Q1. Explain one of the Business Usecase of Blockchain.

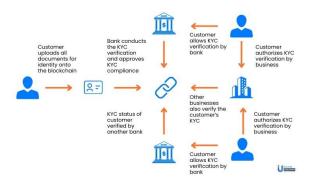
One of the business use cases of blockchain is in **Know Your Customer (KYC)** within the financial services industry. Blockchain can streamline the Know Your Customer (KYC) process in financial services by securely verifying customer identities. It reduces inefficiencies, as customers don't need to resubmit documents to different institutions, preventing fraud and cutting down on repetitive, time-consuming tasks.

Blockchain streamlines KYC by enabling customers to store personal data and documents securely in a decentralized network. Here's how it works:

- 1. Data Upload: Customers upload their information and KYC documents to the blockchain.
- Encrypted and Validated: Data is encrypted, stored, and validated via consensus mechanisms.
- 3. Access Control by Customers: Customers manage access and grant permissions to financial institutions (FI).
- 4. **Efficient Verification:** When a customer wants to open an account with a new FI, the institution retrieves pre-validated KYC data for new account openings.
- Faster Onboarding: Pre-verified data speeds up account setups and transactions, reducing costs and delays.

Benefits of blockchain in KYC:

- Efficiency & Cost Savings: No repeated submissions, and quick verification reduces costs.
- Enhanced Security & Privacy: Blockchain's cryptographic security ensures data integrity and gives customers control over access.
- 3. Faster Onboarding: Pre-validated KYC data allows financial institutions to approve accounts more quickly, speeding up the process.



 ${\tt Q2.}$ Explain how Blockchain technology enhances business.

Blockchain technology enhances businesses in several key ways, bringing advantages across various industries

- Increased Transparency and Trust: Blockchain's distributed ledger ensures all
 participants have access to a single, immutable record, reducing fraud, enhancing
 compliance, and building trust among partners and customers.
- Improved Security and Data Integrity: Blockchain uses cryptographic techniques to secure data, ensuring it cannot be altered once recorded. This is particularly valuable for sensitive information like financial transactions and medical records.
- 3. **Efficiency and Cost Reduction:** Smart contracts automate processes, eliminating intermediaries and reducing paperwork. This boosts efficiency and cuts costs, particularly in industries like finance, where cross-border payments are faster and cheaper.
- 4. Enhanced Supply Chain Management: Blockchain tracks goods in real-time from production to delivery, ensuring authenticity, reducing waste, and improving customer confidence, as seen in companies like Walmart and IBM.
- 5. Streamlined Identity Verification: Blockchain-based digital identities allow businesses to verify identities more securely and efficiently, addressing challenges in industries like banking and finance.

- 6. Smart Contracts and Automation: These self-executing contracts automate transactions once predefined conditions are met, reducing legal and administrative costs in sectors such as insurance, real estate, and finance.
- Q3. Explain crypto currency and tokens.

Cryptocurrencies

Cryptocurrencies are digital assets that use cryptography for secure transactions and operate independently of central banks. They rely on blockchain technology to ensure decentralization, immutability, and transparency. Many cryptocurrencies, like Bitcoin, have a fixed supply to prevent inflation. Transactions are validated through mining or consensus mechanisms, ensuring the integrity of the network.

Examples are Bitcoin (BTC) The first and most widely recognized cryptocurrency. Ethereum (ETH) Provides smart contract functionality. Ripple (XRP) Focuses on fast cross-border payments.

Uses: Peer-to-peer payments: Direct transfer of value between individuals.

Investment: People buying and holding them in hopes of future appreciation.

Decentralized Finance (DeFi) services: Enabling lending, borrowing, and trading without traditional FI

TOKENS

Tokens, often confused with cryptocurrencies, are also digital assets but typically represent something more than just value. They can be built on top of existing blockchain platforms (e.g., Ethereum) and serve various purposes

Types of Tokens:

- 1. **Utility Tokens:** Provide access to a service or application (e.g., Ethereum-based tokens used in decentralized apps).
- Security Tokens: Represent ownership in a real-world asset, like stocks or real estate.
- Stablecoins: Pegged to the value of a stable asset to reduce volatility. Like U.S. dollar, Tether (USDT), Dai (DAI)
- 4. Non-Fungible Tokens (NFTs): Unique tokens representing ownership of digital or physical items, Such as the famous "Everydays: The First 5000 Days" by Beeple
- Q4. With diagram explain Know Your Customer (KYC). (Same as 1st answer)
- Q5. Explain asset management settlement use case in blockchain.

Asset management in traditional financial systems requires multiple intermediaries, such as brokers and custodians. This results in Slow settlements, High transaction costs, Data discrepancies and Fraud and security risks.

Blockchain offers a decentralized, transparent, and secure way to record transactions, enabling real-time settlements and reduces intermediaries

How It Works:

- Tokenization of Assets: Physical and financial assets (stocks, bonds, real estate) are represented as digital tokens, which represents ownership and can be easily transferred between parties.
- 2. Trade Execution & Settlement: Buyer and seller agree to a trade. Once conditions are met, the smart contract executes automatically without human intervention.
- 3. Automated Clearing & Settlement: Once the trade is confirmed, Funds and digital assets are transferred securely without intermediaries. The blockchain ledger updates instantly, ensuring immediate settlement and eliminating delays.
- 4. Immutable & Transparent Record: Every transaction is recorded on an immutable blockchain, ensuring transparency, verify the trade in real-time and preventing fraud or errors.

Example: Companies like IBM Hyperledger and Euroclear are already exploring blockchain to reduce costs and enhance transaction speeds in financial settlements

In Asset Settlement blockchain provides benefits like Near-Instant Settlements, Lower Costs, Improved Security and Real-Time Transparency

Q6. Explain insurance claim processing use case in blockchain.

The traditional insurance claim process is complex and time-consuming due to Lengthy Paperwork, Fraudulent Claims, Multiple Intermediaries and Delayed Payments. It also requires significant **costs** for managing and verifying claims, making the system inefficient.

Blockchain provides a **secure**, **automated**, and **transparent** method to handle insurance claims. With blockchain, **smart contracts** can automatically execute claims, reducing intermediaries and making the process faster, more accurate and less prone to fraud.

How It Works:

- Smart Contract-Based Policy Issuance: Insurance policies are created as smart contracts on the blockchain. Terms and conditions are embedded within the smart contract.
- 2. Claim Submission & Verification: The policyholder submits a claim, which is recorded on the blockchain. Oracles (trusted data sources) fetch external data (e.g., medical reports, vehicle damage assessments).
- 3. Automated Claim Processing: The smart contract verifies claim authenticity by checking policy details and conditions. If the claim is valid, it is automatically approved.
- 4. **Instant Payment Settlement:** Once approved, the payout is triggered automatically via the blockchain. Reduces delays and prevents fraudulent claims.
- 5. **Transparency and Security:** The transaction and the claim's processing details are recorded on the blockchain, accessible to the insurer, customer, and any authorized parties.

Example: Companies like AGI-IBM (Hyperledger), AXA (Fizzy), and Lemonade are already leveraging blockchain technology to transform the insurance claim process

By using blockchain, the insurance industry can significantly reduce fraud, speed up settlements and eliminates administrative inefficiencies.

Q7. Explain trade finance (supply chain) use case in blockchain.

Trade finance involves complex web of financial transactions between buyers, suppliers, banks, and other intermediaries to facilitate the movement of goods across borders.

However, the current system has several inefficiencies like Manual Paperwork, causing delays and errors, fraud Risk, Higher transaction fees and lack of Transparency

Blockchain can revolutionize trade finance by offering a **secure**, **transparent**, and **automated** system. It introduces **smart contracts** and a **decentralized ledger** to enhance efficiency.

How It Works:

- Smart Contracts for Trade Agreements: Buyers, sellers, and financiers agree on terms stored in a smart contract. The contract automates payment processing based on predefined conditions.
- Real-Time Shipment Tracking: Internet of Things (IoT) devices track goods. When
 products are shipped, IoT data triggers a smart contract to confirm dispatch.
- 3. Automated Payment Release: When goods arrive at the buyer's location (verified via IoT), the smart contract releases payment to the seller. Eliminates the need for letters of credit from banks.
- 4. Immutable & Transparent Ledger: All parties (buyer, seller, bank, customs) access real-time transaction records. Reduces fraud and speeds up customs clearance.

Example: IBM and Maersk developed TradeLens, a blockchain-powered supply chain platform designed to track shipping containers in real time. HSBC & Standard Chartered: These global banks have successfully executed a trade finance transaction on the blockchain using a distributed ledger to settle a cross-border trade.

Q8. Explain global payments use case in blockchain.

Global payments refer to the process of transferring money across borders, allowing individuals and businesses to send funds internationally.

Traditional global payment systems often involve high transaction fees and lengthy processing times due to intermediaries like banks and payment processors. Additionally, they can be prone to errors or fraud. / are prone to illicit activities due to limited traceability.

Blockchain offers a faster, cheaper, and more secure alternative by removing intermediaries. With its decentralized, transparent, and immutable ledger, blockchain enhances the efficiency and security of international transactions.

How It Works:

- 1. Direct Transactions via Blockchain: Instead of relying on banks, payments are made through a peer-to-peer blockchain network. Transactions are verified by validators.
- Smart Contracts for Automatic Settlements: When payment conditions are met, smart
 contracts execute transactions automatically by eliminating settlement time from days
 to minutes.
- Instant Currency Conversion: Blockchain-based networks like Ripple (XRP) enable fast currency exchange. Uses crypto-assets as bridge currencies, reducing foreign exchange fees
- 4. Enhanced Security & Transparency: Every transaction is recorded on an immutable blockchain, ensuring traceability. Helps in anti-money laundering (AML) compliance by providing audit trails.

Example: Santander Bank was one of the first to apply blockchain for global payments, enabling 24-hour cross-border settlements. Ripple Network (XRP) has been adopted by banks such as UBS, Royal Bank of Canada, and CIBC to facilitate real-time global transactions.

Q9. Explain smart property use case in blockchain.

Smart property refers to **physical or digital assets** that are managed and controlled using blockchain technology. This includes **Physical assets** like Vehicles, real estate, smart locks, and IoT devices and **Digital assets** like Copyrights, patents, stocks, and digital identity records. By using blockchain, ownership, access, and transactions involving these assets can be securely recorded and automated using **smart contracts**.

How Smart Property Works in Blockchain - Key Points:

- 1. Ownership Management: Each property is assigned a digital certificate that is stored on the blockchain. Ownership transfers are immutable and tamper-proof, reducing fraud.
- 2. Automated Transactions via Smart Contracts: A smart contract automates property transfers when predefined conditions are met. Example: A car sale.
- 3. Smart Collateral for Loans: Smart property can be used as collateral for loans. If the borrower fails to repay, the ownership automatically shifts to the lender via the blockchain.

OR

- 1. Tokenization of Property: Physical property is digitized into a blockchain token (NFT or similar) representing ownership rights, like a deed to the property.
- 2. Smart Contract Creation: A smart contract is programmed to handle transactions, rules, and ownership transfers related to the property automatically. This contract is stored and executed on the blockchain.
- **3. Ownership Verification:** Blockchain's decentralized ledger verifies the ownership and history of the property, ensuring authenticity and preventing fraud.
- **4. Property Transfer:** When a sale or transfer occurs, the smart contract automatically handles the transaction, transferring tokens from the buyer to the seller, based on pre-agreed conditions.
- 5. Decentralization & Security: The blockchain ensures that no central authority controls the property's data. Transactions are encrypted and immutable, enhancing security.
- **6. Automated Payments & Maintenance:** Smart contracts can also automate payments (like rent) or property-related activities (like maintenance).

Example: Propy is a blockchain-based real estate platform that allows users to buy and sell properties globally using smart contracts.

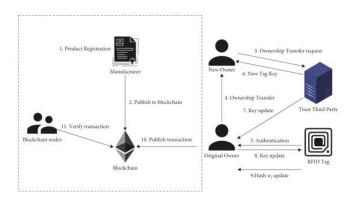
VeChain uses blockchain to track the ownership and history of vehicles, ensuring that buyers have transparent information about the vehicle's history, and sellers can transfer ownership without intermediaries.

Q10. Explain transferring of ownership of smart property in blockchain with proper diagram.

Smart property refers to **physical or digital assets** that are managed, tracked, and transferred. Traditional property systems are often prone to issues like fraud, lengthy paperwork, and errors in title ownership. They also rely on intermediaries like notaries and courts which can be costly and slow.

Blockchain provides a secure, transparent, and tamper-proof platform for recording property transactions. By eliminating intermediaries and automating processes

- 1. **Tokenization:** The property (e.g., real estate, vehicles) is represented digitally on the blockchain as tokens, each representing ownership or a fraction of the asset.
- Smart Contract Creation: A smart contract is created on the blockchain to define the terms of ownership transfer for a specific property (e.g., digital assets, real estate).
- 3. Ownership Registration: The current owner's details and the property's details are registered on the blockchain, ensuring a tamper-proof record of ownership.
- 4. **Transfer Request:** When the current owner decides to transfer ownership, a transaction request is initiated. This request is validated by the blockchain network through consensus mechanisms.
- 5. Smart Contract Execution: The smart contract automatically executes when conditions (such as payment or approval) are met. It then updates the blockchain ledger with the new owner's information.
- 6. Ownership Update: Once the transaction is confirmed, the blockchain records the new owner's details, completing the transfer in a secure, immutable manner.



Q11. Explain smart property collateral use case in blockchain.

Collateral management in traditional finance requires **trusted third parties** (banks, brokers) to **verify and hold assets** as security for loans.

This system has several challenges like Complex Documentation, Limited Access to Collateral, Slow Repossession Process and Risk of Fraud.

By leveraging blockchain's features like **tokenization** and **smart contracts**, this use case enables secure, efficient, and automated collateral management

- 1. Tokenization of Property: The smart property (e.g., real estate, vehicles, or intellectual property) is tokenized into a digital asset on the blockchain. This digital token represents the property's value and ownership.
- 2. Smart Contract Creation: A smart contract is set up between the borrower and the lender, specifying the terms of the loan, collateral requirements, and conditions for release. This contract is stored on the blockchain.

- 3. Collateral Pledge: The borrower pledges the tokenized smart property as collateral. The token is "locked" in the smart contract until the loan conditions are fulfilled.
- 4. **Transaction Verification:** The blockchain network verifies the validity of the transaction and ensures that the collateral is correctly tied to the smart contract.
- 5. Loan Issuance: Upon successful verification, the lender provides the loan to the borrower. The contract records this transaction, and the collateral remains locked on the blockchain.
- 6. **Repayment and Release:** When the borrower repays the loan as per the contract, the smart contract automatically releases the collateral (i.e., the tokenized property) back to the borrower.
- 7. **Default and Seizure**: If the borrower defaults on the loan, the smart contract triggers an automatic seizure of the collateral. The property token is transferred to the lender or liquidated based on the predefined terms.

Example: **BlockFi** is a platform that allows users to pledge cryptocurrency as collateral for loans. Blockchain is used to ensure the security and immutability of collateral records.

Q12. Explain smart contract.

A smart contract is a self-executing contract in which the terms of an agreement between parties are written into code and deployed on a **blockchain**. These contracts automatically enforce the agreed-upon terms without requiring intermediaries, ensuring **secure**, **transparent**, and **tamper-proof transactions**.

Smart contracts operate on **blockchain platforms** like **Ethereum**, **Solana**, and **Binance Smart Chain**, allowing for decentralized, trustless transactions.

How Smart Contracts Work

- 1. **Contract Creation:** The contract terms are **coded** using a blockchain programming language (e.g., Solidity for Ethereum). These terms can include conditions for actions to be taken, such as releasing payment or transferring property.
- 2. **Deployment on Blockchain:** The contract is stored on the blockchain, ensuring immutability. Each network node has a copy of the contract.
- Triggering Events: Smart contracts are event-driven. This means when predefined conditions are met, the contract executes automatically.
- 4. Transaction Validation & Finalization: The blockchain verifies the transaction. Once the contract is executed and the transaction is recorded on the blockchain, ensuring transparency and an immutable record of the event.

Example Use Case: Automated Supply Chain Payments

- 1. A supplier ships goods to a retailer.
- 2. The shipment is tracked using IoT sensors.
- 3. Once the shipment is verified, the smart contract automatically releases payment to the supplier.
- Q13. Explain the trust problem.

The **trust problem** arises when individuals or organizations need to rely on intermediaries, institutions, or third parties to manage transactions or ensure fairness. Trust is often required in financial systems, digital transactions and supply chains, but it can be difficult to establish, maintain or verify.

The **trust problem** in blockchain revolves around the need to replace traditional intermediaries with decentralized systems that do not require participants to trust any one entity.

How Blockchain Solves the Trust Problem

- 1. **Decentralization:** Instead of a single trusted central authority (like a bank), control is distributed across a network of nodes. This removes the need for third parties and prevents any one party from manipulating the system.
- Transparency: Blockchain records all transactions in a public ledger that everyone can access and verify. This openness ensures that all actions are traceable and transparent, reducing the chance of fraud.

- 3. **Immutability:** Once data is recorded on the blockchain, it cannot be changed or deleted. This permanent record makes it nearly impossible for bad actors to alter transaction history.
- 4. **Consensus Mechanisms:** Transactions are verified by the network using consensus methods like Proof of Work or Proof of Stake. This ensures that the majority of participants agree on the validity of transactions, making manipulation difficult.
- 5. Smart Contracts: Blockchain can also use self-executing smart contracts that automatically enforce terms, reducing human error or dishonesty.

Example: Traditional voting systems rely on election officials and are prone to manipulation, fraud and errors. Blockchain-based voting systems for instance Follow My Vote is a platform designed to offer more transparent and secure elections, ensures each vote is securely recorded and verified.

Q14. Explain Trusted Third party in blockchain.

A Trusted Third Party (TTP) is an intermediary entity that facilitates, records, and verifies transactions between two or more parties who do not know each other or cannot fully trust each other.

In blockchain systems, the need for a **centralized trusted third party** is minimized or eliminated because blockchain's decentralized, transparent, and immutable nature provides the necessary trust.

How Blockchain Disrupts the Need for TTPs:

- 1. **Decentralization**: Blockchain allows peer-to-peer transactions without requiring a third party, as trust is distributed across a network of participants.
- 2. **Transparency:** All transactions on the blockchain are publicly recorded and can be verified by anyone, reducing the need for an intermediary to authenticate actions.
- 3. **Immutability**: Once data is recorded on the blockchain, it cannot be altered, ensuring that the transaction is secure without relying on an external verifier.
- 4. **Smart Contracts:** These self-executing contracts automate processes that would traditionally require a third party, such as transferring assets when conditions are met, reducing the role of intermediaries.

Examples:

Cryptocurrency Transactions: Bitcoin allows users to send and receive payments directly without needing banks as intermediaries, relying on the blockchain to verify transactions.

DeFi Platforms: Decentralized finance (DeFi) applications eliminate the need for financial institutions by using smart contracts to facilitate lending, borrowing, and trading directly between users.

Q15. How does a smart contract work? (Same as Q12)