SEMESTER S8

BLOCK CHAIN

Course Code	PEECT867	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To create awareness and understanding among students on the foundation of block chain technology

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Blockchain – Definition, architecture, elements of blockchain, benefits and limitations, types of blockchain. Consensus – definition, types, consensus in blockchain. Decentralization – Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Blockchain and full ecosystem decentralization.	9
2	Consensus Algorithms, Crash fault-tolerance (CFT) algorithms – Paxos, Raft. Byzantine fault- tolerance (BFT) algorithms – Practical Byzantine Fault Tolerance (PBFT), Proof of work (PoW), Proof of stake (PoS), Types of PoS. Bitcoin – Definition, Cryptographic keys – Private keys, public keys, addresses. Transactions – Lifecycle, coinbase transactions, transaction validation. Blockchain – The genesis block. Mining – Tasks of miners, mining algorithm, hash rate. Wallets – Types of wallets.	9
3	Smart Contracts – Definition, Smart contract templates, Oracles, Types of oracles, Deploying smart contracts. Decentralization terminology –	9

KTU SPECIAL

	Decentralized applications, Decentralized Autonomous Organizations. Use cases of Blockchain technology – Government, Health care, Finance, Supply chain management. Blockchain and allied technologies – Blockchain and Cloud Computing, Blockchain and Artificial Intelligence.	
4	Ethereum – The Ethereum network. Components of the Ethereum ecosystem – Keys and addresses, Accounts, Transactions and messages. The Ethereum Virtual Machine, Blocks and blockchain. The Solidity language – The layout of a Solidity source code, Structure of a smart contract, variables, data types, control structures, events, inheritance, libraries, functions, error handling. Smart contracts Case study: Voting, Auction.	**9**

Course Assessment Method

(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

KTU SPECIAL

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination-2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Explain the fundamental concepts of blockchain technology.	K2
CO2	Summarize the classification of consensus algorithms.	K2
CO3	Explain the concepts of first decentralized cryptocurrency bitcoin.	K2
CO4	Explain the use of smart contracts and its use cases.	K2
CO5	Develop simple applications using Solidity language on Ethereum platform	K2

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

KTU SPECIAL

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				3							2
CO2	3				3							2
CO3	3		3	3	3	2		2				2
CO4	3		3	3	3	2		2				2
CO5	3		3	3	3	2		2				2

Note: *1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation*

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Mastering Blockchain: A deep dive into distributed ledgers, consensus protocols, smart contracts, DApps, cryptocurrencies, Ethereum, and more,	Imran Bashir	Packt Publishing,	Third edition, 2020.

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Solidity Programming Essentials: A beginner's guide to build smart contracts for Ethereum and blockchain,.	Ritesh Modi,	Packt Publishing,	First edition, 2018
2	Blockchain Technology: Concepts and Applications,	Kumar Saurabh, Ashutosh Saxena,	Wiley Publications,	First Edition, 2020
3	Blockchain Technology, ,	Chandramouli Subramanian, Asha A George, et al	Universities Press (India) Pvt. Ltd	First edition, August 2020.
4	Mastering Blockchain: Unlocking the Power of Cryptocurrencies, Smart Contracts, and Decentralized Applications,	Lorne Lantz, Daniel Cawrey	O'Reilly Media	First edition, 2020.
5	Mastering Ethereum: Building Smart Contracts and DApps,	Andreas M. Antonopoulos, Gavin Wood	O'Reilly Media	First edition, 2018

KTU SPECIAL

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://onlinecourses.nptel.ac.in/noc22_cs44/preview
2	https://onlinecourses.swayam2.ac.in/aic21_ge01/preview
3	https://archive.nptel.ac.in/courses/106/104/106104220/
4	https://onlinecourses.nptel.ac.in/noc20_cs01/preview