COURSEPLAN

Nameof the Faculty				
Designation/Department	AP/IT			
Course Code/Name	**U20IT514/ BLOCK CHAIN TECHNIQUES**			
Year/Section/Department	IV/IT			
Credits Details	L:3	T:0	P:0	C:3
Total Contact Hours Required	45			

Syllabus:

UNIT I INTRODUCTION TO BLOCKCHAIN	**No of Periods: 9**
Block chain- Public Ledgers, Block chain as Public Ledgers -Bit coin, Block chain 2.0, Smart Contracts, Block in a Block chain, Transactions-Distributed Consensus, The Chain and the Longest Chain – Crypto currency to Block chain 2.0 - Permissioned Model of Block chain, Cryptographic – Hash Function Properties of a hash function-Hash pointer and Merkle tree	
UNIT II BITCOIN AND CRYPTOCURRENCY	**No of Periods: 9**
A basic crypto currency, Creation of coins, Payments and double spending, FORTH – the precursor for Bit coin scripting, Bit coin Scripts , Bit coin P2P Network, Transaction in Bit coin Network, Block Mining, Block propagation and block relay, Consensus introduction, Distributed consensus in openenvironments-Consensus in a Bit coin network	
UNITIII BITCOIN CONSENSUS	**No of Periods: 9**
Bit coin Consensus, Proof of Work (PoW)- Hash cash PoW , Bit coin PoW, Attacks on PoW ,monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bit coin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Block chains, Execute contracts-Consensus models for permissioned block chain-Distributed consensus in closed environment Paxos	
UNIT IV DISTRIBUTED CONSENSUS	**No of Periods: 9**
RAFT Consensus-Byzantine general problem, Byzantine fault tolerant system-Agreement Protocol, Lamport-Shostak-Pease BFT Algorithm-BFT over Asynchronous systems, Practical Byzantine Fault Tolerance	
UNITV HYPER LEDGER FABRIC , ETHERUM & BLOCKCHAIN APPLICATIONS	**No of Periods: 9**
Architecture of Hyper ledger fabric v1.1-Introduction to hyper ledger 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 Internet of Things-Medical Record Management	

System-Block chain in Government and Block chain Security-Block chain Use Cases – Finance.

OBJECTIVES:

- Impart strong technical understanding of block chain technologies.
- To develop familiarity of current technologies, tools and implementation strategies.
- To introduce application areas, current practices and future directions

Reference Book:

1. Mastering Block chain: Deeper insights into decentralization, cryptography, Bit coin, and popular Block chain frameworks by Bashir, Imran,2017.
2. Aravind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Gold feder. Bit coin and crypto currency technologies: a comprehensive introduction. Princeton University Press, 2016.
3. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bit coin and crypto currency, IEEE Symposium on security and Privacy, 2015.

Website:

W1: https://blockchain.mit.edu/hash
W2 : https://blockchain.mit.edu/distributed
W3: https.://www.edureka.com/blog/blockchain

Online Mode of Study (if Any):

- onlinecourses.swayam2.ac.in/aic21_ge01/preview
- https://www.edx.org › learn › block chain
- https://blockchain.mit.edu/how-blockchain-works

CoursePlan:

Topic Number	Topic	Reference Detail	Page Number	Mode of teaching	Number of Periods Required	Cumulative Period
UNITI INTRODUCTION TO BLOCKCHAIN						
1	Blockchain Public Ledgers, Bitcoin	R2	104-108	BB	1	1
2	Blockchain 2.0, Smart Contracts	R1	3-4	PPT	1	2
3	Block in a Blockchain	R1	5-6	BB	1	3

4	Transactions-Distributed Consensus	R1	7-9	BB	1	4
5	The Chain and the LongestChain	R1	13-15	BB	1	5
6	Cryptocurrency to Blockchain 2.0	R2	16-19	BB	1	6
7	Permissioned Model of Block chain	R1	20-25	BB	1	7
8	Cryptographic -Hash Function, Properties of a hash function	R2	5-10	BB	1	8
9	Hash pointer and Merkle tree	W1	-	BB	1	9

Outcome of Unit I:

- Understands the concept of abstract models for Block chain Technology.
- Gain the knowledge of block chain techniques

UNIT II BITCOIN AND CRYPTOCURRENCY						
10	A basic crypto currency	R2	205-208	BB	1	10
11	Creation of coins	R2	213-215	BB	1	11
12	Payments and double spending	R2	226-228	BB	1	12
13	Transaction in Bitcoin Network	R2	206-207	BB	2	14
14	Block Mining	R2	250-253	BB	1	15
15	Block propagation and block relay	R2	261-264	BB	1	16
16	Consensus introduction,	R2	268-271	BB	1	17
17	Distributed consensus in open environments-	R2	276-279	BB	1	18
18	Consensus in a Bitcoin network	R2	280-286	BB	1	19

Outcome of Unit II:

- Able to Identify major research challenges
- Understand the technical gap existing between theory and practice in crypto currency domain.

UNIT III BITCOIN CONSENSUS						
19	Bitcoin Consensus, Proof of Work (PoW)	R1	221-224	BB	1	20
20	Hash cash PoW , Bit coin PoW	R1	300-304	BB	1	21
21	Bit coin PoW, Attacks on PoW	R1	314-316	VIDEO	1	22
22	Monopoly problem- Proof of Stake	R1	320-325	PPT	1	23
23	Proof of Burn - Proof of Elapsed Time, Bitcoin Miner, Mining Difficulty	R1	340-341	BB	1	24
24	Mining Pool-Permissioned model and use cases,	R1	345-347	BB	1	25

25	Design issues for Permissioned Block chains, Execute contracts	R1	348-350	BB	1	26
26	Consensus models for permissioned block chain-	R1	366-368	BB	1	27
27	Distributed consensus in closed environment Paxos	W2	---	BB	2	29
Outcome of Unit III: • Understand the concept of the function of Block • Gain the knowledge of the function of Block						
UNIT IV DISTRIBUTED CONSENSUS						
28	RAFT Consensus	R1	405-407	BB	1	28
29	Byzantine general problem	R1	166-168	BB	1	29
30	Byzantine fault tolerant system	R1	169-171	BB	1	30
31	Agreement Protocol	R1	377-379	BB	1	31
32	Lamport	R1	380-382	BB	1	32
33	Shostak	R1	385-387	BB	1	33
34	Pease BFT Algorithm	R1	390-391	BB	1	34
35	BFT over Asynchronous systems	R1	392-394	BB	1	35
36	Practical Byzantine FaultTolerance	R1	161-164	BB	1	36
Outcome of Unit IV: • Understand the concept of hyper ledger Fabric and Etherum platform • Gain the knowledge of hyper ledger fabric to implement the Block chain Application.						
UNIT V HYPER LEDGER FABRIC,ETHEREUM & BLOCKCHAIN APPLICATIONS						
37	Architecture of Hyperledger fabric v1.1	R3	111-114	BB	1	37
38	Introduction to hyper ledger fabric v1.1, chain code	R3	118-120	BB	1	38
39	Ethereum network, EVM, Transaction fee, Mist Browser	R3	121-124	BB	1	39
40	Ether Gas, Solidity & Smart contracts	R3	126-128	BB	1	40
41	Truffle Design and issue Crypto currency	R3	130-131	PPT	1	41
42	Mining & DApps	R3	132-133	BB	1	42
43	DAO Internet of Things-Medical Record Management System	R3	140-144	BB	1	43
44	Block chain in Government and Block chain Security	R3	148-150	BB	1	44
45	Block chain Use Cases– Finance.	W3	-	PPT	1	45
Outcome of Unit V: • Understand the applications of block chain • Gain the knowledge of applications of block chain						

At the end of course:
Students should be able to do:

CO1: Show emerging abstract models for Block chain Technology.(K2)
CO2: Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain. (K3)
CO3: Summarize conceptual understanding of the function of Block (K2)
CO4: Apply hyper ledger Fabric and Ethereum platform to implement the Block chain Application. (K3)
CO5: Outline various new applications of block chain (K1)
CO6: Develop block chain based solutions and write smart contract using Ethereum Framework.(K3)

Course Outcome:

Course Outcome Vs Program Outcome Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	-	-	-	-	-	2	2
CO2	3	2	2	1	1	-	-	-	-	-	2	2
CO3	3	2	2	2	3	-	-	-	-	-	2	2
CO4	3	2	2	2	3	-	-	-	-	-	2	2
CO5	3	2	2	2	3	-	-	-	-	-	2	2
CO6	2	1	2	2	3						1	1
	2.83	**2.83**	**2**	**1.83**	**2.5**						**2.83**	**2.83**

Content Beyond Syllabus/Gap identification:

- Decentralized Computing Using Block chain Technologies
- Emerging Research and Opportunities in block chain
- Scaling blockchains, payment channels, interoperability

Assignment:

Register Number	Total Number	Mode of Assignment MCQ/ Seminar/ PPT	Topics

Assignment: 1			
810421205001-810421205065 810421205301- 810421205305	69	Written	1.Blockchain - Public Ledgers 22.Monopolyproblem- Proof of Stake 27.Distributed consensus in open environments
Assignment: 2			
810421205001-810421205065 810421205301- 810421205305	69	Seminar	23.Proof of Burn - Proof of Elapsed Time 29.Byzantine general problem 34.Pease BFT Algorithm
Assignment: 3			
810421205001-810421205065 810421205301-810421205305	69	PPT	37.Architecture of Hyper ledger fabric v1.1 41.Truffle Design and issue Crypto currency 43.DAO Internet of Things

Submission Details:

Phase 1(Before AT 1)	Phase 2 (Before AT 2)	Phase 3 (Before AT 3)
Assignment 1	**Assignment 2**	**Assignment 3**

Google class code details:

Google class Name: BLOCK CHAIN TECHIQUES

Google class code: lktefkb

Prepared By **Verified By**

Approved By