

General Studies – 3; Topic – Science and Technology- developments and their applications and effects in everyday life

Blockchain Technology

1) Introduction

- Blockchain is a secure, digitised and distributed ledger to store records.
- Anything recorded on them cannot be deleted, and is instantly uploaded to all users on that blockchain.
- Blockchain originally developed as an accounting system for the cryptocurrency Bitcoin, is being researched across the banking and financial services industries.

2) Advantages

- The blockchain ledger has several advantages over traditional databases.
- It is more transparent and secure as any changes to the ledger can be made only with the approval of all stakeholders.
- The records in the ledger are distributed among the stakeholders and not stored in a centralised database.
- Blockchain removes the need for using a trusted third party such as a bank to make a transaction by directly connecting the customers and suppliers.
- Transaction time is reduced.
- Blockchain's ability to enhance real-time visibility in the functioning of the supply chain will prevent leakages, and thereby increase efficiency.
- It provides an opportunity for technology start-ups for developing and using the technology for diverse applications.

3) Applications

- Bitcoin is just one of the applications for the technology, whose use is being tested across industries.
- Healthcare, banking, education, agriculture, electricity distribution and land records are sectors that could benefit.
- Blockchain-powered smart contracts, where every piece of information is recorded can enhance ease of doing business.
- It will augment the credibility, accuracy and efficiency of a contract while reducing the risk of frauds, substantially.
- Blockchain could play a crucial part in health insurance claims management by reducing the risk of insurance claim frauds.
- The technology can also be used to prevent the sale of spurious drugs in the country by tracking every step of the supply chain network.
- Artificial Intelligence and Internet of Things (IoT) can gain immensely from blockchain applications.
- In an IoT world, thousands of devices would need to rapidly and seamlessly transact with each other in real time.
- The adoption of blockchain by India's banks could help avert frauds such as the one at Punjab National Bank as the technology updates information across all users simultaneously.
- It could be used to further strengthen our national institutions, including the judiciary and the Election Commission.

- Critical citizen information like land records, census data, birth and death records, business licenses, criminal records, intellectual property registry, electoral rolls could all be maintained as blockchain-powered, tamper-proof public ledgers.

4) **Government's Efforts**

- 'IndiaChain' - Niti Aayog's ambitious project to develop a nation-wide blockchain network.
- When implemented it will be the world's largest blockchain implementation programme in governance.
- Several State governments including Andhra Pradesh, Telangana, Gujarat, Karnataka and Maharashtra, are using the technology for their e-governance initiatives.
- The Andhra Pradesh government is leading the way in blockchain adoption in land records and transport.

5) **International Examples**

- Globally, blockchain technology has proven to be a change-maker.
- In Russia, blockchain-based systems are being pursued for land registry management as well as for improving the local voting system.
- The Dubai government is on its way to implement blockchain-based paperless digital systems in visa applications, licence renewals and bill payments.
- Estonia's eHealth Foundation is using a blockchain-based system to process and store patient health records.

6) **Concerns / Challenges**

- Blockchain technology is expensive to initially put it in place.
- The massive usage of energy for the functioning of blockchain.
- Safeguarding the privacy of individuals and companies as blockchains are usually open ledgers for everyone to see.
- Knowledge of the benefits of distributed ledger technology is still limited.

7) **Way Forward**

- Blockchain, with all its possibilities, needs a serious look at its vulnerabilities and commerciality.
- Before introducing blockchain into the public sector data-handling system, we need a robust and informative data repository.
- Linking IndiaChain with Aadhar, thus creating a secure personal identity for all Indians.
- Proper regulations for the use of blockchain technology in the country.
- Identifying and resolving key issues and challenges in implementing this technology, the prime amongst those being data privacy.
- India should effectively channel its technical human capital surplus to position itself as one of the pioneers during this upcoming wave of innovation.