India and the Blockchain technology

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Manifest Pedagogy:

Blockchain is an innovative distributed ledger technology which was first introduced in the design and development of cryptocurrency, Bitcoin in 2009 by Satoshi Nakamoto. Blockchain is an amalgamation of various innovations, with a clear business value. Globally and nationally, various efforts are being made towards implementing Blockchain based applications. In order to reap the benefits of this technology, there is a need for a national collaborative effort on Blockchain technology. In the future, the adoption of blockchain technology is all set to propel India to a whole new level altogether, helping it to rise considerably in ranks amongst the nations.

In News: Jharkhand is the first state to implement blockchain in the country which is being used to track seed distribution.

Placing it in the Syllabus: Science and Technology.

Static Dimensions

- About Blockchain Technology

Current Dimensions

- Significance of Blockchain
- India and the Blockchain technology
- Government measures to Promote Blockchain technology
- Advantages of Blockchain technology
- Issues with Blockchain technology

Content

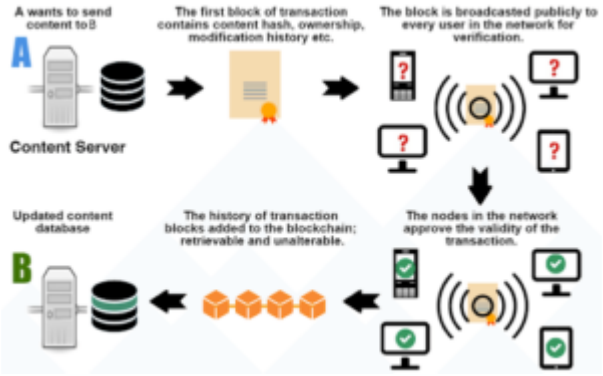
A digital infrastructure based on blockchain technology

will transform the digital ecosystem in India, and will enable the future of digital services, platforms, applications, content, and solutions.

- In recent years, India has made a significant effort to become a digital society by building a large citizen-scale digital public infrastructure.
- The Government of India and Reserve Bank of India (RBI) have been promoting simplification and transparency to increase the speed of interaction between individuals, markets, and the government.
- With the commencement of the Digital India mission in 2015, our payments, provident fund, passports, driving licences, crossing tolls, and checking land records all have been transformed with modular applications built on Aadhaar, UPI, and the India Stack.

About BlockChain Technology

- Blockchain derives its name from the digital databases or ledgers where information is stored as “blocks’’ that are coupled together forming “chains”.
- It offers a singular combination of permanent and tamper-evident record keeping, real-time transaction transparency and auditability.
- An exact copy of the blockchain is available to each of the multiple computers or users who are joined together in a network.
- Any new information added or altered via a new block is to be vetted and approved by over half the total users.
- As per predictions, blockchain technology is all set to become a massive $176 billion business by 2050.



Significance of Blockchain

- Blockchain technology can facilitate innovations across a range of processes and applications requiring management, storage, retrieval and safety of vast and important information.
- These include management of information pertaining to financial transactions (as in the case of cryptocurrencies), electoral voting, medical records, academic lessons, property ownership records and professional testimonials.
- A decentralised framework like blockchain makes the system and the information stored therein fraud-proof, transparent and credible.
- Blockchain technology provides an excellent technological framework for preservation of classified and unclassified data in a reduced risk environment. Hence, it is suitable for entities requiring such capability.
- Blockchain technology provides an opportunity for transparent transaction processing in any domain as it supports track and trace capability.
- With the Blockchain-as-a-Service paradigm, revenue generation models can be evolved for offering various services (G2C, G2G, B2B etc.)

India and the Blockchain technology

- **The Telecom Sector** – The Telecom Regulatory Authority of India(TRAI) has instructed all telecom companies to

start incorporating blockchain technology. This will be helpful in tackling the problem of spam calls and will enable the authorities to track down the unregistered telemarketing companies.

- **The Tea Board of India** – The Tea Board of India is planning to adopt blockchain technology to help increase traceability across the entire supply chain. The Board has been facing a degradation in the quality of tea being produced, due to adulteration. The adoption of blockchain technology throughout the supply chain will help in keeping a record at every step.
- **Blockchain for secured voting** – Three students from Malla Reddy Engineering College for Women have developed a new concept, showing how blockchain technology can be used to secure the voting process in our country.
    - A pilot project carried out by these students in gated communities and housing estates had shown that the implementation of the concept in real life will be very beneficial.
- **Securities and Exchange Board of India (SEBI)** – SEBI has instructed all depositories to make use of blockchain technology to maintain records.
    - This will bring in more transparency in the process of record-keeping, as well as in the process of monitoring the creation of securities and covenants of non-convertible securities.
- **Banking Sector**-Reserve Bank of India (RBI) is exploring applying Blockchain technology in the banking domain. Mahindra and IBM are jointly collaborating on supply chain management solutions.
    - State Bank of India (SBI) has associated with commercial banks and financial institutions for Blockchain based application pilot. Yes Bank, Axis Bank and ICICI Bank are also adopting Blockchain in their banking business.
- **Agriculture**– NITI Aayog in collaboration with Gujarat Narmada Valley Fertilisers & Chemicals Limited (GNFC)

has developed a Blockchain based system for fertiliser subsidy.
    - In a significant development that would revolutionise agriculture in the country, the Directorate of Agriculture, Jharkhand, and global blockchain technology company, SettleMint, India jointly announced the successful launch of seed distribution to farmers based on blockchain technology. This will enable timely availability of seeds to distributors, retailers and most importantly, the farmers.
- **Governance**– IIT Kanpur is working on Blockchain technology focused on developing e-governance solutions.
- **Tourism**– Blockchain can reduce the delay time of passenger document handling, creates a decentralised hotel booking ecosystem at the least transaction fee and also keeps passengers private information safe.

Government Measures to Promote Blockchain technology

- The Ministry of Electronics and Information Technology (MeitY) has prepared a draft framework for the use of blockchain technology in government services and intends to use it in the areas of property record keeping, digital certificates, power distribution, health records as well as supply chain management.
- The government think tank NITI Aayog had also, through a discussion paper, suggested the use of the distributed ledger technology for delivery of state-run services such as fertiliser subsidy disbursement and educational certificates among others.
- MeitY has supported a multi-institutional project titled “Distributed Centre of Excellence in Blockchain Technology” with C-DAC.
- NIC along with NICSI has established a Centre of Excellence (CoE) in Blockchain technology

Advantages of Blockchain technology

- Blockchain technology provides a **decentralised, vigilant, time stamped, immutable and consensus based data storage for the stakeholders.**
- Ensures integrity of the entire process- It means that any block or even a transaction that adds to the chain cannot be edited which ultimately provides a very high range of security.
    - The block encryption in the chain makes it tougher for any hacker to disturb the traditional setup of the chain.
- The blockchain ledger, each time an exchange of goods is recorded on a Blockchain, an audit trail is present to trace where the goods came from. This improves security and prevents fraud in exchange-related businesses
- After the blockchain technology speed of the banking transaction increased to a very high extent
- Depending on the need of the application domain, either permissioned or permissionless Blockchain environments can be set up.
- Blockchain-as-a-Service allows for seamless integration for using Blockchain features in various application domains

Issues with Blockchain technology

- **Scalability:** The current transaction processing rate of Blockchain platforms varies from 7tps (transactions per second) to 3500 tps depending on individual platform's applicability to a particular domain, architectural considerations, consensus approach, number of nodes in deployment, etc.
    - The generic architectural platforms such as HyperLedger Fabric, though apparently suitable for requirements of various domains, still have scalability as a major concern and researchers are striving to get better results
- Indian developers do not have the ability to develop

open blockchain solutions at scale.

- Once some data has been entered, it cannot be altered or deleted.
    - It poses a challenge as it eliminates the possibility of modifying student records for legitimate purposes.
- Blockchains are vulnerable to network attacks as they were not originally designed for network protocols
- **Interoperability** across various Blockchain platforms is still in its infancy and a lot of work is required to address this issue. Interoperability mainly is required in the following situations:
- Setting up a blockchain network can be an expensive investment in the first place
- A high surge of energy is required for the functioning of this technology
- **Disposal of Records-** Right to be forgotten is one of the requirements in the proposed Personal Data Protection Bill.
    - As records stored on Blockchain are immutable, in order to enforce this requirement, appropriate measures have to be taken while implementing the Blockchain technology

Way Forward

- To promote entrepreneurial development and involve premier research institutions, Blockchain technology stack may be collaboratively evolved by involving various stakeholders from Government, premier research institutes, startups and industry
- Currently, blockchain models that rely on inherent standards and are uncontrolled are either fully public, like Ethereum, or partially authorised. Therefore, the necessity for government regulations exists.
- Creating National Ecosystem on Blockchain: This public infrastructure will help to solve existing issues of

decentralised technologies.

- Supporting research in standards, interoperability, and effective management of currently recognised problems with distributed technology is necessary.
- Security audit and assessment processes / guidelines may be evolved considering the smart contract and other specific constructs of Blockchain
- Advanced research may be focused upon in the domain of Blockchain technology and various challenges in adopting the technology towards building a trusted public digital platform may be addressed.
- Standardisation across the various layers of Blockchain technological stack and applications should be considered as one of the important activities in the framework development.

Mould your thoughts

1. The decentralised nature of the blockchain technology applications makes it a perfect fit for many industries to carry out secure business transactions. Discuss the potential of Blockchain technology for India. Also highlight the steps taken by the government to promote the technology. (250 Words)

Approach to the answer.

- About Blockchian technology
- Significance and Strengths
- Potential of Blockchain technology for India
- Challenges associated
- Government Initiatives
- WayForward and Conclusion