**Module 5**

**Lec 14 : Permissioned BC basics**

Permissioned BC and State machines + Distributed State machines vagere diya hai isme to AT wala hi thokna hai

**Lec 15 : Permissioned BC - Consensus algos**

Consensus algos ka intro then PAXOS explain kara hai

**Lec 16 : Permissioned BC - Consensus algos**

Isme RAFT explain kara hai

**Lec 17\_18 : Permissioned BC - Consensus algos**

Isme BFT and Practical BFT hai , Three Phase Commit Protocol

**Lec 19: BC For enterprise**

Blockchain for business, Degree of centralisation, Permissioned VS Permissionless BC,Hyperledger intro

**Lec 20: BC Components & Concepts**

Actors in BC solution, Block, Ledger, BC Events,Integrating with existing systems

**Lec 21: Hyperledger fabric - Txn flow**

Hyperledger fabric, Nodes & Roles, Txn Flow,

**Lec 22: Hyperledger fabric details**

Ordering service, Channels, Single Channel n/w, Multichannel n/w, Fabric peer, Client Appln, Fabric certificate authority

**Lec 23: Membership & Identity mgmt**

Organisations, Consortium n/w, Membership service provider,Transport layer security, User identities, Admin identities, Peer and Orderer identities, Channel MSP info, Txn signing

**Lec 24: Hyperledger fabric n/w setup**

6 step process, Endorsement policies,

**Lec 25: Fabric demo on IBM blockchain cloud**

Demo ke link dale hai 2pg

**Lec 26: Fabric demo appln**

Demo ke link dale hai 2pg

**Lec 27: Fabric demo DIY**

**Lec 28: Hyperledger composer - Appln dev**

Business service provider, Assets, Participants & Txns, Events & Queries, Debugging

**Lec 29: Hyperledger composer - N/w administration**

2 roles with admin responsibility - N/w Service Provider, NSConsumer, Business SP, Participant identity, Business n/w cards, Systems of record integration, How composer maps to fabric chaincode, Hyperledger composer outlook

**Module 6**

**Lec 30 - Usecases Intro**

Sample Usecases by Industry

What makes a good blockchain use case?

What makes a good first blockchain use case?

Understanding the business problem

Understanding the participants

Identities

Understanding the Assets and Transactions

Defining Transactions

Assessing Business Value

Building Communities in Blockchain Networks

**Lec 31 - BC in Financial Services: Payments and Securities Trading**

Cross-Border Payments

Stellar Protocol and Network

Ripple Protocol and Network

Permissioned Networks for Payments and Settlements

Project Ubin: SGD on Distributed Ledger

Blockchain for Commercial Paper

Components, Processes in Securities Trading

Securities T+3 Trade Lifecycle

Securities Settlement in Low Liquidity Markets

Private Equity Administration

**Lec 32 - BC in Financial Services: Compliance and Mortgage**

Compliance (KYC, AML)

Shared KYC Solution

Information Sharing

Privacy and Consent

Mortgage Processes

Syndicated Loans

**Lec 33 - BC in Financial Services: Financing Trade**

Overview of International Trade

Blockchain enabled Future state

Trade Finance Elaborated

Trade Finance Advantages using Blockchain

WeTrade: Trade Finance Network

Supply Chain Financing- As-is

Blockchain Solution Roles/Responsibilties

**Lec 34 - Revolutionizing Global Trade**

IBM Blockchain for Trade logistics

Logistics Data Challenges

Key Industry Challenges

Global Trade Digitization(GTD)

Paperless trade

Shared Visibility

GTD Documents and Events

Other Issues: Empty Container Repositioning

Blockchain for Container Management

Other Issues: Port Operations

Blockchain for Port Operations

**Lec 35 - Blockchain in SupplyChain I**

Food Safety

Food Traceability and Safety enabled by Blockchain

FDA Food Safety Modernization Act

Supply Chain Visibility

Supply Chain Orchestration

**Lec 36 - Blockchain in SupplyChain II**

Diamond Provenance

Everledger

The Diamond Lifecycle

Supply chain compliance

Addressing Supply Chain Fraud

**Lec 37 - Blockchain in Other Industries**

Blockchain for Healthcare: Use cases

Patient Mediated Health Data Exchange

Loyalty Points Exchange

Blockchain in Energy Markets: Gridchain

Renewable Energy Flexibility  
Media

**Lec 38 - Blockchain in Government I**

Blockchain and Government

Multi-institutional or Multi-organization

Government and Cybercrime

Theft of Government Data

Use Case: Sharing of Passport Data

Government Information Sharing System

How blockchain helps

**Lec 39 - Blockchain in Government II**

Auditing & Compliance

Citizen Identity

Blockchain for Defense

Defense Secure Messaging and Transaction Platform

**Lec 40 41 - Blockchain and Government**

Digital Identity - Single Sign on(SSO)

SSO and Decentralization

Fundamental Principles of Digital Identity Management

Why blockchain for Identity Management

Hyperledger Indy & Plenum Consensus (RBFT)

**Lec 42 - Blockchain in Government IV**

Processing tax Payments

GST Without & With Blockchain

Blockchain for Land Registry Records

**Lec 43 - Security Features Overview**

Open Network: Security Properties

Blockchain for Enterprise World

Enterprise Blockchain Applications: Security Considerations

Security and Privacy: Key Differentiation of Fabric

Security in Cloud/ Hardware

Intel Software Guard Extensions (SGX)

Coco Framework

**Lec 44 - Fabric - Membership and Access Control**

Identities and Policies required at Every stage

Membership and Access control architecture

MSP Details

A standard PKI based MSP for Fabric

MSPs: Building blocks for Access Policies

Blockchain Crypto Service Providers (BCCSP)

Integration with HSM

Tool to Bootstrap a Network

**Lec 45 - Hyperledger Fabric - Privacy**

Privacy in a Blockchain system

Privacy using Channels in HF

Data privacy using Encryption

Data privacy using Encryption within Chaincode

Chaincode Transient Data

Smart Contract Confidentiality

Anonymous and Unlinkable Transactions (Identity Mixer)

X.509 vs Identity Mixer

Anonymous and Unlinkable Transactions (Auditability)

Anonymous and Unlinkable Transactions (Revocation)

Identity Mixer Integration

Privacy with zk proof cryptography

UTXO Ownership Model with Privacy

**Lec 46 - Fabric SideDB**

Ledger in HF

State Database Options

SideDB Motivation, Overview, One Collection, Multiple Collections

Define Collections for each Chaincode and Channel

**Lec 47 - Secured Multiparty Computation(MPC) over Blockchain**

MPC  
Dining Cryptographer Problem

Formal Definition

Decentralized Solution

Yao’s Millionaire Problem

Preconditions

Protocol steps & other protocols

Problems with MPC

Fair MPC

Witness Encryption

**Lec 48 - Research Aspects - I Consensus Scalability**

BC Consensus Protocols

PoW vs PBFT

PoW Scalability

Performance vs Scalability for PoW and BFT

PoW vs BFT

Issues with PoW

Bitcoin-NG: Scalable PoW protocol

Bitcoin-NG

**Lec 49 - Research Aspects - II Bitcoin NG**

Same as above

**Lec 50 - Research Aspects - III Consensus Scalability**

Collective Signing (CoSi)

CoSi Architecture

CoSi based on Schnorr Multisig

CoSi Protocol

Scaling CoSi Further

BLS Signature

Advantages of BLS Signature

**Lec 51 - Research Aspects - IV Byzcoin**

Problems with bitcoin & bitcoin-ng

PBFTCoin - Strawman Design

Problems of PBFT

Open the consensus Group

Replace MAC with CoSi

Improve Efficiency

CoSi as BFT Protocol

Further Improvement

Byzcoin Performance

**Lec 52 - Algorand: Scaling Byzantine Agreements for Cryptocurrencies**

Crypto

Algorand - Overview, technical advancement, Security Perspective, architecture

Cryptographic sortition - Selection Procedure, Proof verification, Seed Selection

**Lec 53 - Algorand: Scaling Byzantine Agreements for Cryptocurrencies**

Block Proposal

Strong synchrony vs weak synchrony

Final Consensus

Tentative Consensus

BA\*

**Lec 54 - BC for Data Analytics I BC & Bigdata**

Big Data - Processing, Challenges

BC Usecase: Shared control of big data infra, Audit Trails on Data

BigchainDB

BC vs Distributed Database vs BigchainDB

**Lec 55 - BC for Data Analytics II BC & Bigdata**

Blockchain & AI

SingularityNET

Deepbrain Chain (DBC)

ANN

HedgeFund

Numerai

Matrix AI network

**Lec 56 - Ethereum**

Mod 1 2 3

**Lec 57 - Ethereum tools and Quorum**

Quorum

**Lec 58 & 59 - Corda I**

Read entire for Corda

**Lec 60 - Recap**