,CO2,CO4
UNIT-3	Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography, Integer Factorization,RSA,Elliptic curve cryptography Introducing Bitcoin: Overview,Bitcoin a bird's-eye view, Cryptographic keys, Transactions: The transaction life cycle, Transaction fee, The transaction data structure,Meta data, The types of transactions,Blockchain:structure of a block, structure of a block header, Mining, Digital Signatures, Wallets, Bitcoin Improvement Proposals (BIPs),Advanced Protocols, Segregated Witness	CO1,CO2,CO4
UNIT-4	Ethereum 101:Overview:Ethereum-bird's eye view, The Ethereum Network, Components of the Ethereum ecosystem: keys and addresses, Transactions and messages, Ether cryptocurrency, The Ethereum Virtual Machine. Smart Contracts: Life Cycle of a Smart Contract, Deploying Smart Contracts Gas, Tokens on Ethereum – ERC20 Token, Ethereum Improvement Proposals (EIPs), DApp and its Full Ecosystem, Operations of a DApp,	CO1,CO3,CO4

UNIT-5	Hyperledger: Overview, Hyperledger Reference Architecture, Hyperledger fabric, Ripple, Storj, Multichain, BigchainDB, Quorum Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance, Media, Aviation, Voting, Identity Management, Stock Trading, Agriculture	CO1,CO3,CO4
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Code No: 20CS4601C

PVP20

PVP SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)

BLOCKCHAIN TECHNOLOGY

Duration: 3 Hours **Max. Marks: 70**

Note:

1. Contains 5 essay questions with an internal choice. Each question carries 14 Marks.
2. All parts of Question paper must be answered in one place.

5 x 14 = 70 Marks

			Blooms Level	CO	Max. Marks
		UNIT-I			
1	(a)	Outline the benefits and limitations of blockchain technology	L2	CO1	8
	(b)	Construct a Merkle tree and explain how it is used for efficiently summarizing and verifying the integrity of large sets of data	L3	CO2	6
		OR			
2	(a)	Explain the structure of a blockchain network with a diagram	L2	CO1	7
	(b)	Build a figure to visualize the process of block generation	L3	CO2	7
		UNIT-II			
3	(a)	Explain the terms smart contracts and Decentralized autonomous organizations	L2	CO1	7
	(b)	Identify the methods required to achieve decentralization	L3	CO2	7
		OR			
4	(a)	Build a block diagram to visualize the blockchain decentralized ecosystem	L3	CO2	7
	(b)	Explain how data is stored in a blockchain	L2	CO1	7
		UNIT-III			
5	(a)	Model a public key cryptography signature scheme for digital currency transactions	L3	CO2	7
	(b)	Construct a flowchart to visualize the process of mining a bitcoin	L3	CO2	7
		OR			
6	(a)	Identify the measures need for Bicoin Improvement	L3	CO2	7
	(b)	Model a diagram to visualize blockchain,block,blockheader,transaction and scripts	L3	CO2	7
		UNIT-IV			
7	(a)	Develop a smart contract to store values to blockchain and then retrieve same from the blockchain	L3	CO3	7
	(b)	Identify why an attacker could try creating contracts including lots of computationally expensive operation to slow down the network	L3	CO3	7

		OR			
8	(a)	Develop a smart contract to to insert value into Ethereum blockchain using metamask	L3	CO3	7
	(b)	Identify the benefits and limitations of creating Dapps	L3	CO3	7
		UNIT-V			
9	(a)	Construct flowchart to demonstrate workflow of Hyperledger Fabric	L3	CO3	7
	(b)	Analyze the current problems in voting and how blockchain will help to resolve those problems.	L4	CO4	7
		OR			
10	(a)	Identify the Benefits of IoT on convergence with blockchain	L3	CO3	7
	(b)	Analyse how security concerns in aviation can be handled by blockchain	L4	CO4	7