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Coimbatore- 49

DEPARTMENT OF COMMERCE WITH INFORMATION TECHNOLOGY

21UCI505 – BLOCKCHAIN AND DISTRIBUTIVE LEDGER

Unit-5: The concept of smart contracts on the Ethereum network and their role in decentralized applications (dApps)

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The Concept of smart contracts on the Ethereum Network

In the Ethereum network, **smart contracts** are self-executing digital programs stored on the blockchain that automatically carry out the terms of an agreement when predetermined conditions are met.

A Smart Contracts works like a digital contract written in code. Once deployed on the blockchain, it operates automatically without requiring intermediaries such as banks, brokers, or legal authorities.

Example:

If a buyer sends **₹5,000 worth of Ether**, the smart contract automatically transfers ownership of a digital product or service to the buyer.

Key characteristics of smart contracts

1. **Automation** – Executes actions automatically when conditions are satisfied
2. **Transparency** – Contract rules are visible on the blockchain
3. **Immutability** – Once deployed, the code cannot easily be altered
4. **Security** – Transactions are verified through blockchain consensus
5. **Smart contracts** on Ethereum are executed in the Ethereum Virtual Machine (EVM), which ensures that the program runs consistently across all network nodes.

Working Process of Smart Contracts

The basic working process involves the following steps:

- **Contract Creation:** A developer writes the contract code using programming languages such as Solidity.
- **Deployment:** The contract is uploaded to the Ethereum blockchain.
- **Trigger Event:** A user sends a transaction or meets a specific condition defined in the contract.
- **Execution:** The EVM executes the contract automatically.
- **Result Recording:** The outcome is recorded permanently on the blockchain.

Role of Smart Contracts in Decentralized Applications (dApps)

Decentralized Applications are applications that run on a decentralized blockchain network

instead of centralized servers. Smart contracts serve as the **backend logic** for these applications.

Major roles of smart contracts in dApps include:

1. Automating Transactions

Smart contracts allow dApps to execute transactions automatically without human intervention.

This reduces processing time and eliminates manual verification.

Role of Smart Contracts in Decentralized Applications (dApps)

2. Eliminating Intermediaries

Traditional applications rely on centralized authorities such as banks or service providers. Smart contracts remove these intermediaries, enabling direct peer-to-peer interactions.

3. Enhancing Trust and Transparency

All smart contract operations are recorded on the blockchain, ensuring that transactions are transparent and verifiable by all participants.

Role of Smart Contracts in Decentralized Applications (dApps)

4. Enabling Decentralized Finance (DeFi)

Smart contracts power financial services such as lending, borrowing, and trading through Decentralized Finance platforms without traditional financial institutions.

5. Managing Digital Assets

They control the transfer and ownership of digital assets such as tokens and NFTs within decentralized applications.

Example of Smart Contracts in dApps

Examples of dApps that use smart contracts include:

Decentralized cryptocurrency exchanges

Blockchain-based voting systems

Online gaming platforms with digital assets

Supply chain tracking systems

THANK YOU