SCIENCE AND TECHNOLOGY

❖ **End-To-End Encryption**

➢ **CONTEXT: Recently, Apple announced it will be increasing the number of data points protected by end-to-end encryption on iCloud from 14 to 23 categories. The company claimed that with end-to-end encryption, user data will be protected even in case data is breached in the cloud.**

➢ **What is end-to-end encryption?**

• **Definition:** End-to-end encryption is a communication process that encrypts data being shared between two devices.

• It stops third parties from accessing data while it is being transported, including cloud service providers, internet service providers (ISPs), and hackers.

• End-to-end encryption has long been employed when sending corporate documents, financial information, legal documents, and private discussions.

• **Usage:** Communication security is achieved through end-to-end encryption. It is used by a number of well-known instant messaging programmes, including Signal, WhatsApp, iMessage, and Google Messages.

• End-to-end encryption is not only used to protect user data in instant messaging, though. Passwords, saved data, and data on cloud storage are all protected with it.

• **Significance:** End-to-end encryption uses an algorithm to convert plain text into an unintelligible format.

• Exclusively individuals having the decryption keys, which are only kept on endpoints and not with any other parties like service providers, can decode and read this format.

• It can also be used to control users' authorisation when accessing stored data, which seems to be what Apple intends to do.

➢ **Why are tech companies using it?**

• Apple stated that the total amount of data breaches more than tripled between 2013 and 2021 in its blog post citing data breach research titled "The Rising Threat to Consumer Data on the Cloud".

• The business disclosed that 1.1 billion personal records' worth of data were compromised in 2021 alone.

• It is attempting to counter this growing threat by introducing end-to-end encryption.

• Apple added that it thinks targets of hacking attempts carried out by well-funded parties will benefit from the additional degree of security.

➢ **What does it mean for users?**

• **Safety:** The protection of user data from unauthorised parties, such as service providers, cloud storage providers, and businesses that handle encrypted data, is ensured through end-to-end encryption.

• Even in the event of a data breach in the cloud storage, no one else has access to this data, and it is still secure.

• Only those who know the device's passcode, password, recovery contact, or recovery key can access the data.

• **Only trusted devices:** Apple stated on its support page that only trusted devices that users have signed into with their Apple IDs can decode end-to-end encrypted data.

• **Data protection:** The technology also makes it more difficult for service providers to give authorities with user data from their services.

• End-to-end encryption does not, however, safeguard metadata, which includes details such as the date a file was produced, the date a message was delivered, and the endpoints where data was shared.

➢ **What are steps taken by government in other countries regarding end to end encryption?**

➢ The FBI stated its **disapproval of the idea of technology companies** using end-to-end encryption more frequently in a statement.

➢ It stated it remains a strong advocate of encryption methods that offer [lawful access] by design, which would enable IT companies [served with a legal order] to decode data.

➢ Government agencies from all over the world have previously **encountered stiff resistanc**e when attempting to access encrypted data housed and held by internet corporations.

➢ The United States, the United Kingdom, and Australia intended to put pressure on Facebook in 2019 to **develop a backdoor into its encrypted messaging apps.**

➢ According to a report by The Guardian, the intention was to provide governments access to the content of private communications.

➢ Australia implemented rules in 2018 requiring tech companies and service providers to develop tools enabling covert government enforcement access to messages on social media platforms like Facebook and WhatsApp.

➢ The legislation was required to stop "terrorists" and other dangerous criminals from eluding the law.

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➢ While cryptographers and cybersecurity specialists contend that attempts by law enforcement to undermine encryption with backdoors are unwise and could jeopardise the security of the internet, the trend by tech companies to use end-to-end encryption to secure more user data appears to be strengthening.

PRELIMS

1. PM Adi Adarsh Gram Yojna (PMAAGY)

➢ **CONTEXT: Minister of State for Tribal Affairs Smt. Renuka Singh gave data about the scheme to Lok sabha recently**

• Recently Government has modified the earlier scheme of 'Special Central Assistance to Tribal Sub-Scheme (SCA to TSS) with nomenclature 'Pradhan Mantri Adi Adarsh Gram Yojna (PMAAGY)'.

• (PMAAGY) aims at mitigating gaps and providing basic infrastructure in villages with significant tribal population in convergence with funds available under different schemes in Central Scheduled Tribe Component.

• 'PMAAGY' will be implemented during 2021-22 to 2025-26

• 'Pradhan Mantri Adi Adarsh Gram Yojna (PMAAGY)' is being implemented by Ministry of Tribal Affairs.

• PMAAGY is envisaged to cover 36,428 villages having at least 50% ST population and 500 STs across States / UTs with notified STs during the period.

• A sum of ₹20.38 lakh per village as 'gap-filling' has been provisioned for approved activities including administrative expenses under PMAAGY.

• An amount of Rs. 7,276 cr has been approved by the Cabinet for the scheme in next 5 years.

• States/UTs are encouraged for convergence of resources as Central/State Scheduled Tribe Component (STC) funds and other financial resources available with them for saturation of infrastructure and services in the villages identified under PMAAGY.

➢ **Objectives**

• Integrated Socio-Economic Development: The main objective of PMAAGY scheme is to achieve integrated socio-economic development of selected villages through convergence approach. It includes the following components-

    ➢ Preparing Village Development Plan based on the needs, potential, and aspirations;

    ➢ Maximizing the coverage of individual / family benefit schemes of the Central / State Governments;

    ➢ Improving the infrastructure in vital sectors like health, education, connectivity and livelihood;

    ➢ Mitigating Gaps: PM Adi Adarsh Gram Yojna (PMAAGY) envisions to mitigate gaps in prominent 8 sectors of development viz. Road connectivity (Internal and Inter village /block), Telecom connectivity (Mobile /internet), School, Anganwadi Centres, Health Sub-Centre, Drinking water facility, Drainage and Solid waste management.

2. What ISRO is doing to boost the use of NavIC, India's version of GPS

➢ **CONTEXT: To promote the use of 'NAVigation with the Indian Constellation' (NavIC), the Indian version of GPS, the Indian Space Research Organisation (ISRO) will introduce the L1 frequency in all its future satellites, Jitendra Singh, Union Minister of State for the Department of Space, said in Parliament recently.**

➢ **What exactly is ISRO doing**

• The next satellites, starting from NVS-01 onwards, will have an L1 band for civilian navigational use.

• The seven satellites in the NavIC constellation so far use two frequencies for providing positioning data — the L5 and S bands.

• The new satellites NVS-01 onwards, meant to replace these satellites, will also have L1 frequency.

• The L1 is the oldest and most established GPS signals, which even the less sophisticated, civilian-use devices such as smartwatches are capable of receiving. Thus, with this band, the use of NavIC in civilian-use gadgets can go up.

➢ **What is NavIC?**

• NavIC is India's homegrown alternative to GPS. Developed by ISRO, the navigation satellite system was first approved in 2006 at a cost of $174 million, but became operational only by 2018. At present, it consists of eight satellites, covering the whole of India and up to 1,500 km from its boundaries.

• According to government NavIC is as accurate as GPS. the "performance of NavIC system is on par with the other positioning systems".

➢ **Where is NavIC being used right now?**

• NavIC is mainly being used in public vehicle tracking, to provide emergency warning alerts to fishermen venturing into the deep sea, and for tracking data related to natural disasters.

• The government is also pushing for its increased use in smartphones.

• the government urging tech giants to make smartphones compatible with NavIC had "worried the likes of Samsung, Xiaomi and Apple, who fear elevated costs and disruptions as the move requires hardware

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changes." According to the report, the government wanted that smartphones support NavIC as well as GPS by January 2023.

➢ **Advantages of NavIC**

• The government says that India should not rely on positioning systems run by other governments, which are at the risk of suspension for civilians in times of crises. Also, NavIC, since it is homegrown, will be more accurate than other systems.

• With a fully operational constellation and ground stations outside of India — ISRO plans to set up ground stations in Japan and France to better triangulate the entire area under NavIC coverage – the system is likely to become more accurate than GPS.

• The satellites placed directly over India also ensure better availability of signals in varied geographical regions compared to GPS, which India receives at an angle, making it difficult to access in dense forests or valleys.

• Apart from the US-owned GPS, the other prominent navigation systems are Galileo from the European Union, Russia-owned GLONASS and China's Beidou. QZSS, operated by Japan, is another regional navigation system covering Asia-Oceania region.

3. **New India Literacy Programme**

➢ **CONTEXT: The information was given by the Minister of State for Education, Smt. Annpurna Devi in a written reply in the Lok Sabha.**

• Government has announced a Centrally Sponsored Scheme namely, "New India Literacy Programme" (NILP) for implementation during five years from 2022-23 to 2026-27.

• The programme aims to cover a target of 5.00 crore learners during the five years under Foundational Literacy and Numeracy component.

• NLIP Scheme aims to impart not only 'Foundational Literacy and Numeracy' but also to cover other components which are necessary for a citizen of 21st century such as
  ✓ Critical Life Skills (including financial literacy, digital literacy, commercial skills, health care and awareness, child care and education, and family welfare);
  ✓ Vocational Skills Development (with a view towards obtaining local employment);
  ✓ Basic Education (including preparatory, middle, and secondary stage equivalency); and
  ✓ Continuing Education (including engaging holistic adult education courses in arts, sciences, technology, culture, sports, and recreation, as well as other topics of interest or use to local learners, such as more advanced material on critical life skills).

• **Funding pattern:** The Central and State shares are in the ratio of 60:40 for all States other than North Eastern Region (NER) and Himalayan States where the sharing pattern between the Centre and the State is in the ratio of 90:10. For UTs with legislature the ratio is 60:40, except in the UT of Jammu & Kashmir where the ratio is 90:10, and for all other UTs without legislature the Central share is 100%.The fund flow is through PFMS and State treasuries.

➢ **Steps Taken by Government**

• Various steps are being taken by the Government for effective implementation of the programme in the country and encouraging users to join the programme including Andaman and Nicobar Islands.

• Effective Identification: The first step is to identify the beneficiaries and Volunteer Teachers. Survey of beneficiaries and Volunteer Teachers (VTs) are being conducted by States/UTs using schools as the base.

• Quality Training: The volunteer teachers are trained to carry out the learning modules in online mode. Various workshops are being conducted by States/UTs.

• Quality Content: At national level, the content is driven by the Cell for National Centre for Literacy (CNCL) at National Council of Educational Research and Training (NCERT).

• The teaching and learning material is available on DIKSHA portal developed by NCERT.

• The sample assessment modules have also been made available on DIKSHA.

• Awareness Generation and Sensitization: All States/UTs have been sensitized along with a roadmap for implementation of the programme for conducting, among others-
  ✓ Environment building activities by the involvement and use of social media platforms including Print/Electronic/Folk Media and Interpersonal Media to reach across the country including all rural areas and
  ✓ To create an atmosphere so as to motivate and spur potential literacy volunteers and learners and also to adopt multiple strategies, keeping in view the local conditions, with active participation of community leaders, PRI functionaries, Mahila Mandals, Civil Society Organisation and educational institutions.

• **Challenge:** The major challenge faced by the Government while implementing the NILP presently is the opening and mapping of all Bank Accounts of Single Nodal Agencies (SNAs) and Implementing Agencies (IAs) in all States with Public Financial Management System (PFMS). This is a pre-requisite for release of

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funds as per revised procedure guidelines of Ministry of Finance. The challenge exists because this is the first year of implementation.

4. <u>**Pradhan Mantri Mudra Yojana (PMMY)**</u>

➢ **CONTEXT: As per data uploaded by the Pradhan Mantri Mudra Yojana (PMMY) by Member Lending Institutions (MLIs) on Mudra portal, as on 25.11.2022, more than 37.76 crore loans amounting to over Rs. 20.43 lakh crore have been disbursed since inception of the Scheme in April 2015.**

• The Union Government launched the Pradhan Mantri MUDRA Yojana (PMMY) on April 8, 2015, to provide loans up to Rs. 10 lakhs to non-farm small/microenterprises and non-corporate.

• All banks, including Public Sector Banks, Private Sector Banks, Regional Rural Banks (RRBs), State Co-operative Banks, Urban Co-operative Banks, Foreign Banks, and Non Banking Finance Companies (NBFCs)/Micro Finance Institutions (MFIs), are required to lend to non-farm sector income-generating activities with a value of less than Rs.10 lakh under the PMMY.

➢ **Institutional Mechanism:** The government has established a new institution called MUDRA (Micro Units Growth & Refinance Agency Ltd.) to carry out the Scheme's development and refinancing activities, as well as serve as a regulator for the microfinance sector in general. PMMY's mission is to provide grants to small businesses that are not corporations. Loan offerings under PMMY.

➢ **Category of Loans:**

• Shishu: covering loans up to Rs. 50,000/- given with no collateral, at 1% rate of interest/month repayable over a period of 5 years.

• Kishor: cover loans above Rs. 50,000/- and up to Rs. 5 lakh.

• Tarun: cover loans beyond Rs. 5 lakh to Rs. 10 lakh.

➢ **Approach of PMMY**

• Enterprises in the smallest segment must receive at least 60% of the funding. MUDRA Bank's partner intermediaries must strive to adhere to the following general framework:

• First-time entrepreneurs, young entrepreneurs (those under 30 years old), and women entrepreneurs will be welcomed, with special schemes being planned for them.

• Cash flow-based lending would be prioritized over security-based lending. Collateral securities, among other things, must be avoided.

• Repayment commitments shall be flexible and framed in light of the entrepreneur's company cash flows.

➢ **Micro Units Development Refinance Agency (MUDRA) Bank**

• The Micro Units Development Refinance Agency (MUDRA) Bank is a microfinance refinancing institution. of SIDBI and renamed as MUDRA (SIDBI) Bank.

• The MUDRA Bank is primarily responsible for –

• Developing policy guidelines for the micro/small enterprise financing industry, as well as registering and regulating MFI organizations.

• MFI organizations are accredited and rated.

• Establishing responsible lending policies to avoid indebtedness and to ensure proper client security principles and recovery methods.

• Creating a standardized set of covenants for last-mile lending to micro and small businesses.

• Promoting appropriate technological strategies for the final mile.

• Creating and implementing a Credit Guarantee System to provide loan guarantees to micro-enterprises.

• Creating a good architecture of Last Mile Credit Delivery to micro businesses under the scheme of Pradhan Mantri Mudra Yojana.

• MUDRA Bank operates through regional level financing institutions who in turn connects with last-mile lenders like Micro Finance Institutions (MFIs), Small Banks, Primary Credit Cooperative Societies, Self Help Groups (SHGs), NBFC (other than MFI) and such other lending institutions.

• In lending, MUDRA gives priority to enterprises set up by the under-privileged sections of the society particularly those from the scheduled caste/tribe (SC/ST) groups, first-generation entrepreneurs and existing small businesses.

ANSWER WRITTING

Q. Critically examine the aims and objectives of SCO. What importance does it hold for India?

Created in 2001, the Shanghai Cooperation Organisation (SCO) is a Eurasian political, economic, and military organisation aiming to maintain peace, security, and stability in the region. India became a permanent member of the SCO in 2017.

SCO aims to strengthen relations among member states. But India-Pakistan-Russia-China relations create a complex matrix of diverging and conflicting interests. To illustrate, China has shown little respect to an international rule-based order. 'Chequebook' and 'wolf warrior' diplomacy, human rights violations, etc. raise

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fundamental questions on Chinese commitments to aims and objectives of SCO. Moreover, under the guise of economic co-operation, China has pushed its Belt and Road Initiative (BRI) projects through SCO.

Likewise, SCO seeks to safeguard regional peace, security, and stability. But, China (in Taiwan, Hong Kong, Ladakh), Russia (in Ukraine) and Pakistan (in Jammu & Kashmir) are accused of destabilising the regional peace, security, and stability.

Importance of SCO for India:

- SCO is part of India's stated policy of pursuing "multi-alignments" and "strategic autonomy".
- The challenges of terrorism, radicalism, and instability pose a grave threat to Indian sovereignty and integrity. SCO's counter-terrorism body, the Regional Anti-Terror Structure (RATS), may prove useful for India in this context.
- SCO allows India to deepen its strategic reach in Central Asia. India already has substantial soft power potential in Central Asia. India's membership of SCO can boost energy security by providing access to mineral and energy resources of the Central Asian countries.
- India's presence in the SCO will help in India's aim to link itself to the larger Eurasian region, and to Europe via INSTC.
- SCO membership will also help India, which is currently boxed in the South Asian region, to become a major pan-Asian player.
- SCO can play a vital role in deepening people-to-people engagement through cooperation in the field of education, medicine, tourism, etc.

India's relations with countries in the region have enormous potential for enhancing ties in areas such as economy, security, policy, investment, trade, connectivity, energy, and capacity building. However, India's benefits from the SCO will be limited due to the role of China and Pakistan in the organisation. Positive outcomes will depend on how Indian diplomacy deals with its rivals.

MCQs

1. Consider the following statements:
   1. End to End encryption does not support Meta data.
   2. Metadata is data about the data or documentation about the information which is required by the users.

   Which of the above statements is/are correct?
   - a) 1 only
   - b) 2 only
   - **c) Both 1 and 2**
   - d) Neither 1 nor 2

2. With reference to the Pradhan Mantri Mudra Yojana (PMMY), consider the following statements:
   1. It is a flagship scheme of the Ministry of Finance, Government of India launched in 2021.
   2. Any Indian Citizen who has a business plan for a non-farm sector income generating activities such as manufacturing, processing, trading or service sector.

   Which of the statement/s given above is/are correct?
   - a) 1 only
   - b) 2 only
   - c) Both 1 and 2
   - d) Neither 1 nor 2

3. Consider the following statements about 'New India Literacy Programme':
   1. The scheme is being implemented through volunteerism through offline mode.
   2. It is a Centrally Sponsored Scheme.
   3. The scheme will cover non-literates of the age of 15 years and above in all states/UTs.

   Which of the statement/s given above is/are correct?
   - a) 1 and 2 only
   - **b) 2 and 3 only**
   - c) 1 and 3 only
   - d) 1,2 and 3

4. With reference to NavIC and GPS, consider the following statements
   1. The Indian Regional Navigation Satellite System (IRNSS) is the operational name of NavIC.
   2. GPS only has geosynchronous satellites, but the NaviC has both geostationary and geosynchronous satellites.
   3. GPS is accurate up to 5-10 meters on land against 20-30 meters for NaviC.

   Which of the statement/s given above is/are correct?
   - a) 1 and 3 only
   - b) 2 and 3 only
   - **c) 1 and 2 only**

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d) 1,2 and 3

5. With reference to India, the terms 'HaIbi, Ho and Kui' pertain to
   a) Dance forms of Northwest India
   b) Musical instruments
   c) Pre-historic cave paintings
   d) Tribal languages

6. With reference to PM adi adarsha gram yojna consider the following
   1. The yojna supports the efforts of State Governments to promote the welfare of Tribal People (TSP) by providing Special Central Assistance as an addition to the State Tribal Sub-Plan.
   2. It attempts to address funding gaps and provide essential infrastructure in communities with more than 50% tribal populations by combining funds from other Central Scheduled Tribe Component programmes.

   Which of the above statement/s is are correct?
   a) 1 only
   b) 2only
   c) Both 1 and 2
   d) Neither 1 nor 2

7. With reference to PM SHRI Scheme, consider the following statements;
   1. The scheme aims to upgrade and develop all the government schools in the country.
   2. The included schools will showcase all components of the National Education Policy 2020
   3. Ministry of Education is the nodal ministry for the scheme.

Which of the statement/s given above is/are correct?
   a) 1 and 2 only
   b) 2 and 3 only
   c) 1 and 3 only
   d) 1,2 and 3

8. Consider the following statements about National Environment Awareness Campaign (NEAC):
   1. The NEAC was established in 1986 with the intention of raising national environmental awareness.
   2. It is a multimedia campaign that uses traditional and non-traditional communication channels to spread environmental messages.

Which of the statements given above is/are correct?
   a) 1 only
   b) 2 only
   c) Both 1 and 2
   d) Neither 1 nor 2

9. Consider the following statements:
   1. Environment Education, Awareness & Training Scheme is a Central Scheme launched during the 6th Five Year Plan in 1983-84.
   2. The Ministry of Education is the nodal agency of the scheme.

Which of the statements given above is/are correct?
   a) 1 only
   b) 2 only
   c) Both 1 and 2
   d) Neither 1 nor 2

10. With reference to Central Water Commission (CWC), consider the following statements:
    1. It works as an attached office of Ministry of Jal Shakti.
    2. Flood control and management is the responsibility of CWC.
    3. It handles issues related to surface water only.

Which of the statements given above is/are correct?
   a) 1 and 2 only
   b) 2 and 3 only
   c) 1 and 3 only
   d) 1,2 and 3

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