

SCIENCE AND TECH❖ **An India Blockchain Platform**

❖ **CONTEXT:** 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, 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.**

❖ **Limitations of public digital infrastructure**

- It is well established that digital infrastructure should be designed based on principles of availability, affordability, value, and trust. The invisible rules underlying technology can be made visible using design principles, legislative frameworks, governance frameworks, and public engagement.
- But when we look at the current digital ecosystem, it's identified that existing different digital infrastructures are not interconnected as a design; a technical integration is required to make them conversant and interoperable. Today, information has to travel across multiple systems to complete the interaction, and rely on private databases, which makes the validation of data more complex as the network grows, driving up costs and creating inefficiencies.

❖ **Web 3.0 to address challenges**

- It is becoming increasingly essential for developing nations to iteratively build innovative solutions on top of existing digital infrastructure.
- India need resilient platforms, which may be based on the Web 3.0 architecture of tomorrow, even when it may take some more time to get these platforms capable of scaling and solving the current challenges in a cost-efficient manner.
- The Web 3.0 architecture establishes a new version of the Internet protocol incorporating token-based economics, transparency, and decentralisation.
- It is critical to understand that Web3 is not only the cryptocurrencies, but also NFTs or non-fungible tokens, representing physical assets or digital twins.
- A user can access all ecosystem benefits using a distributed token where they can show proof of ownership, tax history, and payment instruments.
- Since the Web 3.0 ecosystem is less zero-sum, user lock-in is not the primary goal for new companies, and key operations can be encoded in "smart contracts" that are auditable, immutable, and easier for an early adopter to complete.
- A block chain-based infrastructure can provide all of these attributes without the need of trusting any particular actor to verify a ledger's history. The block chain records could be visible, compiled, and audited by the regulators in real time.

❖ **Increasing global adoption of block chain infrastructure**

- According to the management consulting company Gartner, by 2023, 35 per cent of enterprise blockchain applications will be integrated with decentralised applications and services. Many countries have already begun establishing their blockchain policies and infrastructure.
- Estonia, the world's blockchain capital, is using blockchain infrastructure to verify and process all e-governance services offered to the general public.
- China launched a program in 2020 called BSN (Blockchain-based Service Network) to deploy blockchain applications in the cloud at a streamlined rate.
- In Britain, the Centre for Digital Built Britain, a partnership between the University of Cambridge and the UK government's Department for Business, Energy, and Business Strategy, is running the National Digital Twin program (NDTp) to foster collaboration between owners and developers of digital twins in the built environment.
- Brazilian government recently launched the Brazilian Blockchain Network to bring participating institutions in governance and the technological system that facilitates blockchain adoption in solutions for the public good.
- There are also well-established decentralised finance (DeFi) platforms that rely on blockchain infrastructure like Ethereum, however, pegged to the base cryptocurrencies owned by that platform. As is well known, these platforms have multi-country presence and usage, and do not come under any particular regulatory ambit.

- DeFi allows users to borrow and lend cryptocurrencies on a short-term basis at algorithmically determined rates. DeFi users are rewarded with tokens that confer governance rights, which are analogous to seats on the protocol's board.
- Recently, blockchain provider Solana launched a prototype smartphone with hardware and security that can support decentralised apps for people interested in crypto wallets, Web3, and NFTs.
- Many Indian technology firms are building layer 2 chains (L2) on top of the base proven layer 1 chains (L1), while providing value-adds like scale, throughput, etc., mainly through bundling the transactions. These implementations convey the story of blockchain technology driving the future of Web 3.0.
- ❖ **The digital roads that India must build using blockchain**
- The Indian digital community, including fintechs, academia, think tanks, and institutions, should focus on supporting research in standards, interoperability, and efficient handling of current known issues with the distributed technologies, e.g., scalability and performance, consensus mechanisms, and auto-detection of vulnerabilities.
- At present, end-user devices such as smartphones do not support blockchain-based technology and, as a result, the last mile is always outside the network. However, the day is not far when smartphone manufacturers will deliver blockchain compliant devices by adding extensions.
- The blockchain models today are either permissioned, which suffice for the need of a consortium, or are public like Ethereum which are unregulated and rely on intrinsic standards.
- The ideal solution to solving most of the known issues of decentralised technologies lies in the middle path, i.e., a national platform operating at L1 that interconnects blockchains (both permissioned and public), application providers (decentralized applications — dApps — and existing), token service providers, and infrastructure managers. Together they can form a reliable and efficient network for the Indian digital economy.
- The ecosystem can further deploy relevant and purpose-specific applications at L2 for very little cost and effort, while the L1 continues to handle the heavy lifting for all the L2s operating on layer 1. All L2 chains on this public infrastructure L1 will communicate with each other, thus replicating the communication (and avoiding the need for complex integrations with each other) on the Internet for existing Indian digital infrastructures.
- The need of the hour is to work on an indigenous solution of the people, for the people, and by the people — an India Blockchain Platform — even if it takes years to design and implement. 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. Considering the current state of affairs worldwide, one can safely assume that we are at the beginning of the curve, but the days are not far

PRELIMS

1. Megalodon

- ❖ **CONTEXT: Using fossil evidence to create a three-dimensional model, researchers have found new evidence about the life of one of the biggest predatory animals of all time — the Megalodon.**
- According to the new study published in the journal Science Advances, the Megalodon could “completely ingest, and in as few as five bites,” a prey as big as the killer whale.
- According to the study, the Megalodon was bigger than a school bus at around 50 feet from nose to tail. In comparison, the great white sharks of the present can grow to a maximum length of around 15 feet.
- Using their digital model, the researchers have suggested that the giant transoceanic predator would have weighed around 70 tonnes — or as much as 10 elephants.
- Megalodons roamed the oceans an estimated 23 million to 2.6 million years ago.
- Using a previously established relationship between speed and body mass, researchers calculated that the Megalodon had an average cruising speed faster than sharks today. According to the research team, the Megalodon had the ability to migrate across multiple oceans.
- ❖ **3D modelling research**
- The technique was used as the Megalodon's skeleton is made of soft cartilage that doesn't fossilize well. Using fossils that were available, including mainly teeth and a rare collection of vertebrae that has been with a Belgium museum since the 1860s, computer modelling was used to reconstruct the entire body of the extinct and largest known macropredatory shark.

2. Corporate Social Responsibility (CSR)

❖ **CONTEXT:** The Ministry of Corporate Affairs, instituted the annual National Corporate Social Responsibility (CSR) Awards to recognize companies that have made positive impact on the society through their innovative & sustainable CSR initiatives. These awards are the apex national level recognition by the Government of India

- The term "Corporate Social Responsibility" in general can be referred to as a corporate initiative to assess and take responsibility for the company's effects on the environment and impact on social welfare.
- Corporate social responsibility is a type of business self-regulation with the aim of social accountability and making a positive impact on society. Some ways that a company can embrace CSR include being environmentally friendly and eco-conscious; promoting equality, diversity, and inclusion in the workplace; treating employees with respect; giving back to the community; and ensuring business decisions are ethical.

❖ **CSR in India**

- In India, the concept of CSR is governed by clause 135 of the Companies Act, 2013.
- India is the first country in the world to mandate CSR spending along with a framework to identify potential CSR activities.
- The CSR provisions within the Act is applicable to companies with an annual turnover of 1,000 crore and more, or a net worth of Rs. 500 crore and more, or a net profit of Rs. 5 crore and more.
- The Act requires companies to set up a CSR committee which shall recommend a Corporate Social Responsibility Policy to the Board of Directors and also monitor the same from time to time.
- The Act encourages companies to spend 2% of their average net profit in the previous three years on CSR activities.

❖ **Activities can be Undertaken by A Company under the CSR**

- Specified under Schedule VII of the Companies Act 2013, these activities include:
 - Eradicating extreme hunger and poverty
 - Promotion of education, gender equality and empowering women
 - Combating HIV-AIDS and other diseases
 - Ensuring environmental sustainability
 - Contribution to the PM's National Relief Fund or any other fund set up by the Central Government for socio-economic development and relief.

3. **BioSentinel**

❖ **CONTEXT:** NASA's BioSentinel will carry microorganisms to deep space to help scientists better understand the effects of deep space radiation on biological life forms.

- The BioSentinel mission was selected as one of the secondary payloads, and the sole biological experiment, to fly on the first launch of the Space Launch System rocket for the Artemis I mission.
- The primary objective of BioSentinel is to develop a biosensor instrument to detect and measure the impact of space radiation on living organisms over long durations beyond low-Earth Orbit (LEO).
- While progress identifying and characterizing biological radiation effects using Earth-based facilities has been significant, no terrestrial source can fully simulate the unique radiation environment encountered in deep space.
- The BioSentinel biosensor utilizes the budding yeast *Saccharomyces cerevisiae* to query the biological response to ambient deep space radiation, including DNA damage like the formation of double strand breaks (DSBs).
- DSBs are deleterious DNA lesions that are generated by exposure to highly energetic particles in the deep space radiation spectrum, and that are often repaired without errors by the cell.
- The biosensor contains two genetically engineered yeast strains.
- One is a wild type strain that serves as a control for yeast health and "normal" DNA damage repair.
- The second is a rad51 deletion strain, which is defective for DNA damage repair.
- These changes will be detected by the biosensor payload.

4. **Emergency Credit Line Guarantee Scheme (ECLGS)**

❖ **CONTEXT:** Recently, the Union Cabinet has approved the enhancement in the limit of the Emergency Credit Line Guarantee Scheme (ECLGS).

❖ **About**

- The limit is enhanced from Rs. 4.5 Lakh crore to Rs. 5 Lakh crore. The additional amount is being earmarked exclusively for enterprises in hospitality and related sectors till validity of the scheme which is 31.03.2023.
- The increase has been done on account of the severe disruptions caused by COVID-19 pandemic on hospitality and related enterprises.
- Impact of limit enhancement will provide much needed relief to enterprises and support the recovery of hospitality sectors. Incentivizing lending institutions with additional credit of up to Rs. 50,000 crore at low cost. Enabling these business enterprises to meet their operational liabilities and continue their businesses.
- ❖ **Emergency Credit Line Guarantee Scheme (ECLGS)**
 - Announced as part of the Atma Nirbhar Bharat Package in 2020
 - Objective: to help businesses including MSMEs to meet their operational liabilities and resume businesses in view of the distress caused by the COVID-19 crisis.
 - Providing Member Lending Institutions (MLIs), 100 percent guarantee against any losses suffered by them due to non-repayment of the ECLGS funding by borrowers.
 - Operational domain of the Department of Financial Services (DFS), Ministry of Finance.
 - Limit:
 - The overall ceiling initially announced for ECLGS was Rs 3 lakh crore which was subsequently enhanced to Rs 4.5 lakh crore.
 - Loans of about Rs. 3.67 Lakh crore have been sanctioned under ECLGS till 5.8.2022.
- 5. **The Great Indian Bustard (Ardeotis nigriceps)**
 - ❖ **Context: The perceived beliefs and recorded observations of egg laying habit of Great Indian Bustard (GIB) have changed after the recent excessive rains in western Rajasthan. The critically endangered bird species has adopted an altogether new behaviour of giving clutch of two eggs at a time after getting additional protein diet during the monsoon season. 5% to 10% of the female GIBs had been detected in the past laying two eggs each, but the high incidence, with the signs of an evolving habit, had been observed for the first time.**
 - ❖ **Conservation Status:**
 - Listed in Schedule I of the Indian Wildlife (Protection) Act, 1972,
 - In the CMS Convention and in Appendix I of CITES,
 - As Critically Endangered on the IUCN Red List
 - It has also been identified as one of the species for the recovery programme under the Integrated Development of Wildlife Habitats.
 - ❖ **Conservation Issues**
 - The biggest threat to this species is hunting, which is still prevalent in Pakistan.
 - This is followed by occasional poaching outside Protected Areas, collisions with high tension electric wires, fast moving vehicles and free-ranging dogs in villages.
 - habitat loss and alteration as a result of widespread agricultural expansion and mechanized farming,
 - ❖ **Distribution and habitat**
 - Historically, the great Indian bustard was distributed throughout Western India, spanning 11 states, as well as parts of Pakistan.
 - Its stronghold was once the Thar desert in the north-west and the Deccan plateau of the peninsula.
 - Today, its population is confined mostly to Rajasthan and Gujarat. Small population occur in Maharashtra, Karnataka and Andhra Pradesh.
 - Bustards generally favour flat open landscapes with minimal visual obstruction and disturbance, therefore adapt well in grasslands.
 - In the non-breeding season they frequent wide agro-grass scrub landscapes. While in the breeding season (summers and monsoons) they congregate in traditional undisturbed grassland patches characterized by a mosaic of scantily grazed tall grass (below 50 cm).
 - They avoid grasses taller than themselves and dense scrub like thickets.
 - ❖ **Project Great Indian Bustard**
 - With an objective of conservation of the remaining population of critically endangered Great Indian Bustard, locally called Godawan, an ambitious conservation program namely, Project Great Indian Bustard, was launched by Rajasthan government in 2013.

- Probably more vulnerable to extinction than even tiger, Great Indian Bustard, although it was brought under the umbrella of Wildlife (Protection) Act, 1972, it did not gain attention and remained BPL (Below Protection Line);
- The Project Bustard can be seen as a dawn of a new era for the conservation of neglected species like Great Indian Bustard which is also the state bird of Rajasthan.
- Once more than 1000 individuals few decades back, bustard population shrunk to 745 in the year 1978, 600 in 2001, 300 in 2008 and not more than 125 in 2013.
- Being custodian of more than 50 percent population of bustard across the world, the desert state of Rajasthan took up the responsibility for the conservation of this species and its habitat for our future generations by becoming a first state in launching the Project Bustard, initially in the Desert National Park Sanctuary, located in Jaisalmer district of Rajasthan.

ANSWER WRITING

Q. The frequency of urban floods due to high intensity rainfall is increasing over the years. Discussing the reasons for urban floods, highlight the mechanisms for preparedness to reduce the risk during such events.

Flooding and disruption have become the new normal for the monsoon season in urban India. Recent water logging in Gurgaon, urban flood in Mumbai and Srinagar shows the increasing intensity of urban flood disasters in India. These are some of the reasons of urban floods in case of Indian cities.

- A special feature in India is heavy rainfall during monsoons. There are other weather systems also that bring in a lot of rain. Storm surges can also affect coastal cities/ towns.
- The urban heat island effect has resulted in an increase in rainfall over urban areas. Global climate change is resulting in changed weather patterns and increased episodes of high intensity rainfall events occurring in shorter periods of time.
- Stormwater drainage systems in the past were designed for rainfall intensity of 12–20 mm. These capacities get easily overwhelmed whenever rainfall of higher intensity is experienced. Further, the systems very often do not work to the designed capacities because of very poor maintenance.
- Encroachments are also a major problem in many cities and towns. The flow of water has increased in proportion to the urbanization of the watersheds. Ideally, the natural drains should have been widened (similar to road widening for increased traffic) to accommodate the higher flows of stormwater. But on the contrary, there have been large scale encroachments on the natural drains and the river flood plains. Consequently the capacity of the natural drains has decreased, resulting in flooding.
- Improper disposal of solid waste, including domestic, commercial and industrial waste and dumping of construction debris into the drains also contributes significantly to reducing drainage capacities.
- Presence of impervious cover near trees and on road pavements also reduces water runoff.

❖ **To reduce these risk following measure can be taken:**

- Pre-Monsoon Desilting of drainage system.
- Solid waste disposal and its proper management has significant effect on drainage performance and reduces the chances of choking of drainage system.
- Protection and conservation of wetlands near urban habitats increase the water holding capacities and they also act as natural barriers against any surge in water level.
- Rain water harvesting reduces the load of excess rain water of rain and help in mitigating urban floods.

MCQs

1. With reference to Web 3.0, consider the following statements:
 1. Web 3.0 technology enables people to control their own data.
 2. In Web 3.0 world, there can be blockchain based social networks.
 3. Web 3.0 is operated by users collectively rather than a corporation.
 Which of the statements given above are correct?
 - a) 1 and 2 only
 - b) 2 and 3 only
 - c) 1 and 3 only
 - d) All of the above
2. With reference to India's Desert National Park, which of the following statements are correct?
 1. It is spread over two districts.
 2. There is no human habitation inside the Park.
 3. It is one of the natural habitats of the Great Indian Bustard.

Select the correct answer using the code given below:

- a) 1 and 2 only
b) 2 and 3 only
c) **1 and 3 only**
d) 1,2 and 3
3. With reference to Cooperate social responsibility consider the following statements
1. It is mandatory under Companies Act 2013
 2. India the only country which has regulated and mandated CSR for some select categories of companies registered under the Act
- Choose the incorrect statement using the codes given below
- a) 1 only
b) 2 only
c) Both 1 and 2
d) **Neither 1 nor 2**
4. Consider the following statements with reference to Jal Jeevan Mission
1. Local women are trained for water testing and are members of 'Paani Samitis' under the mission
 2. Goa becomes the first Har Ghar Jal certified state under the mission
- Choose the correct statement using the codes given below
- a) 1 only
b) 2 only
c) **Both 1 and 2**
d) Neither 1 nor 2
5. BioSentinle space craft is related to which of the following?
- a) **NASA**
b) JAXA
c) ROSCOSMOS
d) European Space Agency
6. The term "Megalodon" recently seen in news is related to which of the following?
- a) Near Earth Asteroid
b) **Large marine predator**
c) Spyware
d) Largest territorial mammal
7. Lord Curzon gate recently in news is situated in which state?
- a) Maharashtra
b) Rajasthan
c) **West Bengal**
d) Kerala
8. Durand Cup often mentioned in news is related to which sports?
- a) Hokey
b) **Football**
c) Cricket
d) Volley ball
9. In recent context windfall tax often in news, which of the following statement can be true regarding it?
1. The tax levy on profits
 2. It levy on cooperate profits but cannot be levy on individuals
- Choose the correct statement using the codes given below
- a) **1 only**
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2
10. Which of the following ministry is associated with the exhibition titled 'Sutr Santati' recently organised?
- a) Ministry of Environment
b) Ministry of Small and Medium Enterprises
c) **Ministry of Culture**
d) Ministry of Education