

BLOCKCHAIN TECHNOLOGY

A blockchain is a digital, public ledger that records online transactions. Blockchain is the core technology for cryptocurrencies like bitcoin. A blockchain ensures the integrity of a cryptocurrency by encrypting, validating, and permanently recording transactions. A blockchain is similar to a bank's ledger, but open and accessible to everyone who utilizes the cryptocurrency it supports.

Prerequisite:

- System or laptops should be 64bit with minimum 4GB RAM
- Fast Internet is must without firewall restrictions (or 4G Mobile network can be used for individual laptops/systems) for practical sessions.

Duration – 2 Days

BLOCKCHAIN: INTRODUCTION

- What is Blockchain
- Blockchain Technology Mechanisms & Networks
- Blockchain Origins
- Blockchain Objectives
- Blockchain Users And Adoption
- Blockchain Challenges
- Transactions And Blocks
- P2P Systems
- Keys As Identity
- Digital Signatures
- Hashes As Addresses
- Hash Pointers And Data Structures
- Blockchain Transactions

BITCOIN & CRYPTOCURRENCY

- What is Bitcoin
- The Bitcoin Network
- The Bitcoin Mining Process
- Mining Developments
- Bitcoin Wallets
- Decentralization And Hard Forks
- Alternative Blockchains/Altchains
- Ethereum Consensus Mechanisms
- How Smart Contracts Work
- Difference Between Private Consortium and Public Networks
- Ethereum Virtual Machine (EVM)
- Impact Of Blockchain Technology On Cryptocurrency
- Cryptography

ETHEREUM

- What is Ethereum?
- Introduction
- A Short History Lesson
- Interfacing with Ethereum Networks
- Metamask Setup
- Ethereum Accounts
- Receiving Ether
- What's a Transaction?
- Smart Contracts
- Our First Contract
- Contract Structure
- Function Declarations
- Testing with Remix
- Redeploying Contracts
- Behind the Scenes of Deployment
- More on Running Functions Than You Want to Know
- Gas and Transactions
- Mnemonic Phrases
- Getting More Ether

Solidity Programming

- Solidity - Language of Smart Contracts
- Installing Solidity & Ethereum Wallet
- Basics of Solidity by Example: Subcoin Smart Contract
- Layout of a Solidity Source File & Structure of Smart Contracts
- General Value Types (Int, Real, String, Bytes, Arrays, Mapping, Enum, address)
- Ether Units, Time Units

Ethereum Coding for Blockchain

- Globally Available Variables & Functions
- Operators: Arithmetic, Logical & Bitwise Operators
- Control Structure (if-else, for, while, Do-While)
- Scoping and Declarations
- Input Parameters and Output Parameters
- Function Calls & Return Types
- Function Modifiers
- Fallback Function
- Abstract Contract
- Creating Contracts via "new" Operator
- Inheriting Smart Contracts
- Importing Smart Contracts & Compiling Contracts

- Events & Logging
- Exceptions
- Deployed Contracts in Remix

PROJECT

- Smart Contract: Development of smart block-based contract for project development
- Crowd Funding Smart Contract
- Voting Ballot Smart Contract for Elections using Blockchain Technology
- Ethereum Wallet – Testing Platforms / Local Platform
- **Cryptocurrency**: ERC-20 tokens & creating your **own crypto currency** using solidity for Ethereum.
- Blockchain based Lottery – Picking a Winner from various Blockchain Nodes taking part in a lottery.

Benefits

- The basic advantages of Blockchain technology are decentralization, immutability, security, and transparency.
- The blockchain technology allows for verification without having to be dependent on third-parties.
- It uses protected cryptography to secure the data ledgers.
- The transactions stored in the blocks are contained in millions of computers participating in the chain. Hence it is decentralized. There is no possibility that the data if lost cannot be recovered.
- The transactions that take place are transparent. The individuals who are provided authority can view the transaction