The Reliable IAS

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- To The Point Current Affairs.
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The Reliable IAS

Current Affairs

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Chapter 1

History & Culture

Swami Dayanand Saraswati

Syllabus : GS1/Modern History, Personalities

Context

- The Prime Minister virtually addressed the 200th birth anniversary celebrations of Swami Dayanand Saraswati.

Who was Swami Dayanand Saraswati?

- Maharishi Dayanand Saraswati, was born on February 12, 1824 in Tankara, Gujarat.
- He was a social reformer who founded Arya Samaj in 1875 to counter then prevalent social inequities.

Religious and Social Reforms

- Rejection of Idolatry and Ritualism: He opposed idol worship and ritualistic practices that he believed deviated from the true teachings of the Vedas.
- He promoted the worship of a formless, attributeless God.
- Shuddhi Movement: The Shuddhi Movement was introduced to bring back the individuals to Hinduism who were either voluntarily or involuntarily converted to other religions like Islam or Christianity.
- Back to Vedas: He highlighted the social reformer's role in awakening India from the shackles of ignorance and superstition, leading a movement to rediscover the essence of Vedic knowledge.
- Women's Rights: Dayanand Saraswati advocated for the rights and empowerment of women.
- He encouraged women to receive education and participate in social and religious activities on an equal footing with men.
- Opposition to Child Marriage and Sati: He opposed practices such as child marriage and sati, considering them detrimental to society and contrary to Vedic principles.

Educational Reforms

- He set up a number of Gurukuls to teach his followers the knowledge of the Vedas and for them to spread the knowledge further.

- Inspired by his beliefs, teachings and ideas, his disciples established the Dayanand Anglo Vedic College
- Trust and Management Society, after his death in 1883.
- • The first DAV High School was established at Lahore on June 1, 1886 with Mahatma Hans Raj as its headmaster.

Arya Samaj

- Dayanand Saraswati formed the Arya Samaj at Bombay in 1875.
- It was a Hindu reforms movement, meaning "society of the nobles".
- The purpose of the Samaj was to move the Hindu religion away from the fictitious beliefs.
- 'Krinvanto Vishwam Aryam" was the motto of the Samaj, which means, "Make this world noble".
- The Samaj directs its members to condemn ritualistic practices like idol worship, pilgrimage and bathing in holy rivers, animal sacrifice, offering in temples, sponsoring priesthood etc.
- The Samaj launched programs to support widow remarriage in the 1880s.

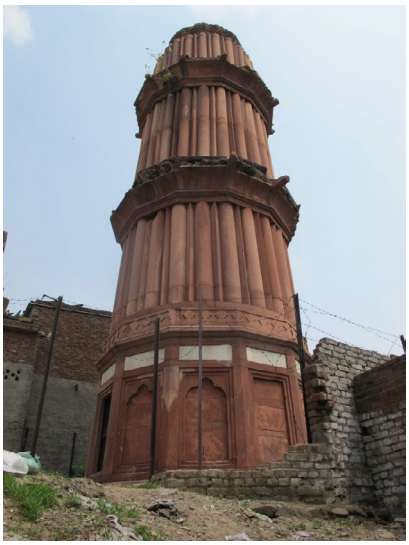
Literary Work

- The philosophy of Dayananda Saraswati can be known from his three famous contributions namely "Satyartha Prakash", "Veda Bhashya Bhumika" and "Veda Bhashya Bhumika" and Veda Bhashya.
- Further the journal "Arya Patrika' edited by him also reflects his thoughts.

Legacy

- The Arya Samaj is very active not only in India but also in other parts of the world.
- Maharishi Dayanand's life and teachings had considerable influence in several important personalities like Lala Lajpat Rai, Vinayak Damodar Savarkar, Madam Cama, Ram Prasad Bismil, Mahadev Govind Ranade, Madan Lal Dhingra and Subhash Chandra Bose.

Hastsal Minar



☛ **Syllabus: GS1/Art and Culture**

Context:

- Recently, efforts are being made to unravel the mysteries surrounding the Hastsal Minar, a Mughal-era symbol of glory.

About the Hastsal Minar:

- It is known as the Mini Qutub Minar, is a minaret tower located in Hastsal village in West Delhi, India.
- Construction: The minar was built in 1650 by Mughal emperor Shah Jahan.
- It was constructed using lakhori bricks and clad with red sandstone.
- Design: The tower stands tall at 17 metres tall on a raised platform, with a reducing diameter. It stands on a square platform with an octagonal body.
- It was originally a five-storey tower, topped with a domed Chhatri pavilion.
- The design of the tower resembles the Qutub Minar of Delhi.
- Current State: The minar is currently endangered and has been opened for tourists after renovation.
- It has three floors at present, compared to five earlier.
- Historical Significance: The minar was used by Emperor Shah Jahan for his entertainment after hunting in the encompassing wilderness that used to surround this colossal Hastsal minaret and royal hunting lodge.

Mohammed Quli Qutb Shah's tomb

☛ **Syllabus: GS1/History and Culture**

Context

- A digital twin of the Mohammed Quli Qutb Shah's tomb was unveiled by a reality technology company, Hexagon in Hyderabad.

Qutub Shahi Tombs Complex

- The Qutub Shahi Tombs are located in the Ibrahim Bagh, close to the Golconda Fort in Hyderabad.
- The tombs belong to the rulers of the Qutb Shahi Dynasty, their queens and children and the nobles who faithfully served them.

- It consists of 30 tombs, mosques and a mortuary bath, spanning the 130-year period from 1543 to 1672.

Muhammed Quli Qutb Shah's tomb

- Muhammed Quli Qutb Shah's tomb is located within the Qutb Shahi tombs complex and is considered the grandest of the Qutb Shahi tombs.
- It was built in 1602 A.D.
- The tomb is on a terrace of 65 m square and 4m high.
- Inscriptions in Persian and the Naskh scripts decorate the tomb.

Muhammad Quli Qutb Shah

- Muhammad Quli Qutb Shah was the fifth sultan of the Qutb Shahi dynasty of Golkonda.
- He founded the city of Hyderabad on the banks of the Musi river in 1590 and built the Charminar.
- During his reign, the dynasty reached the zenith of its material and cultural life.

Dhokra Shilpkala

Syllabus: GS1/ Art & Culture

Context:

- Recently, an entrepreneur has taken the initiative to preserve and safeguard the cultural heritage of Dhokra Shilpkala.

About the Dhokra Shilp Kala:

- Origin and History: The origins of Dhokra Shilpkala can be traced back to the tribal communities residing in the regions of Chhattisgarh, Jharkhand, West Bengal, and Odisha, where it evolved as an integral part of their cultural and religious practices.
- The word 'Dhokra' is believed to be derived from the Dhokra Damar tribes, who are the traditional metal smiths of Central India.
- It is a 4,000-year-old metal casting tradition from India, blending intricate craftsmanship with cultural heritage.
- It used the Lost-wax casting technique for creating intricate metal sculptures.

Issues:

- It faces challenges due to urbanisation and mechanised production.
- **The Lost-wax Casting Method :**
- It is a time-tested technique used for creating intricate metal sculptures.

– It is also known as 'investment casting' or 'precision casting' or 'cire perdue' Process:
– A detailed solid wax model of the figure is created, and then a clay mould is made around the wax model.
a. The mould is heated, causing the wax to melt and drain away, hence the term 'lost-wax'.
– Molten metal (often bronze, but can also be silver, gold, brass, or copper) is poured into the now empty clay mould.
– Once the metal cools, the clay mould is broken to reveal the cast sculpture.
– This method of casting has been used since the days of the Cholas.

Jan Bharat Rang

☛ **Syllabus: GS1/Culture**

Context:

- Recently, the National School of Drama (NSD) has invited all performing art groups for participation in Jan Bharat Rang under the banner of Bharat Rang Mahotsav 2024.

About the Jan Bharat Rang:

- It is an initiative by the NSD and is part of their annual theatre festival, Bharat Rang Mahotsav.
- It is celebrated on the 25th anniversary of the Bharat Rang Mahotsav.
- It is an attempt to create a record with over 2,000 short performances taking place simultaneously across India.

Themes:

- Vasudeva Kutumbakam;
- Panch Pran; and,
- Vikasit Bharat
- The theatre groups participating in Jan Bharat Rang can develop their own scripts as long as they stay true to any of the above themes.

Bharat Rang Mahotsav

- It is the **largest theatre festival in Asia,** established by the NSD to stimulate the growth and development of theatre across India.
- It includes serval **National and International** performance, and various associated events.

The National School of Drama, New Delhi:

- It is one of the foremost theatre training institutions in the world and the only one of its kind in India.

- It was set up by the Sangeet Natak Akademi as one of its constituent units in 1959.
- In 1975, it became an independent entity and was registered as an autonomous organisation under the Societies Registration Act XXI of 1860, fully financed by the Ministry of Culture.
- Training in the School is intensive and is based on a thorough, carefully planned syllabus. As a part of their training, students are required to produce plays which are then performed before the public.
-

IGNCA's 'Language Atlas'

Syllabus: GS 1/Art and Culture

In News

- The Indira Gandhi National Centre for Arts (IGNCA) proposes to conduct a linguistic survey across the country to create a 'Language Atlas' of India.

About IGNCA

- IGNCA was set up in 1985 under the Culture Ministry in honour of late Prime Minister Indira Gandhi after her death in 1984
- It is meant to be a resource centre for the arts and to provide a forum for creative and critical dialogue.

About Language Atlas' of India

- The first and most exhaustive Linguistic Survey of India (LSI) was carried out by Sir George Abraham Grierson and published in 1928.
- The Indian map was redrawn after Independence, and therefore, the LSI includes languages and dialects that may not be a part of contemporary Indian States.
- The proposed linguistic survey would focus on the number of languages and dialects in India, would try to know how many languages are spoken in India, and how many scripts and dialects there are.
- It would also have the number of languages and dialects which are extinct or on the verge of extinction
- The stakeholders in the survey would be the Ministries of Culture, Education, Tribal Affairs, Home, Social Justice and Empowerment, and Development of the North East Region, apart from various language communities.
- Phases : The DPR proposes that firstly, there should be State-wise data collection, and then region-wise.

- It also proposes to digitally archive the audio recordings of all the languages spoken.
- Need: A language is a means of communication and is essential for preserving local wisdom, knowledge, stories and culture.
- Many janjatis (tribal communities), for example, have their own localised medicinal plants and herbs, which they pass on to younger generations in their local language.

Do you know ?

– India recognises 22 languages officially, which are part of Schedule 8 of the Indian Constitution.
– According to Census data, 97 % of the Indian population speaks one of these languages.
– There are an additional 99 non-scheduled languages included in the Census, and according to the 2011 Census, around 37.8 million people identify one of these non-Scheduled languages as their mother tongue.
– The native language of 1.2 million people remains unaccounted for due to the decision to not include languages with less than 10,000 speakers in the Census since 1971.

A. of all the Census surveys, the official Census of 1961 was the most exhaustive and detailed with respect to linguistic data. In this Census, even languages with a single speaker were included in the records.

Chalukyan period temple discovered in Telangana

Syllabus:GS1/History and Culture

Context

- Two Badami Chalukya temples and a label inscription were discovered in Mudimanikyam village,Telangana.

About

- The two temples date back to between 543 AD and 750 AD.
- In one temple, a Panavattam (base of a Shiva lingam) without the Shiva Linga, has been found. The other temple contains a Vishnu idol lying inside.
- The label inscription, dating back to the 8th or 9th Century AD reads as 'Gandaloranru' (Ganda in Kannada means hero), and is inscribed on a pillar of a group of five temples, known as Panchakuta, in the village.
- Another inscription dating to 1673 AD, is present on two sides of the pillar in the Rama temple of Mudimanikyam.

- The discovery shows that the village of Mudimanikyam on the banks of river Krishna was part of the kingdom ruled by Badami Chalukyas.

Temple Architecture

- The temples showcase unique architectural styles, blending Badami Chalukyan and Kadamba Nagara influences.
- The monuments also integrate features of Rekha nagara architecture, characterized by a typical northern Indian shikhara with a slightly curved tower having four sides of equal length.

Chalukya Dynasty

- The Chalukya dynasty was a Hindu dynasty that ruled large parts of southern and central India between the 6th and the 12th centuries.
- During this period, they ruled as three related yet individual dynasties. The earliest dynasty, known as the "Badami Chalukyas", ruled from Vatapi (modern Badami) from the middle of the 6th century.
- The Badami Chalukyas began to assert their independence at the decline of the Kadamba kingdom of Banavasi and rapidly rose to prominence during the reign of Pulakeshin II, also known as Immadi Pulakeshi.
- After the death of Pulakeshin II, the Eastern Chalukyas became an independent kingdom in the eastern Deccan. They ruled from Vengi until about the 11th century.
- The rise of the Rashtrakutas in the middle of the 8th century eclipsed the Chalukyas of Badami. Later they were revived by their descendants, the Western Chalukyas, in the late 10th century.
  A. They ruled from Kalyani (modern Basavakalyan) until the end of the 12th century.

Architecture of Badami Chalukya

- The Chalukya style of architecture is called "Chalukyan architecture" or "Karnata Dravida architecture".
- Temple building activity of Chalukyas were concentrated within Aihole, Badami, Pattadakal and Mahakuta in modern Karnataka state.
- The building material used was locally found reddish-golden Sandstone.
- The temple building activity of Badami Chalukya can be categorized into three phases:
  A. The first phase includes cave temples like temples at Aihole and Badami.
  B. The second phase includes the Lad Khan Temple, the Meguti Jain Temple etc.
  C. The third phase of the mature phase includes the Sangamesvara Temple, Virupaksha Temple, Papanatha temple etc.

Attukal Pongala

Syllabus: GS1/Culture

Context:

- Recently, an annual event offering Pongala at Attukal was witnessed in Kerala.

About Attukal Pongala:

- It is a renowned religious event held annually at the Attukal Bhagavathy Temple in Thiruvananthapuram, Kerala and falls on the ninth day of the annual ten-day festival.
- It is dubbed as the 'Women's Sabarimala', symbol- ising the strength and power of women.
- It involves women preparing a sweet pudding of rice, jaggery, grated coconut, ghee, and banana in earthen pots.
- This offering, known as 'Pongala', is prepared on makeshift brick stoves and is offered to the presiding deity, the Attukal Bhagavathy.
- It is dedicated to Kannaki, the heroine of the Chilappatikaram.
- The ritual can only be performed by women, and the streets of the city are known to be jam-packed with faithful devotees during the time of the festival.

Global Recognition

- Over time, the Pongala has gained international recognition with the Malayali diaspora taking it to the US and the UK.
- Known for its record assemblage of women devotees, the festival has made its entry into 'The Guinness Book of World Records' for being the largest religious gathering of women on a single day.

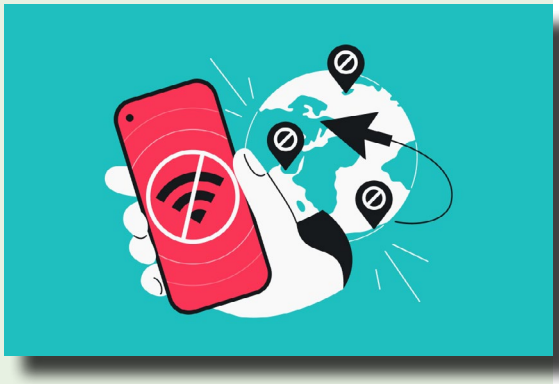
Chapter 2

Polity & Governance

Internet Shutdowns in India

Syllabus: GS2/Polity & Governance

In Context



- The Supreme Court questioned the Union Territory of Jammu and Kashmir about the nonpublication of orders for the suspension of Internet services in the UT.

About

- In the past few years India had gone through several violence acts as a result of certain legislations by the Union Government such as The Citizenship Amendment Act, abrogation of Article 370 etc. which could have resulted in Internal Aggression.
- Due to which it becomes the need of the hour to shut down the internet services to maintain peace.
- It has become very common practice for law enforcement agencies and even for the Government to cut down the internet during the moment of tension.

Legal Provisions

- Till the year 2017, shutdowns were imposed largely under Section 144 of the Code of Criminal Procedure (CrPC).
- Section 144 of CrPC gave the police and the District Magistrate the powers in order to prevent unlawful gathering of people and also to direct any person to abstain from a certain activity.
- However, in 2017 the law was amended and the Government promulgated the Temporary Suspension of Telecom Services (Public Emergency or Public Safety) Rule 2017.
- Under the 2017 Rules, telecom/internet shutdowns may be ordered on grounds of public emergency and public safety.
- Public emergency and public safety have not been defined in the 1885 Act or the 2017 Rules.

Arguments in Favour of Internet Shutdown by the Government

- National Security: The government may assert that suspending internet services is a temporary and targeted measure to prevent the spread of misinformation, coordinate unlawful activities, or address security threats.
- Preventing Unrest and Violence: Suspending online communication helps prevent the organization of protests, riots, or other forms of civil unrest.
- Counteracting Fake News and Disinformation: During times of crisis or conflict, false information circulating online can exacerbate tensions and contribute to misinformation.
- Temporary and Targeted Measures: Supporters may emphasize that internet shutdowns are intended to be temporary and narrowly focused.
- These measures are not meant to infringe on long-term access but rather to address specific and immediate concerns.

Arguments Against the Internet Shutdown by the Government

- Impact on Freedom of Expression: Internet shutdowns infringe upon the freedom of expression guaranteed by the Indian Constitution.
- Economic Disruptions: India has a rapidly growing digital economy, and internet shutdowns can lead to significant economic losses.
- The perception of frequent internet shutdowns may impact tourism and trade, as a stable and accessible digital environment is crucial for business operations and attracting visitors.
- Educational Challenges: With the increasing use of online platforms for education, internet shutdowns can severely affect students' access to learning resources, online classes, and communication with teachers.
- Healthcare Consequences: Access to healthcare information, telemedicine services, and health-related updates can be hampered during internet shutdowns.
- Social and Political Implications: Internet shutdowns are often associated with attempts to control social unrest, protests, or political opposition.
- Critics argue that such measures can stifle democratic dissent and limit the right to peaceful assembly.
- Global Image and Investment: Frequent internet shutdowns can impact India's global image, raising concerns among investors and international partners.
- A perceived lack of digital freedom and stability may deter foreign investments and collaborations.
- Human Rights Concerns: Critics assert that internet shutdowns raise human rights concerns, including the right to access information, freedom of speech, and the right to peaceful assembly.

- Lack of Transparency: Some critics argue that the government needs to provide clear justifications for such actions and communicate transparently about the duration and reasons for the shutdown.

Anuradha Bhasin v. Union of India Case:

– In 2020 the Supreme Court by ruling on Jammu and Kashmir Internet shutdown held that indefinite internet shutdowns by the State is not permissible under Indian Constitution.

– The apex Court further stated that imposition of Section144 can not be used as a mechanism to avoid genuine protest which is permitted under the Constitution.

A. Section 144 has very specific parameters, only if those parameters are satisfied then only a Magistrate can pass the orders.

– **Key Highlights of the orders :**

A. Usage of the Internet is the Fundamental Right under Article 19 of the Indian Constitution.

B. Internet shutdowns can be of temporary period but not for indefinite period.

C. Government to publish all orders imposing restrictions under Section 144.

D. The Court had also said that any order with regard to Internet Shutdowns will come under Judicial Scrutiny.

Conclusion

- In a democracy Governments should provide a rationale for disrupting the internet services in a periodic manner.
- The publications of all the orders must be made to maintain transparency.
- Indiscriminate shutdowns have high social and economic costs and are often ineffective.
- A proportionality and necessity test analysis to determine the proper course of action are essential at this juncture.
- For better internet governance the Indian civil society needs to push for a transparent and accountable system.

Odisha Government's Tribal Outreach

Syllabus: GS2/Polity

Context

- Recently the Odisha government announced measures for the welfare of tribal Population.

About

- The Odisha government announced the launch of LABHA (Laghu Bana Jatya Drabya Kraya) Yojana, for minor forest produce (MFP).
- It has also approved the establishment of a Commission for the Preservation and Promotion of the Tribal Languages of the Scheduled Tribes of Odisha.

LABHA (Laghu Bana Jatya Drabya Kraya) Yojana

- It is a 100% State-funded minimum support price (MSP) scheme for minor forest produce (MFP). The MSP will be determined every year by the State government.
- Under the scheme, a primary collector (a tribal person) will be able to sell the MFP.
- It will be collected at the procurement centers by the Tribal Development Cooperative Corporation Limited of Odisha (TDCCOL).
- These procurement centers will be managed by SHGs and any other notified agencies assisted by TDCCOL.
- As 99% of primary collectors are tribals and the majority of them are women, the LABHA Yojana will integrate the efforts with Mission Shakti's Women SHGs (self help groups).
- The procurement automation system will be set up to capture the total collection of MFPs, the details of the primary collectors, and the procurement point.
- Significance: The LABHA Yojana will also eliminate the possibility of distress sale of produce to middlemen Commission for the Preservation and Promotion of the Tribal Languages
- The Commission will encourage multilingual education, document and preserve tribal languages, promote the use and protect linguistic rights.
- The Commission will make efforts for inclusion of tribal languages like Ho, Mundari, Kui and Saora in the 8th Schedule of the Indian Constitution

Tribal Population in Odisha

- Odisha is home to 62 distinct tribes, including 13 Particularly Vulnerable Tribal Groups (PVTG).
- The Scheduled Tribes in Scheduled Areas constitute approximately 68.09% of the total tribal population in the State.
- It ranks as the third largest concentration of a tribal population, trailing behind Madhya Pradesh and Maharashtra.
- There are 21 tribal languages in Odisha.

Lakhpati Didi Scheme

Syllabus: GS2/Government Policies and Interventions

Context:

- With the aim of creating two crore women entrepreneurs in villages, the Union Finance Minister announced expansion of the Lakhpati Didi Scheme in her Interim Budget 2024–25 speech.
- The interim budget proposes to increase the number of beneficiaries to three crore from 2 crore.

Lakhpati Didi Scheme

- Launched: December 2023
- Aim: To financially empower women in rural areas and promote their entrepreneurial spirit.

Key Features:

- Target beneficiaries: Women members of existing or newly formed SHGs in rural areas.
- Participants in the Scheme must be active members of self-help groups.
- Documents required: Domicile certificate, Aadhar card, Ration card, Proof of income and Bank details.
- Financial assistance: Interest-free loan of Rs. 5 lakh per SHG for initiating or expanding income-generating activities.
- Skill training: Skill development programs in various areas like tailoring, food processing, animal husbandry, etc., based on local needs and market potential.
- Market linkages: Connecting SHGs with markets through fairs, exhibitions, and digital platforms.

Significance

- Increase in income: Help women earn a sustainable income of at least Rs. 1 lakh annually per household.
- Financial inclusion: Bring more women into the formal financial system by encouraging them to join self- help groups (SHGs).
- Skill development: Provide skill training to women entrepreneurs to improve their business capabilities.
- Women empowerment: Create a network of successful women entrepreneurs who can inspire and support others.

National Research Foundation (NRF)

Syllabus: GS2/Government Policies and Interventions

Context

- Despite approving a Bill to set up a National Research Foundation (NRF), the interim budget for 2024-25 was silent on allocation for the institution.

About

- The Union Cabinet had approved the NRF Bill in June 2023, paving the way for its establishment. However, the interim budget for 2024-25 skipped any mention of NRF.
- In the Union budget for 2021-22, the Centre had announced that it would set aside Rs 50,000 crore for NRF over five years.
- However, the following year, it was allocated a budget of just Rs 1 lakh. Further in 2023-24, the Union budget allocated Rs 2,000 crore for the NRF, which was then revised to Rs 258.60 crore.

The National Research Foundation (NRF) Bill, 2023

- The approved Bill will pave the way to establish NRF, an apex body to provide high-level strategic direction of scientific research in the country as per recommendations of the National Education Policy (NEP).
- The Department of Science and Technology (DST) will be the administrative Department of NRF.

National Research Foundation (NRF)

- Aim: To seed, grow and promote Research and Development (R&D) and foster a culture of research and innovation throughout India's universities, colleges, research institutions, and R&D laboratories.

- Governing Board: NRF will be governed by a Governing Board consisting of eminent researchers and professionals across disciplines.
- Ex-officio President of the Board: The Prime Minister
- Ex-officio Vice-Presidents of the Board: Union Minister of Science & Technology & Union Minister of Education
- Executive Council: NRF's functioning will be governed by an Executive Council chaired by the Principal Scientific Adviser to the Government of India.

Role:

- Forge collaborations among the industry, academia, and government departments and research institutions,
- Create an interface mechanism for participation and contribution of industries and State governments in addition to the scientific and line ministries(specific governmental departments).
- Focus on creating a policy framework and putting in place regulatory processes that can encourage collaboration and increased spending by the industry on R&D.
- Repeal: The bill will also repeal the Science and Engineering Research Board (SERB) established by an act of Parliament in 2008.

Benefits of the NRF:

- It will help to improve the quality of research in India.
- It will help to increase the quantity of research in India.
- It will help to make India a more attractive destination for foreign researchers.
- It will help to create new jobs in India.
- It will help to improve the quality of life for all Indians with the help of ensuing research.

Challenges:

- Still in the planning phase: The NRF does not yet have an administrative structure or direction.
- Transparency: The experts also highlighted a lack of transparency in establishing the governance structure of the proposed institution.
- Opposite to the objective of NEP: The NEP 2020 had mentioned that the NRF would be governed independently of the government, by a rotating board of governors consisting of the "very best researchers and innovators across fields".
- However, in June 2023, the government stated that the governing board would be presided over by the Prime Minister and the Union Minister of Science and Technology.
- Not an independent body: Even the Executive Committee, which will govern the day-to-day functioning of the NRF, is to be headed by a government-appointed person (the Principal Scientific Advisor).

- Though initially modeled around the National Science Foundation, an independent agency of the US federal government, the NRF now seems to be dependent on the government.
- Insufficient funding: Of the Rs 50,000 crore set aside for NRF over five years (2023-28), some Rs 36,000 crore (72 per cent) was expected to come from the private sector.
- Thus, the government is envisaging spending only around Rs. 14,000 crore over five years, i.e., around 2,800 crore per year which is insufficient considering the volume of research conducted in India.
- This is much less than Rs 7,931.05 crore allocated to the DST, Rs. 2,683.86 crore for the DBT, and Rs 5,746.51 crore allocated for the Department of Scientific and Industrial Research during the Union budget for 2022-23.

Way Ahead:

- There is a need to wait for the full Union Budget that will be presented after the elections slated later this year.
- There is a need to move the proposed institution from the planning phase and set up an administrative structure.

C-CARES

Syllabus: GS2/Governance

In Context

- Government has launched a web portal of Coal Mines Provident Fund Organization (CMPFO) namely C- CARES.

About

- It is designed by the Centre for Development of Advanced Computing (C-DAC), an R&D organization under the Ministry of Electronics and Information Technology.
- At present, CMPFO processes settlement claims of Provident Fund subscribers and pensioners manually.
- With the launch of the portal, settlement of PF and pension claims will now be processed and settled online.

Coal Mines Provident Fund Organization

- It is an autonomous organization under the aegis of the Ministry of Coal.
- It was established in the year 1948 for administering Provident Fund and Pension schemes for the purpose of providing social security to the coal sector workers.
- Source: PIB

Cervical Cancer

Syllabus: GS2/Health

In Context

- The Union Budget 2024-25 encourages vaccination against cervical cancer.

About Cervical Cancer

- The government will encourage vaccination for girls in the age group of 9 to 14 years for the prevention of cervical cancer.
- Cervical cancer develops in a woman's cervix (the entrance to the uterus from the vagina).
- Spread: Almost all cervical cancer cases (99%) are linked to infection with high-risk human papillomaviruses (HPV), an extremely common virus transmitted through sexual contact.
- Although most infections with HPV resolve spontaneously and cause no symptoms, persistent infection can cause cervical cancer in women.
- Prevalence: Cervical cancer is the fourth most common cancer in women.
- It is the second most common type of cancer in India for women.
- Prevention: Effective primary (HPV vaccination) and secondary prevention approaches (screening for, and treating precancerous lesions) will prevent most cervical cancer cases.
- Treatment: When diagnosed, cervical cancer is one of the most successfully treatable forms of cancer, as long as it is detected early and managed effectively.
- Cancers diagnosed in late stages can also be controlled with appropriate treatment and palliative care.
- Vaccination: There are, at present, two vaccines available in the country against the human papillomavirus (HPV) which causes cervical cancer, namely Merck's Gardasil and Serum Institute of India's Cervavac.

Technology Development Fund Scheme

Syllabus: GS2/Policies and Interventions; GS3/Technology

Context:

- Recently, the Defence Research Development Organisation (DRDO) demonstrated a green propulsion system, developed under the Technology Development Fund (TDF) Scheme.

About Technology Development Fund (TDF) Scheme

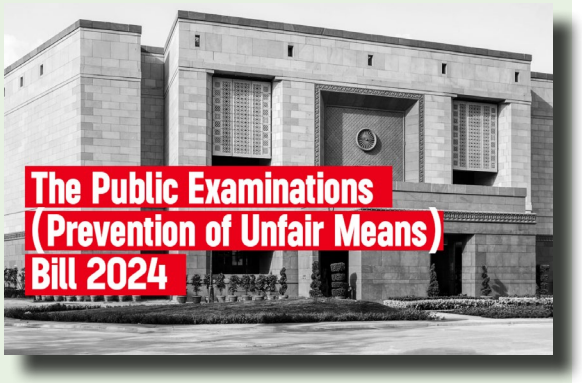
- It is a flagship programme of the Ministry of Defence executed by DRDO under the 'Make in India' initiative for funding innovation in defence and aerospace, especially to start-ups and MSMEs.
- It is executed to meet the requirements of the Tri-Services, Defence Production and DRDO.
- It encourages participation of public/private industries to create an ecosystem for enhancing cutting edge technology capability in the defence sector.

Focus Areas:

- Significant upgradation, improvements, developments in the existing products, processes, applications;
- Development of futuristic technologies, innovative products which can be useful for defence applications;
- Import substitution of components whose technologies do not exist in the Indian market.

Public Examinations (Prevention of Unfair Means) Bill

Syllabus :GS 2/Polity and Governance



In News

- The Centre introduced a Bill in the Lok Sabha titled "The Public Examinations (Prevention of Unfair Means) Bill, 2024" to curb leaks, malpractices as well as organized malpractices in recruitment examinations

About the bill

- It outlines 15 unfair practices, such as leaking question papers, colluding to leak them, unauthorised possession of materials such as question paper or an Optical Mark Recognition response sheet, providing answers by unauthorised individuals, assisting candidates without authorisation, manipulating exam conditions, conducting fake exams, issuing fraudulent admit cards, and more.
- Coverage : It will cover entrance examinations held by the Union Public Service Commission, the Staff Selection Commission, the Railways, banking recruitment

examinations and all computer-based examinations conducted by the National Testing Agency.

- It will also cover entrance tests such as NEET, JEE, and CUET.
- Punishment : "All offences under this Act, shall be cognizable, non-bailable and non-compoundable.
- It proposes a punishment of a minimum of three to five years of imprisonment to curb cheating and for those involved in organised crimes of cheating will face five to 10 years of imprisonment and a minimum fine of Rs 1 crore.
- In case of institution found guilty, attachment and forfeiture of property and proportionate cost of examination to be recovered from it Objectives and Need : In the last few years, leaks of question papers and organised cheating had affected the interests of lakhs of student due to cancellation of tests and examinations
- The bill is aimed at preventing organised gangs and institutions that are involved in unfair means for monetary gains, but it protects candidates from its provisions.
- It is aimed to bring greater transparency, fairness and credibility to the public examination systems and to reassure the youth that their sincere and genuine efforts will be fairly rewarded and their future is safe.

OBC Quota in J&K Local Bodies

Syllabus: GS2/Policies and Interventions

Context

- The Union government recently introduced the Jammu and Kashmir Local Bodies Laws (Amendment) Bill, 2024 to provide reservation to OBCs in local bodies in J&K.

Key Features of the Bill

- The bill seeks to amend certain provisions of the Jammu and Kashmir Panchayati Raj Act, 1989, the Jammu and Kashmir Municipal Act, 2000, and the Jammu and Kashmir Municipal Corporation Act, 2000 in consonance with the provisions of Part IX and Part IXA of the Constitution of India.
- It is intended to bring consistency in the local bodies' laws of the Union Territory of J&K with the provisions of the Constitution of India.
- Clause (6) of Articles 243D and 243T of the Constitution empowers the Legislature of a State to make provision for reservation of seats in any 'Panchayat' and 'Municipality' in favour of backward classes of citizens.
- The power to prepare and conduct local body polls should be with the State Election Commission.

- Articles 243K and 243ZA: The superintendence, direction, and control of the preparation of electoral rolls for, and the conduct of all elections to the Panchayats and Municipalities is vested in a 'State Election Commission' consisting of a 'State Election Commissioner'.
- The number of seats reserved for OBCs will be decided by a Commission that will be formed after the legislation has been passed by the Parliament.

Self-Reporting of Mental Illness in India

Syllabus:GS2/Health

Context

- A study conducted by the Indian Institute of Technology (IIT) Jodhpur revealed that self-reporting of mental illness was less than 1% in India.

What is Mental Healthcare?

- Mental health care refers to the range of services and treatments provided to individuals who are experiencing mental health challenges or disorders.
- Mental health care can take many different forms, including therapy, medication, support groups, hospitalization, and other interventions.

The findings of the study

- Low Self-Reporting: Self-reporting of mental disorders in India is considerably lower than the actual burden of the disease indicating a significant gap in identifying and addressing mental health issues.
- Socioeconomic Disparities: The study revealed a socioeconomic divide, with self-reporting of mental disorders being 1.73 times higher among the richest income group population compared to the poorest in India.
- Dominance of the Private Sector: With 66.1% of outpatient care and 59.2% of inpatient care, the private sector emerged as a major provider of mental health services.
- Limited Health Insurance Coverage: About 23% of individuals hospitalized for mental disorders had health insurance coverage at the national level.
- High Out-of-Pocket Expenditure: The average out-of-pocket expenditures for both hospitalization and outpatient care were significantly higher in the private sector as compared t1o the public sector.

Mental Healthcare in India

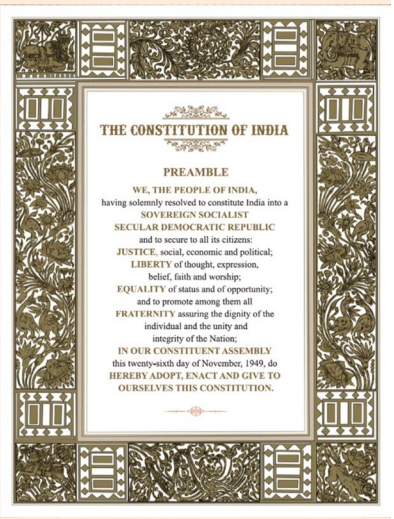
- National Tele Mental Health Programme: It was launched in 2022 to improve access to quality mental health counseling and care services in the country.
- National Mental Health Programme (NMHP): It provides affordable and accessible mental healthcare facilities in the country.
- National Suicide Prevention Strategy: The strategy aims to reduce suicide mortality by 10% in the country by 2030.
- Rights of Persons with Disabilities Act, 2017: The Act acknowledges mental illness as a disability and seeks to enhance the Rights and Entitlements of the Disabled.
- Mental Healthcare Act, 2017: It is aimed at safeguarding the rights of people with mental illness and ensuring that they receive proper mental healthcare services.
- Rights of Persons with Mental Illness: The act recognizes the rights of persons with mental illness, including the right to access mental health care and treatment without discrimination, the right to confidentiality, the right to access legal services, etc.
- Advance Directives: It allows individuals to make advance directives specifying how they wish to be treated in the event of a mental health crisis.
- Prohibition of Electroconvulsive Therapy (ECT): The act prohibits the use of electroconvulsive therapy without the use of muscle relaxants and anesthesia.
- The act decriminalised suicide attempts in India.
- Manodarpan Initiative: An initiative under Atmanirbhar Bharat Abhiyan, aims to provide psycho-social support to students for their mental health and well-being.
- Ayushman Arogya Mandirs: Mental health services have been added in the package of services Ayushman Bharat – Health and Wellness Centres (HWC) Scheme.
- Online capacity building of health workers by NIMHANS in providing psychosocial support and training through (iGOT)-Diksha platform.

Way Ahead

- Promote Awareness and Reduce Stigma: Public awareness campaigns should be conducted to increase understanding and reduce stigma surrounding mental illness.
- Early Intervention: Emphasis should be placed on preventive measures like screening programs, counseling services and promotion of mental well-being through lifestyle interventions to address mental health issues before they escalate.
- Community-Based Interventions: Community-based mental health programs should be developed to provide psychosocial support, rehabilitation, and social inclusion for individuals with mental illness.
- Research and Data Collection: Robust data collection systems should be established to monitor the prevalence of mental disorders, treatment outcomes, and service utilization patterns.

Preamble to the Constitution of India

Syllabus: GS2/Indian Constitution: Features



Context

- The Supreme Court recently asked if the Preamble of the Constitution could have been amended without changing the date of its adoption on November 26, 1949.

Background

- The Preamble was amended only once in December 1976 through the 42nd Constitutional Amendment to make two changes:
- The phrase "unity of the nation" was replaced with "unity and integrity of the nation".
- The words 'socialist' and 'secular' were inserted between 'sovereign' and 'democratic'. Originally, the text of the Preamble declared India as a 'sovereign, democratic republic'.
- The Supreme Court in the Kesavananda Bharati case had held that the Preamble was an integral part of the Constitution and was subject to the amending power of the Parliament, provided the basic structure was not tinkered with.

Preamble to the Constitution of India

- The Preamble of the Indian Constitution is primarily based on the 'Objective Resolution' written by Jawaharlal Nehru in 1946.
- The Preamble to the Constitution of India is a brief introductory statement outlining the guiding principles and aspirations of the nation.

Components of the Preamble

- Source of authority for the Constitution – The Preamble states that the Constitution derives its authority from the people of India.
- Nature of Indian State – It declares India to be a Sovereign, Socialist, Secular Democratic, and Republican Polity.
- Objectives of the Constitution – It specifies Justice, Liberty, Equality, and Fraternity as the objectives.
- Date of adoption of the Constitution – It stipulates November 26, 1949, as the date of its adoption.

Significance

- The Preamble serves as a guiding light for interpreting the Constitution and enacting laws.

- It defines the national goals and aspirations of India.
- It emphasizes the importance of fundamental rights and values for all citizens.
- It fosters a sense of national unity and identity.

Is the Preamble a Part of the Constitution of India?

- In Berubari Union Case, 1960, the Supreme Court said, the Preamble is not a part of the Constitution.
- But it also said, since the Preamble serves as the key to the minds of our Constitution makers, some assistance in interpreting any ambiguity in the Constitution can be taken from the Preamble.
- Kesavananda Bharati Case, 1973: In this judgment, the Supreme Court reversed its stand on the Preamble and made the following observations-
- The Preamble of the Indian Constitution will now be considered a part of the Constitution.
- It will play an important role in the interpretation of statutes and other various provisions of the Constitution.
- LIC of India Case, 1995: The Supreme Court once again ruled that the Preamble is an integral part of the Constitution, but it cannot be directly enforced in a court of justice in India.

Can the Preamble be Amended?

- Another important discussion,– whether the Preamble can be amended under Article 368 or not.
- Kesavananda Bharati Case, 1973: In this case, the Supreme Court held that the Preamble is a part of the Constitution and hence can be amended, subject to the condition that no amendment is done to the 'Basic Structure' of the Constitution.

Conclusion

- The preamble of the Constitution of India is one of the best preambles ever drafted, not only in ideas but expressions as well.
- It contains the purpose of the constitution, to build an independent nation that protects justice, liberty, equality, and fraternity which are the objectives of the Constitution.

Parliamentary Standing Committee on Legal Aid

Syllabus: GS2/Structure, organisation & functioning of the Judiciary

Context

- The Department-related Parliamentary Standing Committee on Personnel, Public Grievances, Law and Justice has recently underscored the need to have additional Posts In NALSA.

About

- The recommendations were presented in its 143rd Report of the Committee on the Subject – "Review of the working of Legal Aid under the Legal Services Authorities Act, 1987".
- The Committee while discussing the budgetary constraints and allocations, observed that the majority of the Indian population are eligible for legal aid.

Major recommendations

- Funding: Though funding legal services authorities is also one of the responsibilities of States, there is a dire need to significantly enhance the expenditure on this front.
- Grant-in-aid: The Committee strongly recommends that Grant-in-aid to NALSA may be substantially increased in order to carry out the activities as planned by them.
- Human resource: The Committee has also recommended augmenting the current staff allocation for National Legal Services Authority (NALSA), by sanctioning an additional 40 positions.
- Its existing sanctioned staff strength of 34 only is too low considering its mandate and reach.
- Fill vacancy: The Committee further recommends the NALSA to take proactive steps to fill up the vacant posts on a regular basis and not to allow piling up of unfilled vacancies.
- Utilization Of Para-Legal Volunteers (PLVs): Addressing the underutilization of Para-Legal Volunteers (PLVs), the Committee proposed immediate actions to enhance their effectiveness.
- It suggested regular and comprehensive training and capacity building for PLVs, along with providing adequate resources, support and compensation.
- Public outreach: It further recommended that the legal services authorities and the Lok Adalats should conduct awareness campaigns and outreach programs to inform and educate the people about the role and functions of PLVs.

- Increased Access To Legal-Aid To The Prisoners Moving ahead: The Committee recommends that NALSA should study and evaluate these types of cases and assist them on priority.

Legal Aid in India Constitutional Provisions:

- Preamble: Securing to all the citizens, Justice – social, economic and political.
- Article 39 A: Provides for free legal aid to the poor and weaker sections of the society, to promote justice on the basis of equal opportunity.
- Articles 14 and 22(1): Make it obligatory for the State to ensure equality before law.

Legal Provisions:

- The Legal Services Authorities Act, 1987: Enacted by the Parliament to establish a nationwide uniform network for providing free and competent legal services to the weaker sections of the society.
- The National Legal Services Authority (NALSA): It was constituted under the Legal Services Authorities Act, 1987 to provide free Legal Services to the weaker sections of the society.
- The Chief Justice of India is the Patron-in-Chief and the Senior most Hon'ble Judge, Supreme Court of India is the Executive Chairman of the Authority.
- A three-tier structure: National Legal Services Authority (NALSA), State Legal Services Authorities (SLSAs), and District Legal Services Authorities (DLSAs).

Significance of legal aid

- Ensures equal access to justice: Upholds fundamental right to equality and access to justice for all.
- Empowers marginalized communities: Provides legal support to those who might otherwise be unable to afford it.
- Promotes social justice: Contributes to a more just and equitable society by addressing legal issues faced by disadvantaged groups.
- Strengthens democracy: Ensures fair legal representation and participation in the justice system.
- Reduces social unrest: Early legal intervention can prevent disputes from escalating into larger issues.

Challenges

- Funding: Requires sustained financial support from government and other stakeholders.
- Capacity building: Training and capacity development of lawyers and paralegals is crucial.

- Awareness campaigns: Extensive outreach programs are needed to inform people about their rights and legal aid options.
- Technology adoption: Utilizing technology can improve efficiency, accessibility, and transparency.
- Quality control mechanisms: Implementing measures to ensure quality legal representation is essential.

Way Ahead

- Legal aid plays a vital role in ensuring equal access to justice and promoting social justice in India.
- By addressing these challenges and continuously improving the system, legal aid can contribute significantly to building a more just and equitable society for all.

Annual Death Penalty Report, 2023

Syllabus: GS2/ Government Policies & Interventions

Context

- According to the Annual Death Penalty Report 2023, appellate Courts in India – SC and all the HCs together – confirmed only one death sentence in 2023 while the rest were either commuted or saw the prisoners acquitted altogether.
- The Annual Death Penalty Report, 2023, prepared by Project 39A, a criminal justice programme linked with the National Law University, Delhi.

Death Penalty

- The death penalty is the state-sanctioned execution of a person as a punishment for a crime.
- It is the highest degree of punishment that can be awarded to an individual under a specified penal law in force.
- The legal process for imposing the death penalty in India involves a trial court issuing a death sentence, which can then be appealed in higher courts, including the High Court and the Supreme Court of India.
- The President of India has the power to grant pardons or commute sentences.

Major findings of the Report

- As per the report, there has been a 45.71% increase in the population of inmates sent to death row since 2015.

- Uttar Pradesh had the largest death row population at 119 prisoners.
- According to the report, in 2023, trial courts awarded death sentences to 120 prisoners.
- Appellate Courts (Supreme Court and all the High Courts together) confirmed only one death sentence in 2023 while the rest were either commuted or saw the prisoners acquitted altogether.
- The total number of death sentences awarded (in trial courts) last year had seen a significant drop — from 167 in 2022 to 120 in 2023.
- More than half (55%) of these 120 were in homicidal rape cases.
- The report said that in 2023, the HCs also disposed of fewer cases involving death sentences compared to 2022 (68 cases involving 101 prisoners), meaning the number of prisoners on death row went up.

Concerns

- Acquittal and remand by the higher Courts in 2023 indicate significant concerns with the quality of police investigations and appreciation of evidence by lower courts in cases.
- The trial courts imposed death sentences in 86.96% of its cases in the absence of any information relating to the accused, despite the Supreme Court's mandate in Manoj v. State of Madhya Pradesh (2022).

Arguments in favor of Death Penalty

- Arguments in favor of Death Penalty: In the 35th Report of Law Commission of India (1962), the Law Commission favored retaining the death penalty in the Indian Judicial System.
- Acting as a deterrent: Supporters argue that the fear of facing capital punishment may deter individuals from committing heinous crimes such as murder or terrorism.
- Retribution and Justice: Advocates believe that the death penalty provides a form of retribution for the victims and their families.
- Permanent Incapacitation: Advocates suggest that the death penalty ensures that individuals who have committed heinous crimes will never be able to harm society again.
- Moral Condemnation: The death penalty reflects society's moral condemnation of certain acts and reinforces the sanctity of human life by holding individuals accountable for their actions.

Arguments against Death Penalty

- Against the global trend: According to the Amnesty Report, at the end of 2021 more than two thirds of the world's countries had abolished the death penalty in law or practice.

- The poor are most affected: The numbers of the uneducated and the illiterate sentenced to death outweigh those who are educated and literate.
- 74.1% of individuals on death row in India come from economically disadvantaged backgrounds.
- Life Imprisonment as an Alternative: Some argue that life imprisonment without the possibility of parole is a viable alternative to the death penalty, ensuring public safety without the irreversible consequences of execution.
- Risk of Wrongful Execution: Critics argue that no justice system is infallible, and the risk of executing an innocent person exists.
- Cases of wrongful convictions, sometimes based on flawed evidence or legal errors, can lead to irreversible consequences.
- Psychological Effects: Critics raise concerns about the psychological impact on those involved in the execution process, including prison staff and witnesses, as well as the mental health of the condemned individual.
- Global Abolition Trend: There is a global trend toward the abolition of the death penalty, with an increasing number of countries choosing to eliminate or suspend capital punishment.
- In Ghana, the Parliament passed a Bill in 2023 to abolish the death penalty for ordinary crimes.

Way Forward

- The death penalty issue in India requires a balanced and inclusive approach that takes into account diverse perspectives, respects human dignity, and promotes the principles of fairness and justice.
- There is a need to facilitate collaboration among government agencies, civil society organizations, legal experts, and other stakeholders to explore alternative approaches to addressing serious crimes while upholding human rights.

Women in Politics

Syllabus: GS2/Structure, organisation & functioning of the Legislature

Context:

- Recently, the Women's Reservation Bill was passed in the Parliament of India.
- Status of Women in Indian Politics
- Representation: Despite constitutional guarantees of equality, women remain underrepresented in Indian politics. As of 2023, they hold only 14.3% of Lok Sabha (lower house) and 11.8% of Rajya Sabha

(upper house) seats.

- State level: Representation is even lower in state assemblies, averaging around 8%.
- Local governance: Although 33% of seats in Panchayats (rural local bodies) are reserved for women, their effective participation and leadership remain concerns.

Challenges

- Socio-cultural barriers: Patriarchal societal norms and discriminatory attitudes restrict women's entry and advancement in politics.
- Economic constraints: Financial limitations hinder women's ability to contest elections and participate effectively.
- Lack of access to resources: Political networks, funding, and campaign support are often skewed towards men.
- Violence and harassment: Women face physical and verbal abuse, online trolling, and intimidation, creating a hostile environment.
- Political party structures: Lack of internal party support and gender-sensitive policies within parties hinder women's rise.

Measures

- Reservations: Increased reservation of seats in legislatures and local bodies can provide a crucial initial boost to women's representation.
- Financial support: Government funding schemes and subsidies can address economic barriers faced by women candidates.
- Capacity building: Training programs and leadership development initiatives can equip women with necessary skills and confidence.
- Awareness campaigns: Public awareness campaigns can challenge societal biases and promote gender equality in political participation.
- Stricter laws: Effective enforcement of laws against electoral violence and harassment can create a safer environment for women in politics.
- Internal party reforms: Political parties need to adopt gender-sensitive policies, quotas, and mentorship programs to support women candidates and leaders.
- Empowering women voters: Educating and mobilizing women voters can enhance their political participation and hold parties accountable for fielding women candidates.

Way Ahead

- Increased representation of women in politics is crucial for a truly democratic and just society.
- Addressing the existing challenges and implementing effective measures, including the prompt implementation of the Women Reservation Bill, will require sustained efforts from individuals, political parties, civil society organizations, and the government.

Ayushman Bharat, Pradhan Mantri Jan Arogya Yojana (AB-PMJAY)

Syllabus :GS 2/Health Prelims

In News

- Government is preparing to include ASHA and anganwadi workers/helpers in its Ayushman Bharat scheme as announced in Intereim Budget 2024.

AboutAB PM-JAY

- Ayushman Bharat Pradhan Mantri – Jan Arogya Yojana (AB PM-JAY) is the largest publicly funded health assurance scheme in the world .
- It provides health cover of Rs. 5 lakhs per family per year for secondary and tertiary care hospitalization.
- The households included are based on the deprivation and occupational criteria of Socio-Economic Caste Census 2011 (SECC 2011) for rural and urban areas respectively.

Do you know ?

– Ayushman Bharat is a flagship scheme of Government of India

– It was recommended by the National Health Policy 2017, to achieve the vision of Universal Health Coverage (UHC).

– It has been designed to meet Sustainable Development Goals (SDGs) and its underlying commitment, which is to "leave no one behind."It adopts a continuum of care approach, comprising of two interrelated components, which are –

A. Health and Wellness Centres (HWCs)

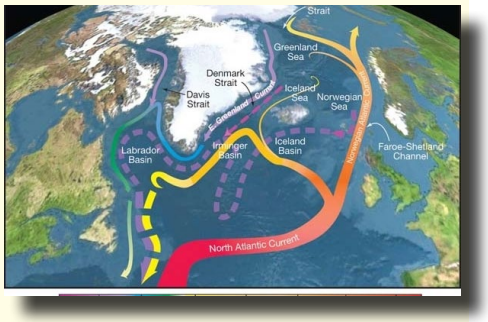
B. Pradhan Mantri Jan Arogya Yojana (PM-JAY)

Chapter 3

Geography

Atlantic Meridional Overturning Circulation (AMOC)

Syllabus: GS1/ Geography



Context

- Recent studies show that the AMOC could collapse between 2025 and 2095 due to the impact of anthropogenic emissions.

About the Atlantic Meridional Overturning Circulation (AMOC)

- It is a system of ocean currents that circulates water within the Atlantic Ocean, bringing warm water north and cold water south and is part of a complex system of global ocean currents.
- The global conveyor belt circulates cool subsurface water and warm surface water throughout the world. It plays a crucial role in moderating the climate of Europe and North America and influences temperatures near the Equator.
- The entire circulation cycle of the AMOC, and the global conveyor belt, is quite slow.
- It takes an estimated 1,000 years for a parcel of water to complete its journey along the belt.
- Even though the whole process is slow on its own, there is some evidence that the AMOC is slowing down further.

What if AMOC would collapse?

- AMOC is a kind of 'switch' for climate in the northern hemisphere, especially Europe.
- It would cause widespread cooling across the northern hemisphere and less precipitation in places such as Europe, North America, China and some parts of Russia in Asia.
- The excess heat due to a collapsed AMOC could lead to less rainfall over the Amazon rainforest and make it drought prone and dry, and it could potentially transform it to a savannah state.
- A slowdown of AMOC could hinder monsoon formation and rainfall in different regions.
- Rainfall in the Sahel region (the West African monsoon) could reduce, the summer

monsoon circulation in South Asia and India could weaken; and there might be more winter storms in Europe.

- Weakening of the land-sea thermal gradient weakens the sea level pressure gradient and the summer monsoon circulation over the Indian region.

Tipping elements in the Earth's climate system

- These are the critical threshold for a system that influences the climate and ecology of the planet, indicating the point beyond which that system begins to undergo a large-scale irreversible shift.
- Tipping elements include long-term loss of major ice sheets on Greenland and in Antarctica, large-scale ecosystem shifts for the Amazon rainforest and northern evergreen forests, species loss for coral reefs, shrinking Arctic sea-ice, and potential weakening of the AMOC etc.
  a. The collapse of AMOC could have a cascading impact on the stability of other tipping elements and climate systems of the earth.

Sea of Japan

Syllabus:GS1/Geography

Context

- South Korea is on high Alert as North Korea has launched Multiple Cruise Missiles into the Sea of Japan.

Sea of Japan

- Sea of Japan, marginal sea of the western Pacific Ocean
- It is bounded by the Japanese archipelago,
- Sakhalin, the Korean Peninsula, and the mainland of the Russian Far East.
- The sea is separated from the East China
- Sea to the south by the Tsushima and Korea straits and from the Sea of Okhotsk to the north by the La Perouse and Tatar straits.

Western Disturbances

Syllabus: GS1/ Important Geophysical phenomena

Context:

- Indian Meteorological Department(IMD) has predicted a fresh western disturbance is likely to cause isolated to scattered rainfall and snowfall over the Western Himalayan Region on the 17th and 18th February 2024.

About:

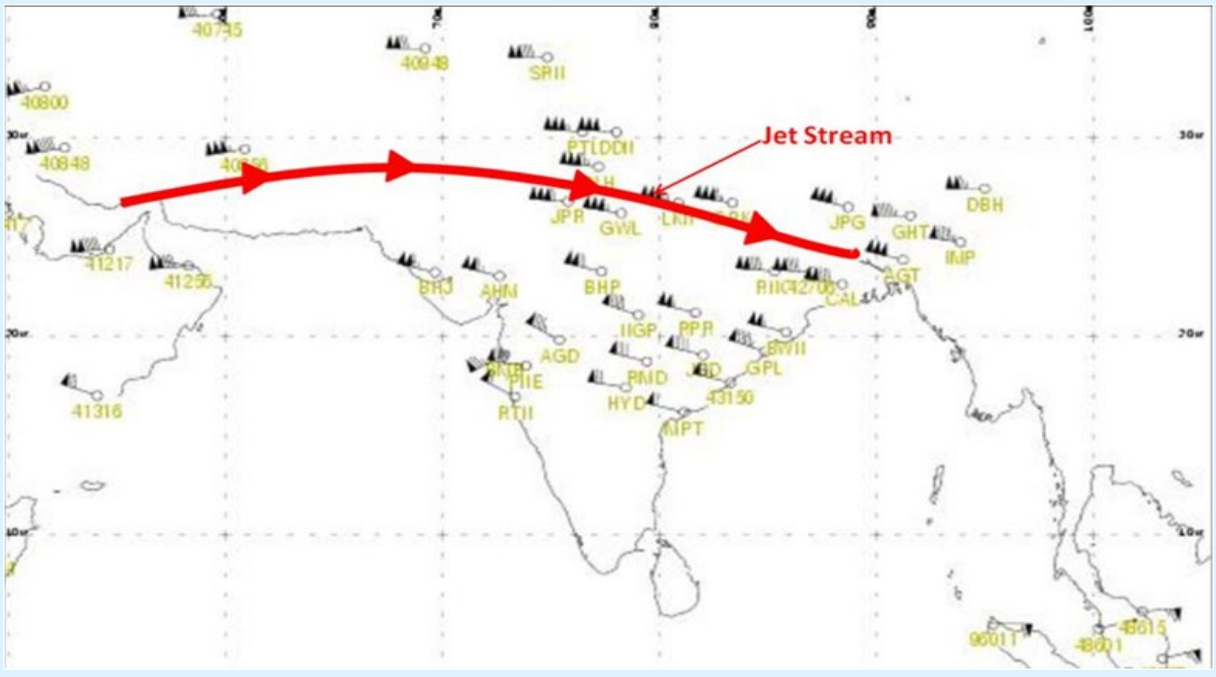
- It also predicts a gradual rise in minimum temperatures by 2 to 4 degrees Celsius over Northwest India during the next 5 days.

Western disturbances

- Western disturbances are the weather systems which are seen as extra tropical upper air trough (extended low pressure area) or/and cyclonic circulations (CCs) in mid- latitude westerlies that move from west to east across Himalayan region.
- They originate in the Mediterranean region or Caspian Sea.
- It brings crucial winter rainfall to northwest India, encompassing areas like Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Punjab, and parts of Rajasthan.

Formation:

- Embedded in the mid-latitude westerly jet stream, a fast-moving ribbon of air high in the atmosphere.
- Gain moisture as they travel over the Mediterranean Sea, Black Sea, or Caspian Sea.



- Move eastward towards the Indian subcontinent, bringing clouds, rain, and sometimes snow.

Impacts:

- Precipitation: Responsible for a significant portion of winter rainfall in the northwest region, crucial for agriculture, water availability, and replenishing snow reserves in the Himalayas.
- Temperature: Can cause temporary dips in temperature, providing respite from harsh winters.
- Other Impacts: Can sometimes bring strong winds, thunderstorms, and fog, requiring weather preparedness measures.

Significance:

- Lifeblood for agriculture: Winter rainfall from Western disturbances is vital for crops like wheat, barley, and oilseeds, impacting millions of farmers.
- Hydropower generation: Contribute to hydroelectricity generation, a clean and renewable energy source.
- Maintain ecological balance: Support healthy ecosystems in the Himalayas and contribute to water availability in downstream regions.

Rip Currents

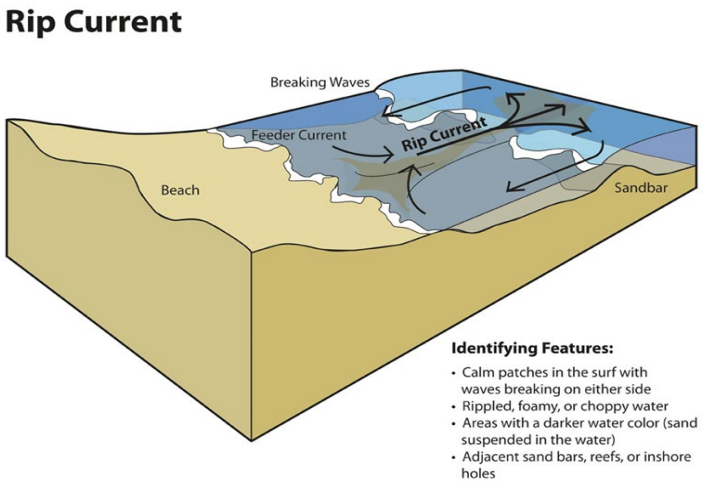
Syllabus:GS1/Geography

Context

- Indian National Centre for Ocean Information Services (INCOIS) and Indian Space Research Organisation (ISRO) will monitor and issue operational forecast alerts of rip currents.

What are Rip currents?

- Rip currents are strong, narrow, seaward flows of water that extend from close to the shoreline to outside of the surf zone.
- They are found on almost any beach with breaking waves and act as “rivers of the sea,” moving sand, marine organisms, and other material offshore.



- They are a common and potentially dangerous coastal phenomenon.

Cause of Rip currents

- These currents often form when waves break near the shoreline.
- Submerged structures such as sandbars, jetties, or reefs alter the flow of water, creating channels where currents can develop.
- As waves approach the shore, they may converge and create imbalances in water distribution, leading to the formation of channels through which excess water flows back to the ocean.

Indian National Centre for Ocean Info rmation Services (INCOIS)

- INCOIS is an autonomous body under the Ministry of Earth Sciences (MoES) and is a unit of the Earth System Science Organisation (ESSO).
- ESSO-INCOIS was established in 1999 under the Ministry of Earth Sciences (MoES) and is located in Hyderabad.
- Indian Tsunami Early Warning Centre (ITEWC) is also housed in the INCOIS.
- Mandate: To provide the ocean information and advisory services to society, industry, government agencies and scientific community through sustained ocean observations and systematic and focussed research.

Chapter 4

Environment

The Water (Prevention and Control of Pollution) Amendment Bill, 2024

Syllabus: GS3/Natural Resources; Conservation

Context

- Recently, the Water (Prevention and Control of Pollution) Amendment Bill, 2024 was introduced in the Rajya Sabha aiming to amend the Water (Prevention and Control of Pollution) Act, 1974.

Key Features of the Bill

- Appointment of Adjudication Officers: The bill proposes the appointment of an 'adjudication officer' who will decide on the penalty in cases of environmental violations.
- Uniformity in appointment of Chairman of SPCBs: The 1974 Act states the Chairman of the State Pollution Control Board was nominated by the State government, to which the Bill adds 'in such a manner as may be prescribed by the Central Government'.
- Applicability: The Bill would be applicable to Himachal Pradesh and Rajasthan, and any other state that passes a resolution under the Water (Prevention and Control of Pollution) Act, 1974.
- Decriminalisation of Minor Offences: The bill aims to decriminalise the existing provisions of the Water (Prevention and Control of Pollution) Act, 1974, which means that instead of imprisonment, violators would be required to pay a fine.
- Changes in Punishment: The 1974 Act currently prescribes imprisonment of up to three months for not informing the State Board about abstraction of water from a stream or well in a substantial volume and not providing information about construction, installation, or operation of disposal system.
- The Bill amends it to a fine between Rs 10,000 and Rs 15 lakh.
- Exemption for Certain Industrial Units: The Bill enables the Centre to 'exempt certain categories of industrial plants' from the restrictions on new outlets and discharges.

- Guidelines for Grant and Establishment of Industries: The Bill also enables the Centre to 'issue guidelines' on matters relating to grant, establishment of any industry, etc.

Water Pollution: A Growing Concern

- Water pollution is a pressing issue that poses significant threats to the environment and human health. It occurs when harmful substances, often due to human activities, enter water bodies and degrade the quality of water.

Causes

- The primary cause of water pollution is the discharge of waste from urban areas, which account for 70% of India's water pollution.
- These wastes, often untreated due to inadequate infrastructure, end up in rivers and other water bodies.
- Industrialization and increasing urbanisation have exacerbated the situation, creating large point sources of it.
- Heavy metals are another significant source of water pollution. They contaminate India's rivers, posing severe health risks.
- The Central Pollution Control Board (CPCB) identified 351 polluted river stretches in India, with Maharashtra having the highest number of polluted rivers.

Impact on Health and Environment

- Pollution has severe impacts on both human health and the environment. In 2019, pollution resulted in more than 23 lakh premature deaths in India, the highest in the world.
- The majority of these deaths were due to air pollution, but water pollution also contributed significantly.
- Water pollution affects the environment by degrading freshwater supplies and ecosystems.
- This degradation increases the vulnerability of small-scale producers to climate shocks and land degradation in some of the world's most fragile ecosystems.

Measures to Control

- The Indian government has implemented various Acts and rules to control water pollution.
- The Water (Prevention & Control of Pollution) Act and the Environment (Protection) Rules, 1986, aim to prevent pollution in water bodies.
- However, effective implementation and enforcement of these laws remain a challenge.
- CPCB performs functions as laid down under the Water (Prevention & Control of Pollution) Act, 1974, and the Air (Prevention and Control of Pollution) Act, 1981.

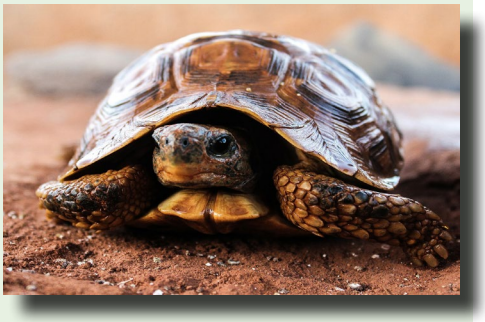
Conclusion

- Water pollution is a grave issue that needs immediate attention. While laws and regulations are in place, their effective implementation is crucial. Moreover, there is a need for increased awareness and individual responsibility towards the conservation and protection of our water bodies.

Brumation

Syllabus: GS3/Environmental Adaptation

Context:



- Researchers have observed instances of brumation in various reptilian species across habitats.

About Brumation

- It's a state of sluggishness, inactivity, or torpor exhibited by reptiles during winter or extended periods of low temperature because of scarcity of food.
- It is a period of dormancy in reptiles, similar to hibernation in mammals, to conserve energy and survive the adverse environmental conditions.
- During brumation, reptiles may retreat to underground burrows, rock crevices or other sheltered areas where temperatures are relatively more stable.

Brumating Species

- Turtles (box and painted), Tortoises, Snakes, Lizards and some amphibians like frogs.
- • The Bearded Dragon is the most brumating of all the known reptiles.

Significance of Brumation

- It allows reptiles to go weeks or even months without eating, and to conserve energy and minimise their resource requirements.
- It is crucial for reptiles to survive cold climes and endure challenging environmental conditions, until they can reemerge to feed and reproduce in more favourable climes.
- It is a survival strategy hardwired into these animals over thousands of years to adapt to sudden climatic changes.

Human-wildlife Conflicts

Syllabus: GS3/Environment

Context

- A radio-collared wild elephant trampled a man to death in Wayanad in Kerala.

Background

- Wayanad has become a human-wildlife conflict hotspot in the State, distressing settler farmers and stoking unrest.
- The year 2022-23 has recorded 8,873 wild animal attacks in Wayanad. It has lost 41 lives to elephant attacks and seven to tiger attacks over the last decade.

Reasons for the increase in human-wildlife conflict

- Habitat fragmentation: Human activities such as increased area under cultivation,changing cropping patterns, and movement of livestock and humans in wildlife habitats have led to habitat loss and fragmentation.
- Changing agricultural practices: Changes in agricultural practices, such as leaving farmland unattended due to poor returns and high wage costs, have made agricultural areas attractive targets for wildlife seeking food.
- Decline in habitat quality: The cultivation of invasive alien plant species like acacia, mangium, and eucalyptus in forest tracts for commercial purposes has degraded the quality of forest habitats.
- These water-guzzling species strain natural water resources, adversely affecting plant biodiversity and making it difficult for native species to thrive.
- Invasive species planted by the forest department have also hindered the growth of natural vegetation in forests.
- Conservation Efforts: It has led to significant increases in the populations of wildlife species such as elephants and tigers, competing for limited resources in shrinking habitats, increasing the likelihood of encounters with humans.

Why is Wayanad worst-affected?

- Wayanad has a forest cover of 36.48 percent.
- The district's forests are a part of a greater forested area comprising
- Nagarhole Tiger Reserve, Bandipur National Park, and BR Tiger Reserve in Karnataka, and Mudumalai Tiger Reserve and Sathyamangalam Forest in Tamil Nadu.

Solutions

- Early warning systems: There is a need to install systems that can track the movement of elephants and other dangerous animals using drones and watchers.
- Plantation of indigenous plants: Plants like wild mango, wild gooseberry, and wild jackfruit should be planted in the forest to ensure wild animals food security and dissuade them from entering agricultural lands.
- Eco-restoration programmes: The state is running a scheme to acquire land from farmers, to convert them into forestland.
- Rapid Response Teams: In areas which see the highest incidence of human-animal conflict, 15 Rapid Response Teams have been established — eight permanent, and seven temporary.
- The state is running schemes for the construction of elephant-proof trenches, elephant-proof stone walls, and solar powered electric fencing.

Greening & Restoration of Wasteland with Agroforestry (GROW)

Syllabus:GS3/Environment

Context:

- Recently, the NITI Aayog unveiled the 'Greening and Restoration of Wasteland with Agroforestry (GROW)' report and portal, aiming to bolster efforts in environmental conservation and sustainable land use across India.

About the GROW

- It is a multi-institutional effort led by NITI Aayog, which utilised remote sensing and GIS to assess agroforestry suitability across all districts in India.
- It provides state-wise and district-wise analysis, supporting government departments and industries for greening and restoration projects.
- It underscores the potential benefits of converting underutilised areas, especially wastelands, for agroforestry.

Key Highlights:

- An Agroforestry Suitability Index (ASI) was developed for national-level prioritisation.
- The GROW-Suitability Mapping portal Bhuvan allows universal access to state and district-level data.
- Currently, agroforestry covers 8.65% of India's total geographical area, totalling about 28.42 million hectares.

- The GROW initiative aligns with national commitments, aiming to restore 26 million hectares of degraded land by 2030 and create an additional carbon sink of 2.5 to 3 billion tonnes of carbon dioxide equivalent.
- Promotion of agroforestry: There is a need for promotion of agroforestry especially for reducing import of wood and wood products, carbon sequestration to combat climate change at global and national level and addressing sub-optimal use of arable land.
- Fallow land and culturable wastelands can be converted to productive use through agroforestry.

Do you know?

- Approximately 16.96% of the total Geographical Area (TGA) is wasteland in India. It requires transformation for productive use.
  a. The Union Budget of Government of India (FY-2022-23) has underlined the promotion of agroforestry and private forestry as a priority.
  b. Approximately 50% of the wastelands are non-forest lands, which can be made fertile again if treated properly.
- Geospatial technologies and GIS are employed to map and prioritise these wastelands for agroforestry interventions.

Utilising wastelands in India

- Integrated Wasteland Development Programme (IWDP): It aims to develop wastelands mainly in non- forest areas by involving local people at every stage of development.
- The programme focuses on improving the productivity of waste & degraded lands.
- Wasteland Reclamation: This approach aims to restore desolate landscapes, revive biodiversity, improve the lives of affected communities, and enhance economic and ecological value.
- It combines ecological restoration, sustainable agriculture, and community engagement.
- Technologies such as mulching, greenhouse, net house, and high-density plantation can make the wastelands fertile.
- State-wise Utilisation: States like Maharashtra and Andhra Pradesh have a high scope for using wasteland due to their large wasteland areas.

Textile Waste Management

Syllabus: GS3/Biodiversity and Conservation

In Context

- According to the European Environment Agency (EEA) nearly half of the textile waste collected in Europe ends up in African second-hand markets.

What is Textile Waste?

- Textile waste refers to any material that is discarded during the production, manufacturing, use, or disposal of textiles and clothing.
- This waste can include scraps generated during the production process, unsold or excess inventory, damaged or defective products, as well as clothing and textiles that are discarded by consumers.
- Globally, 92 million tonnes of textile waste is produced each year.

How Does It Impact the Environment?

- Landfill pollution: Textiles can take a long time to decompose, especially synthetic fibers, which may never fully break down.
- Pollution from production processes: The production of textiles involves various processes, such as dyeing, finishing, and chemical treatments, which can release pollutants into the air, water, and soil.
- Microplastics Pollution: Many textiles, especially those made from synthetic fibers like polyester and nylon, shed microplastics when washed.
- Greenhouse Gas Emissions: The textile industry is a significant contributor to greenhouse gas emissions, primarily due to energy-intensive production processes and transportation.

Textile Recycling

- Textile recycling refers to the process of reusing, repurposing, or transforming discarded textiles and clothing into new products or materials.
- Instead of being sent to landfills or incinerators, textiles are collected, sorted, and processed to recover valuable materials, such as fibers, yarns, and fabrics, which can then be used to create new textiles, insulation, padding, carpeting, and other products.

Why is Textile Recycling Important?

- Environmental Conservation: Textile recycling helps reduce the burden on landfills, conserving valuable landfill space and reducing the amount of waste that

ends up polluting the environment.

- Conservation of Resources: Recycling textiles allows for the recovery and reuse of valuable materials such as cotton, wool, and polyester.
- Energy Savings: Processing recycled textiles into new products often consumes less energy than manufacturing textiles from scratch, leading to lower greenhouse gas emissions and reduced reliance on fossil fuels.
- Economic Benefits: Textile recycling can create economic opportunities by supporting industries involved in recycling, upcycling, and manufacturing recycled products.
- Social impact: Promoting textile recycling raises awareness about sustainable consumption practices and encourages individuals to take action to reduce waste and protect the environment.

Indian Scenario

- India is amongst the world's largest producers and exporters of textiles.
- The Textile and Apparel (T&A) industry is one of the largest contributors to India's economy constituting 2% of the country's GDP, 7% of industry output in value terms and 11.4% of the total exports.
- Both the production and consumption patterns lead to a significant amount of waste generation.
- Estimates suggest that India manages ~7793 kilotons of textile waste annually from three sources- domestic manufacturers, domestic consumers and imported waste coming from other countries.

Textile Waste Management in India

- India established its recycling industry back in the 1990s and today has a stronghold in mechanical recycling with a well networked value chain for the management of textile waste.
- However, the industry is a mix of micro, small and large stakeholders and approximately 41% of the waste is currently known to be moving out for usage in other allied industries.
- Research indicates challenges around unorganised waste value chain and inefficient waste management as the major hindrance in realising the potential of the Indian textile waste management industry.

Government Initiatives

- Solid Waste Management Rules, 2016: These rules, formulated under the Environment Protection Act, provide a comprehensive framework for the management of solid waste in India, including textile waste.
- Project SU.RE: The Government launched a Sustainable Resolution in 2019.
- It is a commitment by India's apparel industry to establish a sustainable pathway for the fashion industry.

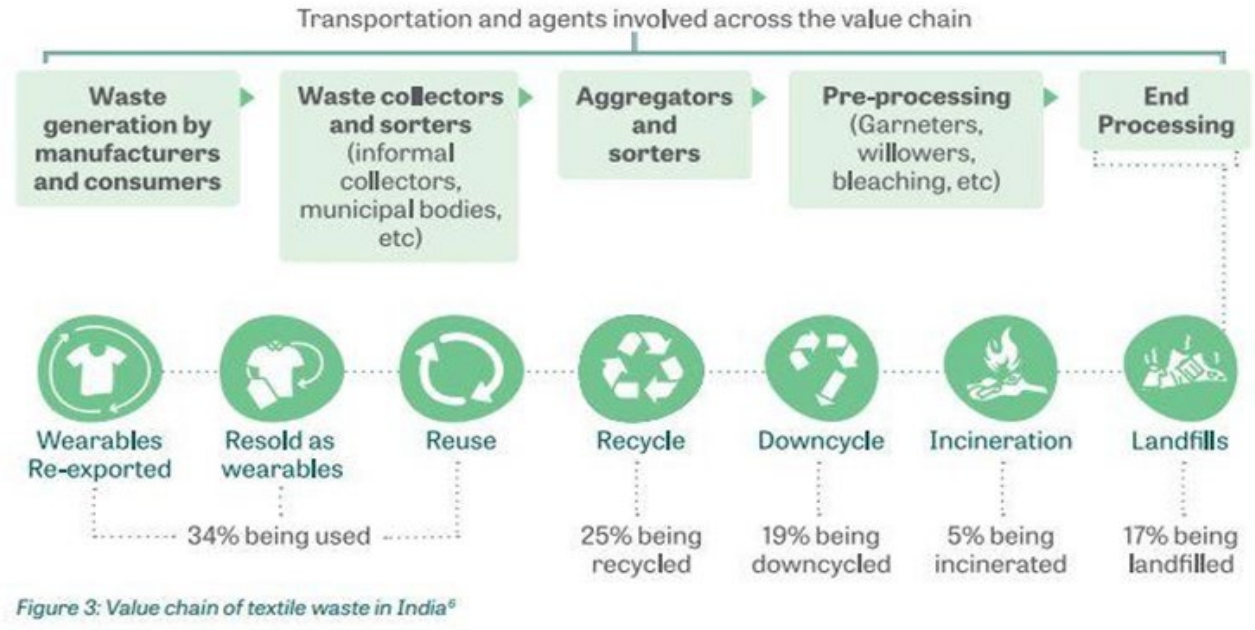


Figure 3: Value chain of textile waste in India[6]

- This project will support the sector achieve Sustainable Development Goals (SDGs) and long-term environmental, social, and corporate governance goals.
- Promotion of Sustainable Practices: The government promotes awareness and adoption of sustainable practices in the textile industry through various initiatives, including workshops, seminars, and training programs.
- Technology Upgradation Fund Scheme (TUFS): TUFS is a scheme by the Ministry of Textiles aimed at providing financial assistance for the modernization and upgradation of textile machinery to improve efficiency and reduce environmental impact.
- Integrated Processing Development Scheme (IPDS): IPDS is another scheme under the Ministry of Textiles that focuses on promoting sustainable and environmentally friendly processing technologies in textile manufacturing units, which includes initiatives for water conservation, waste management, and recycling.

Recommendations

- Waste Management: The industry can reduce waste by improving its product design, using more sustainable materials, and recycling more waste.
- Infrastructure: The industry must invest in infrastructure supporting circularity, such as recycling facilities and collection centres.
- Value Chain Education and Awareness: The industry needs to educate its stakeholders about the benefits of circularity and how they can contribute to it.
- Government Policy: The Government can support circularity by providing incentives for sustainable practices and regulating the industry to reduce its environmental impact.
- Consumer Engagement: The industry needs to engage consumers in circularity by making it easy for them to recycle their clothes and buy sustainable products.

- End-of-life Management: Recycling, upcycling, donation, and other practices should be explored to manage post-consumer waste properly.

Conclusion

- In conclusion, sustainable textile products play a critical role in a circular economy.
- As the fashion industry continues to grow, the need for sustain – able, recycling and ethical practices is becoming the current need of society to sustain the environment.
- By embracing sustainable textile production and recycling practices, we can reduce waste, conserve resources, create job opportunities and preserve cultural traditions etc.

Survival Chances of Cheetah in India

Syllabus: GS3/Environment and Biodiversity; Wildlife

Context:

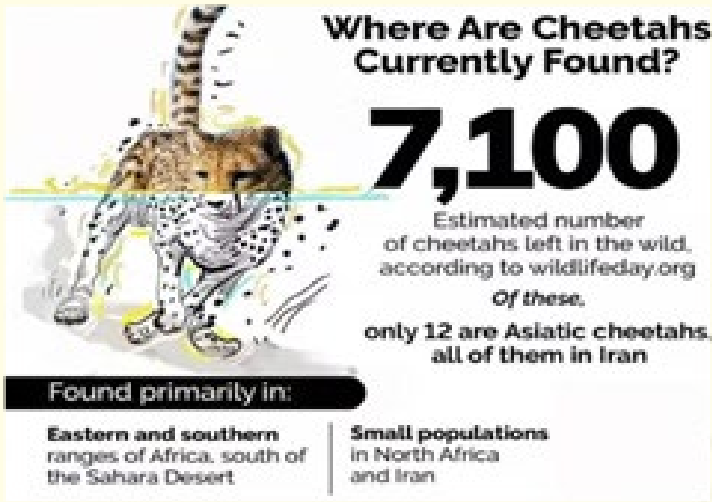
- Recently, the Wildlife officials of Kuno National Park in Madhya Pradesh informed about the birth of seven cheetah cubs.

About Cheetah (Acinonyx Jubatus):

- It is the fastest terrestrial animal on earth, and native to Africa and central Iran.
- The Gestation Period: 93 days;
- Cub Mortality: Higher in Protected Areas (like National Parks and Wildlife Reserves); It can be as high as 90%;
- Average Life Span (in the wild): 10 – 12 years.
- Adult male about 8 years (Adult mortality is one of the most significant limiting factors for the growth and survival of the wild cheetah population).

Cheetah in India (Asiatic):

- 1st plan to reintroduce the cheetah: First solid steps were taken in the 1970s, during negotiations with Iran.
- Iran's cheetahs were Asiatic, like India's extinct animals.
- The plan was to exchange Asiatic lions for Asiatic cheetahs.
- In 2009: Another attempt to source Iranian Cheetahs in India was made without success.
- Iran did not permit cloning of its Cheetahs.



- In 2020: South African experts visited four potential sites: Kuno-Palpur, Nauradehi Wildlife Sanctuary, Gandhi Sagar Wildlife Sanctuary and Madhav National Park.
- In 2022: The Government of India has decided to reintroduce cheetahs, under the 'Action Plan for Introduction of Cheetah in India'.
- It aims to bring back the cheetah.
- As part of the project, 50 cheetahs will be introduced in various National Parks over five years, and it is being done under Project Cheetah, the world's first inter- continental large wild carnivore translocation project.
- It aims to re-establish the functional role of the cheetah in representative ecosystems within its historical range.

- **African Cheetah:**
  - **IUCN Status:** Vulnerable
  - **Characteristics:** They are bigger in size as compared to Asiatic Cheetah.
- **Asiatic Cheetah:**
  - **IUCN Status:** Critically Endangered
  - **Status in India:** Declared extinct in India in 1952.
  - **Distribution:** They are only 40-50 and found **only in Iran.**
  - **Characteristics:** Smaller and paler than the African cheetah.

Kuno Palpur National Park

– It was established in 1981 as a Wildlife Sanctuary.

A. In 2018, it was given the status of a National Park.

– Kuno Palpur Wildlife Sanctuary is underway to become India's second home for the Asiatic lion. Why was it selected for Cheetah?

– Amongst the 10 surveyed sites of the central Indian states, Kuno Palpur National Park has been rated the highest.

A. It is because of its suitable habitat and adequate prey base.

– Kuno is probably the only wildlife site in the country where there has been a complete relocation of villages from inside the park.

– It offers the prospect of housing four big cats of India – tiger, lion, leopard and cheetah – and allowing them to coexist as in the past.

Role Played by Cheetah

- Ecological: Cheetahs fulfil a unique ecological role within the carnivore hierarchy and their restoration is expected to enhance ecosystem health in India.
- It helps restore India's open forests and grassland ecosystems, which have been suffering.
- Conservation: The Cheetah can benefit India's broader conservation goals by improving general protection and ecotourism in areas that have been previously neglected.
- Resources invested in these highly exploited and neglected systems ensure better management and restore their ecosystem services for the country.
- A Flagship Species: The cheetah serves as a flagship to save its prey-base and other endangered species of the grassland and semi-arid ecosystems.
- India is home to the world's largest free-roaming populations of livestock.

Threats to Cheetah:

- Coexistence with Tigers and Leopards: Threats like conflict with leopards, poaching and deaths caused while capturing cheetahs to retrieve them from outside park boundaries loom over the reintroduced species in the new habitat.
- More aggressive predators such as tigers and leopards will compete with the cheetahs.
- They may be driven to the outskirts of the park, where they could come into conflict with humans.
- Anthropogenic Threats: These include snaring for bush meat and retaliatory killings due to livestock depredation.
- Captive Breeding: There is a concern among experts that weak genetics accumulated may persist among the captive cheetahs and eventually weaken the gene pool, resulting in animals that need constant human intervention for survival.
- Cheetahs are known for open forests and grassland ecosystems.

Impacts of Close Enclosure on Cheetah:

- According to Kuno officials, the cubs are **safe in enclosures, away from predators.**
  - But they are going to be artificially protected from **danger without protecting the genetics.**
- Housing cheetahs in small enclosures has been linked to *'stress related behaviours, medical conditions and reduced reproductive performance'.*

Locational Challenges of Kuno-Palpur National Park:

- The protected area of Kuno-Palpur National Park is largely dry, deciduous forest.
- The African cheetahs who are more used to the savannahs of that continent adapt well to Kuno.
- There is a hypothesis that via the wound the African cheetah may have been exposed to parasites that Indian big-cats are usually resistant too.

Specific Prey Base:

- Indian cheetahs were largely dependent on blackbucks and chinkaras, sometimes on chital and rarely on nilgai.
- Few of these species are believed to have disappeared from Kuno.

Government's Efforts:

- Increasing Prey Base: To increase prey base inside the 500-hectare enclosure, the Kuno National Park has brought in 238 chitals or spotted deer (Axis axis) from Pench and Narsinghgarh Wildlife Sanctuaries of the state and are planning to bring in around 300 more deer.
- Gradual Co-existence: Over time, says the action plan by the Centre, cheetah and leopard populations will be able to coexist.
- Tracking: The initial batch of cheetahs and their potential offspring will be radio-collared and tracked for at least 10 years.

Spur-winged lapwing observed at Warangal lake

Syllabus: Species in News

Context

- A birdwatching team from Telangana recently spotted a spur-winged lapwing at Ammavaripet Lake near Warangal.

Spur-winged lapwing

- Scientific name: Vanellus spinosus
- Native: North Africa, the Middle East and Mediterranean regions.
- Habitat: It is found around wetlands, but also away from water in cultivated areas and even suburbia and urban settings.

Features:

- A wader bird: A bird with long legs and a long neck, that lives near water and feeds on fish.
- Vocal: It is very vocal, producing a piercing and repeated "sik-sik-sik…" call.
- Feeding habits: It forages mainly for arthropods, but also small reptiles and amphibians.
- IUCN Status: Least Concern

La Nina impacted air quality in India

Syllabus: GS1/Geography, GS3/Environment & Climate Change

Context

- An unprecedented triple-dip La-Nina event, extended by climate change, has impacted the air quality in India.

Link between pollution & winter months in India

- During October to January, northern Indian cities experience very high concentrations of PM2.5.
- A variety of meteorological factors — temperature, moisture, heaviness in air, wind speed and direction — play a role in trapping pollutants in the lower levels of the atmosphere.

- These factors are also responsible for transporting pollutants from other regions, particularly those generated by agriculture waste burning in Punjab and Haryana, to Delhi and adjoining areas.
- On the other hand Western and Southern parts of the country have always had relatively lower levels of pollution, because of their proximity to oceans.

Rare 'triple dip' La Niña

- The winter of 2022-23 coincided with the last phase of an unusual triple-dip La Niña event, the first in the 21st century.
- The air quality worsened in peninsular Indian cities in the 2022-23 winter season but improved in the northern part of India.
- This phenomenon, influenced by climate change, impacted the large-scale wind pattern, playing a decisive role in preventing stagnation conditions in north Indian cities and thus improving air quality.

El Niño, La Niña & ENSO

El Niño

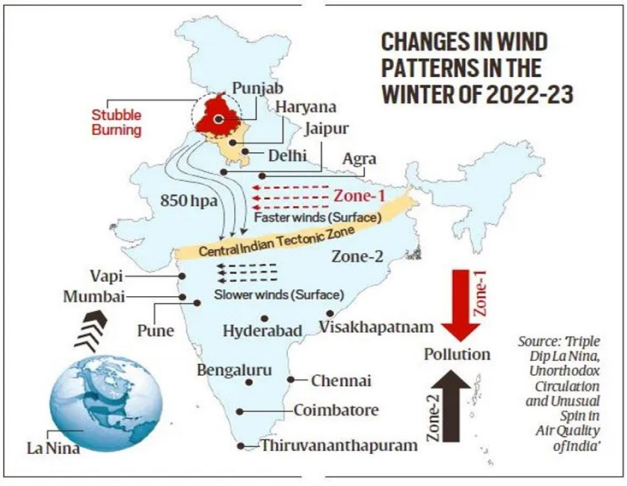
– El Niño is the warming of seawater in the central-east Equatorial Pacific that occurs every few years.
– During El Niño, surface temperatures in the equatorial Pacific rise, and trade winds — east-west winds that blow near the Equator — weaken.
– El Niño causes dry, warm winters in the Northern U.S. and Canada and increases the risk of flooding in the U.S. gulf coast and southeastern U.S. It also brings drought to Indonesia and Australia.
– In India, it causes weak rainfall and more heat.

La Niña

– La Niña is the opposite of El Niño. La Niña witnesses cooler than average sea surface temperature (SST) in the equatorial Pacific region.
– Trade winds are stronger than usual, pushing warmer water towards Asia.
– This leads to drier conditions in the Southern U.S., and heavy rainfall in Canada. It has also been associated with heavy floods in Australia.
– In India, La Niña intensifies rainfall particularly in its northwest.

Wind direction

- A change in the normal wind direction led to the anomaly of winter 2022.
- During this time, wind usually blows in the northwesterly direction, from Punjab towards Delhi and further into the Gangetic plains.
- In the winter of 2022, however, the wind circulation was in the north-south direction.



- The pollutants being carried from Punjab and Haryana bypassed Delhi and surrounding areas and flew over Rajasthan and Gujarat to southern regions.
- In the case of Mumbai, usually wind currents alternate between blowing from the land to the sea every few days. When blowing from the land towards the sea, the winds carry pollutants out of the city.
- In 2022, however, instead of changing direction every four to five days, the winds persisted in one direction for more than a week or 10 days, leading to greater accumulation of pollutants in Mumbai

India's Coffee Industry

☛ **Syllabus: GS3/Major crops**

Context

- In a significant development for the Indian coffee sector, the Coffee Board of India organised a buyer-seller meeting at Dubai, marking a new chapter in the industry's global expansion.
- The event, held on the sidelines of Gulfood 2024, was jointly organised by the Indian Embassy in UAE and the Coffee Board of India.

Coffee Board of India

– The 'Coffee Board' was established through a Constitutional act "Coffee Act VII of 1942.
– Administrative control: The Ministry of Commerce and Industry.
– Structure: The Board comprises 33 members including the Chairman and the Secretary & Chief Executive Officer.

A. The remaining 31 members represent the various interests such as coffee growing industry, coffee trade interests, curing establishments, interests of labour and consumers, representatives of governments of the principal coffee growing states, and Members of Parliament.

– Statutory Committees: The Board functions through six statutory committees which are appointed for one year term each and the functions of each committee as per the Coffee Act.
– Role: The activities of the Board are broadly aimed at

(i) enhancement of production, productivity & quality;
(ii) export promotion for achieving higher value returns for Indian Coffee and
(iii) supporting development of Domestic market.

Historical Context

- Origin: The word coffee came from Ethiopia, where they called itqahve.
- Introduction in India: Coffee seeds were brought to India by Arab traders for use by the gentry. Arabs introduced coffee plantations in South India and Sri Lanka.
- A Sufi, Baba Budan grew coffee plants around Chikamagaluru, Karnataka.
- Starting in 1830, British pioneers planted coffee estates in two varieties of coffee plants —
- Coffee arabica at high altitudes, and Coffee robusta in lower reaches.
- The name Arabica comes as Arab traders traded qahve to Europe while Robusta variety came from West Africa and is more resistant to disease.

India's Coffee Industry

- Production: India is among the top 10 coffee-producing countries, with about 3% of the global output in 2020.
- Two types of coffee: Arabica and Robusta. Arabica has higher market value than Robusta coffee due to its mild aromatic flavor.
- Robusta is the majorly manufactured coffee with a share of 72% of the total production.
- Uniqueness: India's coffee is unique in the sense that it is shade-grown.
- Notably, 35% of the country's coffee exports now comprise value-added and specialty coffees, showcasing a shift towards premium offerings.
- Major producers: Coffee is largely produced in the southern part of India.
- Karnataka is the largest producer accounting for about 70% of the total coffee production in India.
- Orissa and the northeastern areas also have a smaller proportion of production.
- Employment: The industry provides direct employment to more than 2 million people in India.
- Exports: The country exports over 70% of its production. According to FAO statistics, India is the eighth largest exporter of coffee by volume.
- India majorly exports Robusta coffee beans, a coffee bean species with low acidity and high bitterness compared to Arabica coffee.
- Almost one-third of the country's total coffee exports constitute instant coffee.
- Top exporting destinations: Italy, Germany, Belgium, and the Russian Federation are the largest importers of coffee from India

Challenges

- Aging Plantations: A large number of coffee plantations are aging, leading to reduced productivity and requiring replanting with improved varieties.
- Pest and Diseases: Coffee Leaf Rust and other diseases pose significant threats, requiring increased investment in disease management practices.

- Low Productivity: Compared to other major producers, India's coffee yield per hectare remains low due to traditional farming methods and inadequate infrastructure.
- Climate Change: Erratic rainfall, rising temperatures, and extreme weather events are disrupting coffee production, leading to yield decline and quality issues.
- Price Volatility: Fluctuations in global coffee prices can negatively impact farmer incomes and discourage investment.

Measures

- Climate-Smart Agriculture: Promoting climate-resilient coffee varieties, shade management practices, and rainwater harvesting to adapt to changing climatic conditions.
- Disease Management: Investing in research and development of resistant varieties, early detection systems, and sustainable pest control methods.
- Value Addition: Supporting the establishment of processing units, promoting domestic consumption of specialty coffee, and exploring export opportunities for value-added products.
- Promotion and Branding: Increasing domestic and international awareness about Indian coffee through branding, participation in trade fairs, and geographical indication recognition.

Government Initiatives

- Subsidies: The Government of India took the initiative to provide subsidies to the farmers between US$ 2,500-US$ 3,500 per hectare for developing coffee in the traditional areas.
- National policy of tribal development: Coffee cultivation is being encouraged in non-traditional areas such as Andhra Pradesh, Orissa, Maharashtra, the northeastern states, and Andaman and the Nicobar Islands.
- Export promotion: Under various export promotion initiatives, transit and freight assistance are provided to help maximize export earnings.
- Incentives for exporting high-value coffee: It aims to maximize export earnings by enhancing the market share of value-added coffees and high-value differentiated coffees in important high-value international markets such as the USA, Canada and Japan.

Way Ahead

- Overall, addressing associated challenges and implementing effective measures are crucial for ensuring the sustainability and growth of India's coffee industry, enhancing farmer incomes, and contributing to the nation's economic development.
- Public-private partnerships & integrating the coffee industry with rural development initiatives can create livelihood opportunities and improve living standards in coffee-growing regions.

Chapter 5

Science & Technology

Neuralink Implants

Syllabus: GS3/Developments in Science and Technology

Context

- The first human patient has received an implant from brain-chip startup Neuralink recently.

About

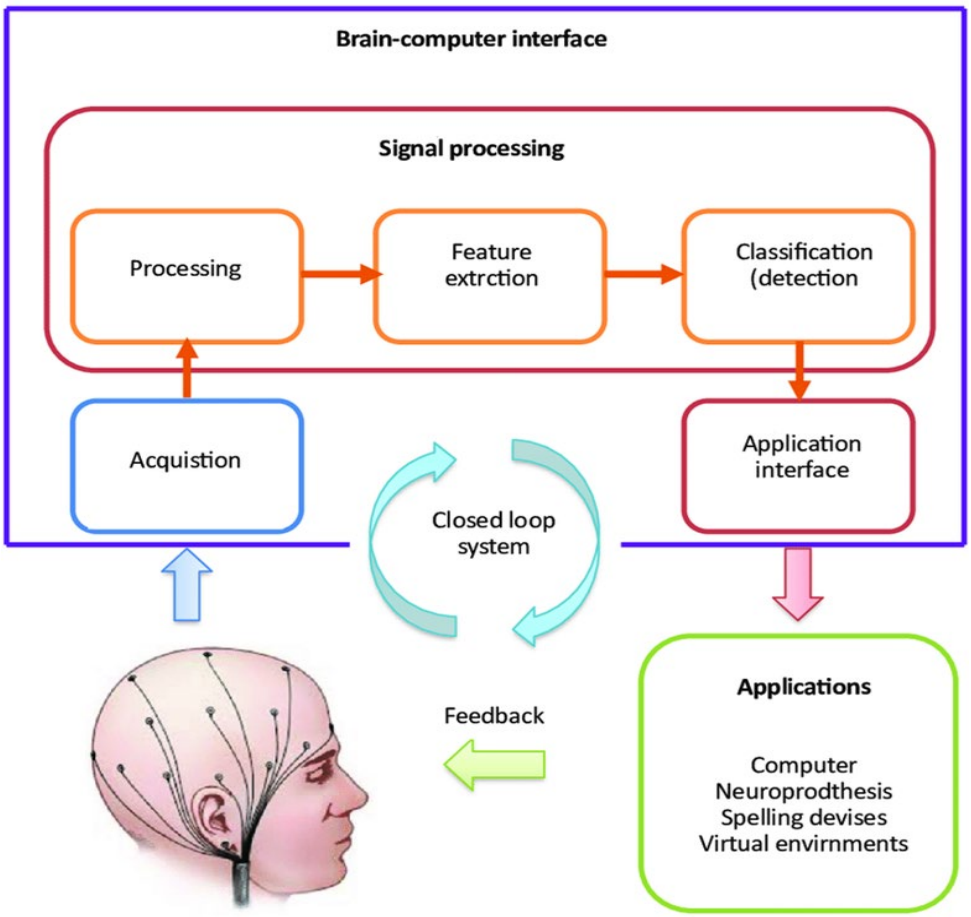
- Initial results show promising neuron spike detection.
- Spikes are activity by neurons, which the National Institute of Health describes as cells that use electrical and chemical signals to send information around the brain and to the body.
- It gives hope that the startup technology will help patients overcome paralysis and a host of neurological conditions.

Neuralink

- Neuralink is a neurotechnology company founded by Elon Musk in 2016.
- The company's main goal is to develop brain-computer interfaces (BCIs) that can be implanted in the human brain.
- These BCIs would allow people to control computers and other devices with their thoughts, and could also be used to treat a variety of neurological conditions.
- Neuralink's BCI is a small, flexible device that is implanted in the motor cortex of the brain.
- The device contains thousands of tiny electrodes that can detect the electrical activity of neurons. This activity is then processed by a computer, which can interpret it as commands or intentions.

Brain-computer interfaces (BCIs)

- BCIs are systems that bridge the gap between human thought and external technology.
- Working: BCIs capture and translate brain activity into signals that computers can understand. Different approaches exist:
- Non-invasive BCIs: These use sensors like EEG (electroencephalography) to measure brain waves from outside the skull. They offer good portability but lower resolution.



- Partially invasive BCIs: These use electrodes implanted under the scalp or skull, providing higher resolution but limited to specific brain areas.
- Fully invasive BCIs: These like Neuralink's implant directly interface with brain tissue, offering the highest resolution but raising ethical and safety concerns.

Application of Brain Computer interface

- Human-technology interface: BCI has the potential to revolutionize the way we interact with technology.
- Communication and Control: Helping people with paralysis control assistive devices, prosthetics, or even computers directly with their thoughts.
- Sensory Restoration: Restoring sight or hearing loss due to injuries or diseases.
- Neurological Treatment: Treating conditions like epilepsy, Parkinson's, and chronic pain by modulating brain activity.
- Augmentation and Enhancement: Potentially amplifying cognitive abilities or memory in the future.

Challenges/Concerns

- Safety: The Neuralink company has faced calls for scrutiny regarding its safety protocols.
- Veterinary records showed problems with the implants on monkeys included paralysis, seizures and brain swelling.

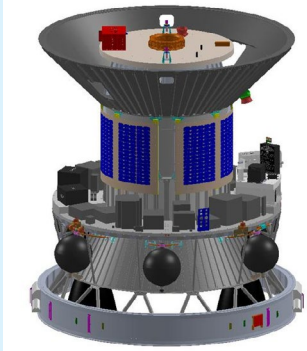
- Ethical concerns: Some worry that the device could be used to hack into people's brains or to control their thoughts.
- Superhumans: Others worry that it could create a new class of people who are enhanced with technology.
- Privacy and Security: Ensuring brain data remains secure and used ethically.
- Accessibility and Equity: Ensuring equitable access to BCI technology.
- Human and Machine Integration: Defining the boundaries between human thought and machine control.
- Brain Enhancement: Considering the implications of cognitive and sensory augmentation.

Way Ahead

- BCI research is rapidly evolving, driven by advancements in neuroscience, engineering, and artificial intelligence.
- While challenges remain, BCIs hold immense potential to transform healthcare, communication, and our understanding of the brain-computer interface.

POEM-3

Syllabus: GS3/Science and Technology



In Context

- As per the Indian Space Research Organisation (ISRO), POEM-3 has successfully achieved all its payload objectives.

About

- The PSLV Orbital Experimental Module-3 (POEM-3) is a space platform.
- It is a three-axis-attitude controlled platform with power generation and telecommand & telemetry capabilities, for supporting Payloads.
- It used the spent PS4 stage of the PSLV-C58 vehicle which launched XPoSat on January 1, 2024.
- After achieving all objectives, more experiments with POEM-3 are planned for generating data for future missions including upcoming POEM configurations.
- With the orbital decay and reentry of POEM-3 in three months, PSLV-C58 XPoSat mission will be leaving zero debris in space.

Digital Detox

Syllabus: GS3/Developments in Science and Technology

Context

- The Karnataka government recently announced it will ensure a responsible gaming environment by pursuing 'digital detox' initiatives.
- The government plans to launch the detox initiative in collaboration with All India Game Developers' Forum (AIGDF).

Karnataka's Digital detox initiative

– The digital detox programme will focus on the time people spend in gaming and on social media.

– Although the initiative looks counter-productive to the industry, the government is expected to spread awareness on the ills of the sector.

– The programme will enable meaningful and constructive use of technology while minimising its adverse effects on individuals and society.

– As part of the initiative, both online and offline 'Digital Detox' centres will be set up across the state.

a. The centres will facilitate personalised guidance involving counselling and support to individuals seeking to navigate their relationship with technology.

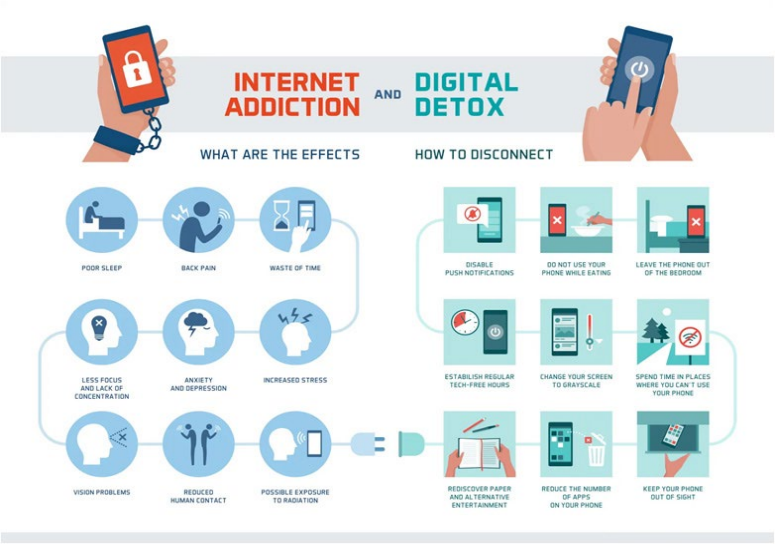
Digital detox

- A digital detox is a period of time when one voluntarily abstains from using digital devices such as smartphones, computers, and social media.
- This can be for a short period of time, like a few hours, or for a longer period, like a week or even a month.
- One study found that around 25% smartphone owners between ages 18 and 44 don't remember the last time their phone wasn't right next to them.

Benefits

- Assist people to overcome addiction to technology. Research shows that about 61% of people admit they're addicted to the internet and their digital screens.
- Improved mental health and wellbeing. Disconnecting from technology can help reduce stress and anxiety, and can improve overall mental health and wellbeing.
- Increased productivity and creativity. Taking a break from constant digital stimulation can help improve focus and concentration, leading to increased productivity and creativity.

- Better sleep quality and quantity. Excessive screen time has been linked to poor sleep quality and disrupted sleep patterns. A digital detox can help improve sleep by reducing exposure to blue light and stimulating content.
- Enhanced face-to-face communication skills. Spending less time online can lead to more time for face-to- face interactions, improving communication skills and overall social connectedness.



Challenges associated

- Feeling disconnected from friends and family.
- Missing out on important information.
- Feeling bored or restless.
- Experiencing withdrawal symptoms like feelings of anxiety, boredom, or FOMO (fear of missing out).

Suggestion

- Start small. Begin with a short detox, like a few hours, and gradually increase the duration as you get more comfortable.
- Let friends and family know about your detox so they don't think you are ignoring them.
- Find healthy activities to fill detox time, such as spending time in nature, reading, exercising, or spending time with loved ones.
- Turn off notifications on devices and put them away in a place where you won't see them.
- Reward yourself for sticking to detox goals.

Conclusion

- Mental health issues, shrinking attention spans and fraying real-world relationships are outcomes of digital dependence.
- Technology has woven itself firmly into the fabric of everyone's lives and being glued to screens has become a norm. This is largely because gadgets offer convenience and connection at the fingertips. At the same time, it is exacting a heavy cost.
- A digital detox can be a great way to improve mental and physical health, as well as relationships with others. With a little planning and effort, one can have a successful and rewarding experience.

Sunrise Technologies

Syllabus: GS3/Developments in Science and Technology

Context

- During the Interim Budget 2024-25 presentation, the Finance Minister revealed a plan to create a corpus of Rs 1 lakh crore for the sunrise technologies.

About:

- The goal is to encourage private investment in sunrise technologies and usher in a "golden era for our tech savvy youth".
- The corpus will be created with a fifty-year interest-free loan, giving a financial boost to encourage innovation and research in emerging technology fields.
- The Finance Minister mentioned that long-term financing with extended tenors and low or zero interest rates will inspire the private sector to increase their focus on research and innovation in sunrise domains.
- Stressing the significance of research and innovation in India's growth she noted the shift from "Jai Jawan Jai Kisan" to "Jai Jawan Jai Kisan Jai Vigyan and Jai Anusandhan" underlining that innovation is the cornerstone of development.

Sunrise technologies

- Sunrise technologies is a category of industries with high growth potential and expected to become significant in the future.
- It's important to note that the specific industries considered "sunrise" can change over time depending on technological advancements, economic trends, and societal needs.

Characteristics

- New or relatively new: They are typically in their early stages of development, offering innovative solutions or catering to emerging needs.
- Rapid growth: They exhibit high growth rates, with significant increases in revenue, market share, and investment.
- Future potential: They are expected to have a major impact on the economy and society in the long term.
- Innovation: They often use cutting-edge technologies or disruptive business models.
- Uncertainty: Due to their early stage, their future success and long-term trajectory can be uncertain.

Examples of Potential Sunrise Technologies:

- Renewable Energy: Solar, wind, bioenergy, and other renewable energy sources are crucial for sustainable development and energy security.
- Artificial Intelligence (AI) and Machine Learning (ML): These technologies have the potential to revolutionize various sectors like healthcare, agriculture, manufacturing, and finance.
- Electric Vehicles (EVs) and Battery Technology: This industry holds immense potential for reducing emissions and promoting sustainable transportation.
- Internet of Things (IoT) and Big Data: Connecting devices and analyzing data can improve efficiency, decision-making, and innovation across various sectors.
- Robotics and Automation: Automation can enhance productivity, precision, and safety in manufacturing, healthcare, and other sectors.
- Space Technology: This sector offers opportunities in satellite communication, remote sensing, navigation, and space exploration
- Genomics and Biotechnology: Advances in these fields have applications in healthcare, agriculture, and other areas.

Challenges

- Lack of infrastructure: Inadequate infrastructure, particularly in areas like state-of-the-art research centres, can hinder growth.
- Skilled workforce shortage: Lack of skilled professionals in these emerging fields can hamper development and adoption of new technologies.
- Funding and investment limitations: Limited access to finance and investment can restrict expansion and innovation.
- Regulatory hurdles: Complex and outdated regulations can create operational challenges and hamper market growth.
- Technological challenges: Integrating and adapting cutting-edge technologies requires constant adaptation and innovation.

Measures

- Government initiatives: Policies promoting investment, infrastructure development, skill development, and research & development can create an enabling environment.
- Public-private partnerships: Collaboration between government and private sector can leverage strengths and resources for optimal development.
- Focus on education and skill development: Upskilling and reskilling programs can address the workforce shortage and prepare individuals for future jobs.
- Promoting innovation and R&D: Encouraging research and development in these fields is crucial for technological advancements and competitiveness.
- Streamlining regulations: Simplifying and updating regulations can facilitate ease of doing business and technological adoption.

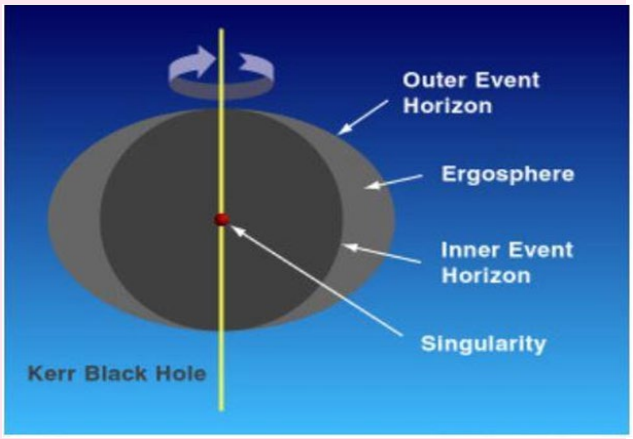
Way Ahead:

- Overall, addressing challenges and adopting supportive measures can unlock the full potential of sunrise technologies and contribute significantly to India's economic growth and progress.
- It's important to note that the dynamics of sunrise industries are constantly evolving, and so India needs to adapt to face these dynamics.

Kerr Black Hole

Syllabus: GS3/Science and Technology

Context



- Rotating black holes (a.k.a. Kerr black holes) have a unique feature: a region outside their outer event horizon called the ergosphere.

What is a Black Hole?

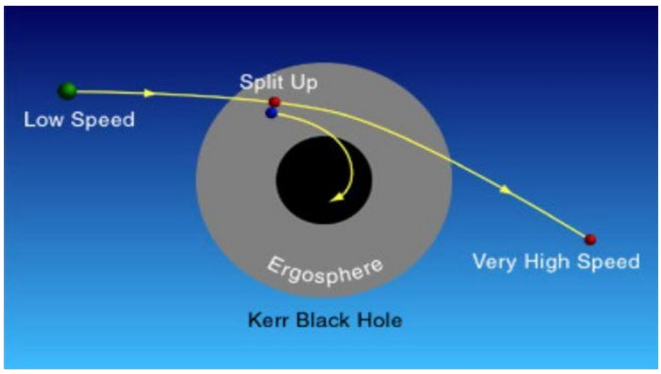
- A black hole is an extremely dense object whose gravity is so strong that nothing, not even light, can escape it.
- A black hole does not have a surface, like a planet or star. Instead, it is a region of space where matter has collapsed in on itself.
- This catastrophic collapse results in a huge amount of mass being concentrated in an incredibly small area.
- Formation: A black hole is formed when a really massive star runs out of fuel to fuse, blows up, leaving its core to implode under its weight to form a black hole.
- The centre of a black hole is a gravitational singularity, a point where the general theory of relativity breaks down, i.e. where its predictions don't apply.
- A black hole's great gravitational pull emerges as if from the singularity.

Rotating Black Hole

- A rotating black hole is also called a Kerr black hole.
- There are two event horizons, the outer and the inner.
- The region of space in-between the two horizons is the ergosphere.
- Anything inside the ergosphere will be dragged by the black hole and rotate with it but it can still escape.
- However, anything inside the inner event horizon can never escape.
- Scientific Significance: We can extract rotational energy from a rotating black hole.

- If something is sent inside of the ergosphere, and split it up into two parts, one goes in the black hole while the other comes out.
- The part coming out can be made to have a much higher speed, hence higher energy.

Do You Know?



– Known black holes fall into two classes:

a. Stellar mass: 5 to tens of times the Sun's mass;

b. Supermassive: 100,000 to billions of times the Sun's mass;

c. Middleweight black holes may exist between these classes, but none have been found to date.

– Spaghettification: As objects approach the event horizon of a black hole, they're horizontally compressed and vertically stretched, like a noodle.

– Sagittarius A*: Sagittarius A* is more than 25,000 light years from Earth – nearest supermassive black hole, with an estimated mass millions of times that of Sun.

a. Often abbreviated by researchers to Sgr A* (pronounced "Sagittarius A star"), it sits in the constellation of Sagittarius at the heart of the Milky Way.

Deep technology and Research Funding

Syllabus: GS3/Science and Technology

Context

- The Finance Minister announced a Rs 1 lakh crore fund to provide long-term, low-cost or zero-interest loans for research and development.

What is deep technology?

- Deep tech refers to advanced and disruptive technologies that have the potential to trigger transformative change, and provide solutions for the future.
- The term is used to describe cutting-edge research in nanotechnology, biotechnology, material sciences, quantum technologies, semiconductors, artificial intelligence, data sciences, robotics, 3D printing, etc.

Advantages of Deep technology

- Solving Complex Problems: These technologies play a key role to address complex global challenges like climate change, hunger, epidemics, energy access, mobility, physical and digital infrastructure, and cyber security.

- Increased Efficiency: Deep technologies enhance productivity by automating repetitive tasks, optimizing processes, and enabling predictive analytics. This leads to cost savings, improved resource utilization, and faster decision-making.
- Enhanced Decision-Making: Deep learning algorithms and predictive analytics empower organizations to make data-driven decisions based on insights extracted from large datasets. This enables better forecasting, risk management, and strategic planning.
- Job Creation: While deep technologies may automate certain tasks, they also create new opportunities for skilled workers in areas such as software development, data science, engineering, and research. This contributes to economic growth and employment generation.

Challenges for Deep technology

- The deep tech projects are time- and money-intensive, with relatively high funding requirements.
- Inadequate budget: India's expenditure on research is far below the global average. Absolute spending has increased, but expenditure on research as a share of GDP has come down.
- India currently spends just about 0.65% of its national GDP on research and development activities whereas the global average is about 1.8%.
- Bureaucratic delays: Even where funds are available, delays and interruptions in disbursal often affects projects. Complex bureaucratic requirements contribute to delays.
- Reduced budget allocation: Also in recent budget allocation the highest increase is for CSIR, (about 9%), and the Department of Space has received only a 4% increment.
- The budget of the Departments of Atomic Energy and Biotechnology, and the Ministry of Earth Sciences have been reduced.

ALLOCATIONS IN INTERIM BUDGET 2024-25 (in cr)

	2023-24 BE	2023-24 RE	2024-25 IB	Change*
Department of Atomic Energy	25,078.49	26,799.78	24,968.98	-0.41%
Department of Space	12,543.91	11,070.07	13,042.75	4.51%
Department of Science & Technology	7,931.05	4,891.78	8,029.01	2.00%
Department of Biotechnology	2,683.86	1,607.32	2,251.52	-26.90%
CSIR	5,746.51	6,202.53	6,323.41	9.30%
Ministry of Earth Sciences	3,319.88	2,879.02	2,521.83	-27.72%
Department of Agriculture Research	9,504.00	9,876.60	9,941.09	4.43%
Department of Medical Research	2,980.00	2,892.83	3,001.73	0.75%
Department of Defence Research	12,850.00	12,942.85	13,208.00	2.77%

BE: Budget Estimates, RE: Revised Estimates, IB: Interim Budget **2023-24 BE to Interim Budget*
Source: Budget documents

The National Deep Tech Startup Policy (NDTSP)

- It was piloted by the Department for Promotion of Industry and Internal Trade and the Office of the Principal Scientific Adviser, and is currently awaiting government approval.
- The idea is to create a deep tech startup ecosystem by offering the right incentives to companies that invest time and money in innovation and research.
- The NDTSP suggests the steps that need to be taken in this regard:
- Create opportunities for long-term funding;
- A simplified but stronger intellectual property rights regime;
- Tax incentives;
- A conducive regulatory framework;
- Development of standards and certifications;
- Nurturing of talent; and
- Linkages between industry, research centers, and educational institutions.

WayForward

- With the recent initiative Startups and other private sector ventures will obtain seed money for their projects and are expected to get benefitted.
- However to raise R&D spending there is a need to have increased partnership with the private sector.
- Efforts are being made to create better synergies between industry, research labs, and educational institutions in order to broad-base both research activity and the funds to support it.

PRITHvi VIgyan (PRITHVI)

Syllabus:GS3/Science and Technology

Context

- The Union Cabinet has approved Rs 4,797 crore research scheme The PRITHvi VIgyan (PRITHVI) to enhance the understanding of the Earth.

About

- It encompasses five ongoing sub-schemes of the Ministry of Earth Sciences (MoES), namely:
- Atmosphere & Climate Research-Modelling Observing Systems & Services (ACROSS);

- Ocean Services, Modelling Application, Resources and Technology (O- SMART);
- Polar Science and Cryosphere Research (PACER);
- Seismology and Geosciences (SAGE); and,
- Research, Education, Training and Outreach (REACHOUT).

Objectives of the Scheme

- Augmentation and sustenance of long-term observations of the atmosphere, ocean, geosphere, cryosphere and solid earth to record the vital signs of the Earth System and change;
- Development of modeling systems for understanding and predicting weather, ocean and climate hazards and understanding the science of climate change;
- Exploration of polar and high seas regions of the Earth towards discovery of new phenomena and resources;
- Development of technology for exploration and sustainable harnessing of oceanic resources for societal applications;
- Translation of knowledge and insights from Earth systems science into services for societal, environmental and economic benefit.

Significance of the Scheme

- PRITHVI promises to unify various disciplines under Earth sciences, fostering integrated, multidisciplinary research.
- This collaborative effort aims to address significant challenges in weather, climate, oceanography, cryospheric studies, seismology, and sustainable resource utilization.

CRISPR Technique & its Application

☛ **Syllabus: GS3/Science and Technology, Biotechnology**

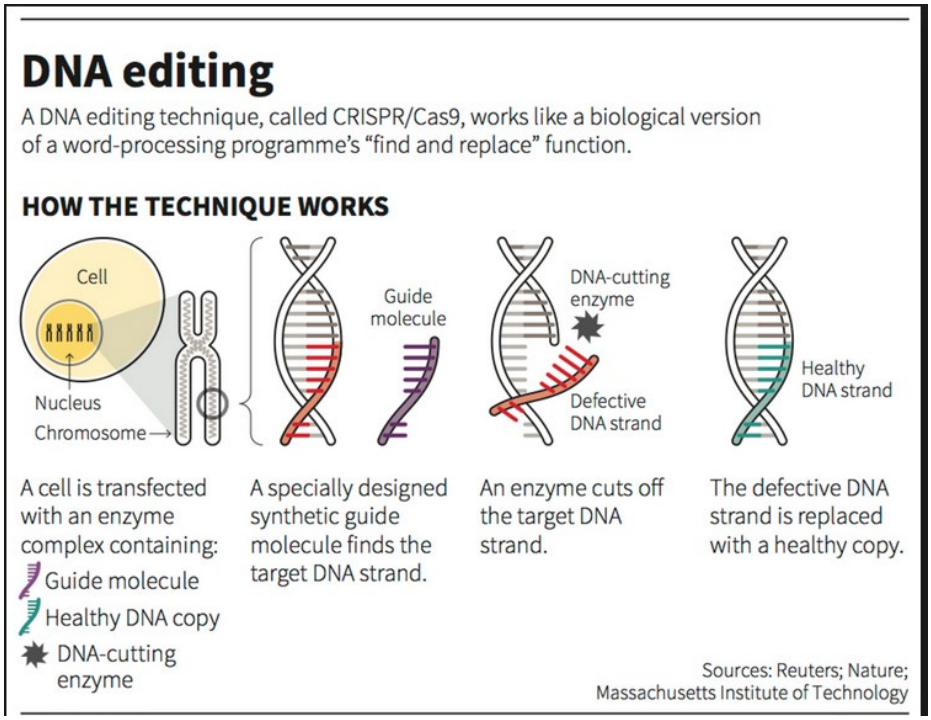
Context

- It has been observed that highly targeted CRISPR Technology advances gene editing in living animals.

Gene Editing Technology

- It refers to technology that permits the change of an organism's DNA by allowing genetic material to be added, removed, or altered at particular locations in the genome.
- It includes techniques like Zinc Finger Nucleases, Transcription Activator-Like Effector Nucleases (TALENs), CRISPR–Cas9 Editors, and Prime Editors, that can be used to repair, modulate, replace, or add genes to achieve a desired genotype.

- Its applications include correcting genetic defects, treating and preventing the spread of diseases and improving crops etc.



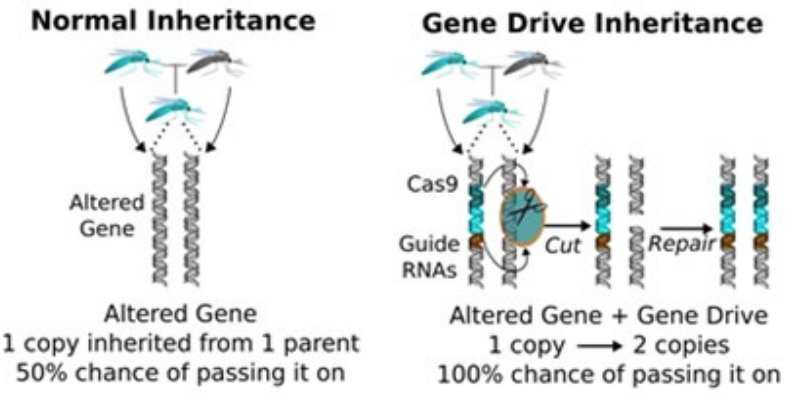
CRISPR-Cas9

- Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) is a DNA sequence which is part of the bacterial defence system.
- Cas9 (CRISPR-associated) is the name of the protein that transfers resistance.
- It is an enzyme that acts like a pair of molecular scissors, capable of cutting strands of DNA.
- It allows researchers to easily alter DNA sequences and modify gene function.

Applications of CRISPR-Cas9

- Gene Drive Inheritance: Using the CRISPR-Cas9 technique, researchers succeeded in getting the offspring of modified and wild mosquitoes to pass on their antimalarial genes, spreading resistance through the whole population in the lab.
- Animal models: CRISPR-Cas9 Genome editing in specific tissues: Researchers have been able to modify the genomes of specific tissues such as liver and brain tissues using hydrodynamic injection and adeno- associated virus.
- It can be used to create animal models to mimic human diseases and to understand disease development by mutating or silencing genes.
- Multiple gene mutations: CRISPR-Cas9 can be used to generate mutants for target genes.
- Treatment of diseases: CRISPR-Cas9 can be applied to cells in vivo or ex vivo. In the in vivo approach, CRISPR-Cas9 is directly transferred to cells in the body using either viral or nonviral methods. In the ex vivo approach, first the cells

are removed from the body; then CRISPR is applied to the cells and they are transferred back to the body.



- Recently, the US FDA approved the Casgevy (developed by Vertex Pharmaceuticals and CRISPR Therapeutics), and Lyfgenia (developed by Bluebird bio) for people aged 12 years and older.
- RNA editing: Single-stranded RNA (ssRNA) sequences can also be edited by CRISPR-Cas9.
- Industrial and Military applications: These studies are commonly focused on increasing the tolerance of soldiers against biological or chemical warfare. This technology has the potential to influence human performance optimization.

Significances of Gene Editing

- Tackling and Defeating Diseases: Most deadly and severe diseases in the world have resisted destruction. A number of genetic mutations that humans suffer will end only after we actively intervene and genetically engineer the next generation.
- Extend Lifespan: Genome editing could extend the human lifespan. The human lifespan has already shot up by a number of years, and we are already living longer and longer.
- Growth in Food Production and Its Quality: Genetic engineering can design foods that can withstand harsh temperatures and are packed full of all the right nutrients.
- Pest Resilient Crops: genome editing can address pest and nutrition challenges facing agriculture. Instead of using tons of insecticides and pesticides, we can protect our plant in a healthier way.

Associated Issues

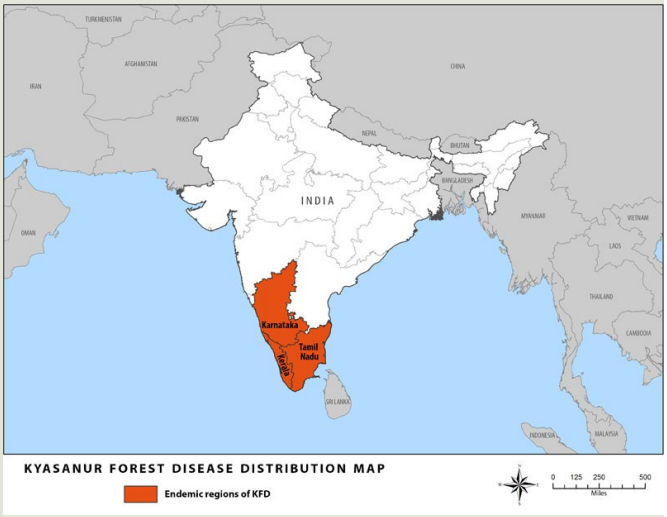
- Ethical Dilemma: modification is unnatural and amounts to playing God.
- Safety Concerns: Slight changes made at the smallest level may lead to unexpected results.
- Diversity: Diversity in all species of animals is a key to evolution on earth. Genetically engineering our species will have a detrimental effect on our genetic diversity- as in something like cloning would.

Kyasanur Forest Disease (KFD)

Syllabus:GS3/Science and Technology

Context

- Karnataka is grappling with the outbreak of Kyasanur Forest Disease (KFD), commonly known as monkey fever.



What is KFD?

- History: The disease was first noticed in the Kyasanur Forest area of Sorab Taluk in Shimoga district in 1956-57, and was named after the region.
- Cause: Monkey fever is caused by the Kyasanur Forest disease virus (KFDV), a member of the Flaviviridae virus family.
- Transmission: The disease is transmitted to humans primarily through tick bites or contact with an infected animal, particularly a sick or recently deceased monkey.
- Human beings who visit the forest area either for livelihood, to graze cattle, or to collect firewood contract the disease. There is no evidence of person-to-person transmission.

Symptoms

- It starts to appear three to eight days after the bite of an infectious tick.
- Fever, redness of the eyes, severe headache, and body pain are common symptoms.
- Three-four days after the onset of initial symptoms, the patient may have gastro-intenstinal symptoms. In severe cases, bleeding from the nose is noted.

Diagnosis

- It can be made in the early stages through molecular detection by Polymerase chain reaction (PCR) or virus isolation from blood.
- Later on, serologic testing using enzyme-linked immunosorbent serologic assay (ELISA) can be performed.

Treatment

- There is no specific treatment for KFD. Management of the disease includes early hospitalization and supportive therapy.
- This entails maintaining hydration and taking precautions for patients with bleeding disorders.

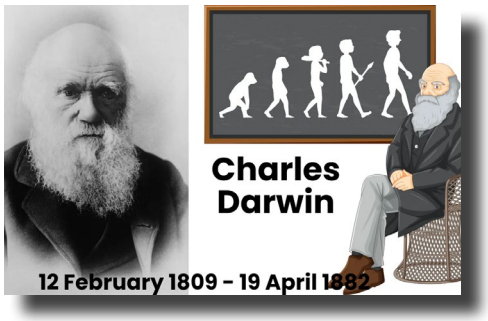
Prevention

- A vaccine is available for KFD and is used in endemic areas of India.
- Additional preventative measures include insect repellents and wearing protective clothing in areas where ticks are endemic.

Darwin Day

Syllabus: GS3/Science and Technology, Genetics

In Context



- February 12 is globally celebrated as Darwin Day to mark the birthday of naturalist Charles Darwin (12 February 1809 – 19 April 1882).

About

- Darwin Day is an opportunity for scientists to showcase the latest advancements in the comprehension of evolution and promote public understanding of science.
- Charles Darwin was a British naturalist and biologist whose work laid the foundation for the modern theory of evolution.
- He is best known for his groundbreaking book "On the Origin of Species," published in 1859, which presented evidence for the theory of natural selection as the mechanism driving evolution.
- He is considered as the Father of Evolution.

His Work

- Theory of Evolution: Darwin's theory of evolution posited that species evolve over time through a process of natural selection, where individuals with advantageous traits are more likely to survive and reproduce, passing those traits to future generations.
- This idea revolutionized the understanding of the diversity of life on Earth.
- Natural Selection: Darwin's concept of natural selection was central to his theory of evolution.

- He proposed that variations within species occur naturally, and those variations that provide an advantage in the struggle for survival are more likely to be passed onto offspring, leading to changes in the population over time.
- Over time, this process can lead to the accumulation of adaptations that increase the fitness of individuals within a population.
- Adaptation: Adaptations are traits or characteristics that enhance an organism's ability to survive and reproduce in its environment.
- Natural selection favors individuals with advantageous adaptations, allowing them to outcompete others and pass on their genes to offspring.
- Over generations, populations may become increasingly adapted to their specific ecological niches.
- Later Work: Darwin continued to refine and expand upon his ideas throughout his life.
- He published several other works, including "The Descent of Man" and "The Expression of the Emotions in Man and Animals," which applied evolutionary principles to human behavior and psychology.
- Legacy: His theory of evolution by natural selection has had a transformative impact on fields ranging from biology and paleontology to anthropology and psychology.
- He is widely regarded as one of the most influential figures in the history of science.

Global Warming

Syllabus: GS3/Conservation of Environment

Context

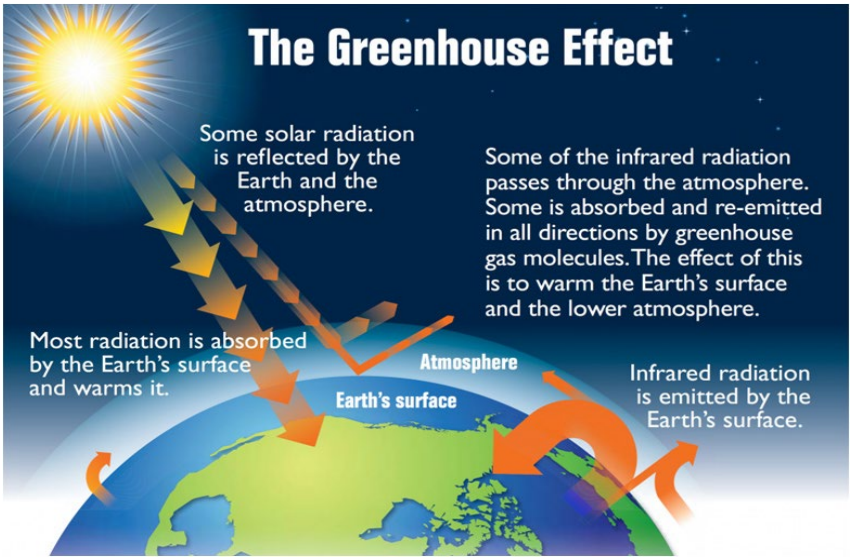
- A new study based on estimates of warming from palaeo-thermometry, have said that the earth's surface has already warmed by more than 1.5 degrees C on average over pre-industrial levels.

Background of 1.5 degrees C threshold

- The 1.5 degrees C is not a scientific threshold. It became enshrined in the Paris Agreement after negotiations by member-countries of the UNFCCC.

Global warming

- It refers to the long-term heating of Earth's climate system observed since the pre-industrial period (between 1850 and 1900), primarily due to human activities.
- This process releases greenhouse gases like carbon dioxide, trapping heat in the atmosphere and causing the planet to warm.



Causes

- Greenhouse gases: These gases absorb and re-emit infrared radiation from the sun, trapping heat in the atmosphere. Carbon dioxide (CO2) is the main culprit, followed by methane, nitrous oxide, and others.
- Fossil fuel burning: Burning coal, oil, and natural gas releases large amounts of CO2, the primary driver of global warming.
- Deforestation: Trees absorb CO2, so their removal contributes to higher atmospheric levels.
- Other human activities: Industrial processes, agriculture, and land-use changes also contribute to greenhouse gas emissions.

Effects

- Rising global temperatures: The average global temperature has already risen by about 1 degree Celsius since the pre-industrial era, with further warming expected in the future.
- Climate change: More extreme weather events like heat waves, droughts, floods, wildfires, and intense storms are becoming more frequent and severe.
- Sea level rise: Melting glaciers and thermal expansion of oceans are causing sea levels to rise, threatening coastal communities and ecosystems.
- Ocean acidification: Increased CO2 absorption by oceans makes them more acidic, harming marine life.
- Changes in plant and animal life: Species are being forced to adapt or migrate due to changing temperatures and ecosystems.

Measures to address global warming

Mitigation:

- Energy transition: Rapidly shift to renewable energy sources like solar, wind, geothermal, and hydro power.
- Sustainable land management: Protect forests, restore degraded land, and adopt sustainable agricultural practices that reduce emissions and store carbon.
- Circular economy: Transition to a circular economy where resources are reused and recycled, minimizing waste and associated emissions.

- Technological innovation: Invest in research and development of clean technologies for various sectors, like carbon capture and storage, advanced biofuels, and green hydrogen.

Adaptation:

- Early warning systems: Develop and implement effective early warning systems for extreme weather events to enable timely preparedness and response.
- Climate-resilient infrastructure: Build and manage infrastructure like dams, water management systems, and coastal defenses to withstand the impacts of rising sea levels, floods, and storms.
- Climate-smart agriculture: Develop and adopt agricultural practices that are resilient to climate change and drought, ensuring food security.
- Disaster risk reduction: Invest in programs that reduce vulnerability to disasters and enable communities to recover quickly and effectively.
- Social safety nets: Implement social protection programs to support vulnerable populations disproportionately affected by climate change impacts.

International cooperation

- Global agreements: Strengthen international agreements like the Paris Agreement, ensuring ambitious emissions reduction targets and effective implementation mechanisms.
- Technology transfer and financial support: Developed countries should support developing countries in their mitigation and adaptation efforts through technology transfer, financial assistance, and capacity building.

Individual action:

- Reduce carbon footprint: Make conscious choices to reduce energy consumption in your daily life, opt for sustainable transportation, and consume less.
- Support climate-friendly businesses: Choose products and services from companies committed to sustainability and reducing their environmental impact.
- Advocate for action: Raise awareness about climate change and advocate for policies that support mitigation and adaptation efforts.

Way Ahead:

- The urgency of addressing climate change is widely recognized, but the pace of action remains insufficient to meet international targets for emissions reductions.
- The Intergovernmental Panel on Climate Change (IPCC) has warned of severe consequences if we fail to limit warming to 1.5 degrees Celsius above pre-industrial levels.

M87* black hole

Syllabus:GS3/Science and Technology

Context

- The Event Horizon Telescope (EHT) Collaboration has released new images of M87*, the supermassive black hole at the center of the galaxy Messier 87.

What is a Black Hole?

- A black hole is an extremely dense object whose gravity is so strong that nothing, not even light, can escape it.
- A black hole does not have a surface, like a planet or star. Instead, it is a region of space where matter has collapsed in on itself.
- This catastrophic collapse results in a huge amount of mass being concentrated in an incredibly small area.
- Formation: A black hole is formed when a really massive star runs out of fuel to fuse, blows up, leaving its core to implode under its weight to form a black hole.
- The center of a black hole is a gravitational singularity, a point where the general theory of relativity breaks down, i.e. where its predictions don't apply.
- A black hole's great gravitational pull emerges as if from the singularity.

Event Horizon Telescope (EHT)

- The EHT is not a single telescope but a worldwide network of radio telescopes that work together to study a common object in space.
- Very-long baseline interferometry: It is the technique, where the data each telescope collects about the object is correlated with data from the others using extremely precise clocks.
- In this setup, the maximum distance between the telescopes defines the network's resolution.
- The Greenland Telescope has been commissioned to the array, which has improved the resolution of the EHT in the north-south direction.

Gravitational lensing

- The diameter of the asymmetric ring had not changed much between observations in 2017 and 2018 – meaning the black hole's gravity bent light consistently over time to form the observed ring.
- This is in line with a prediction from the General theory of relativity, that light around a black hole is strongly lensed.

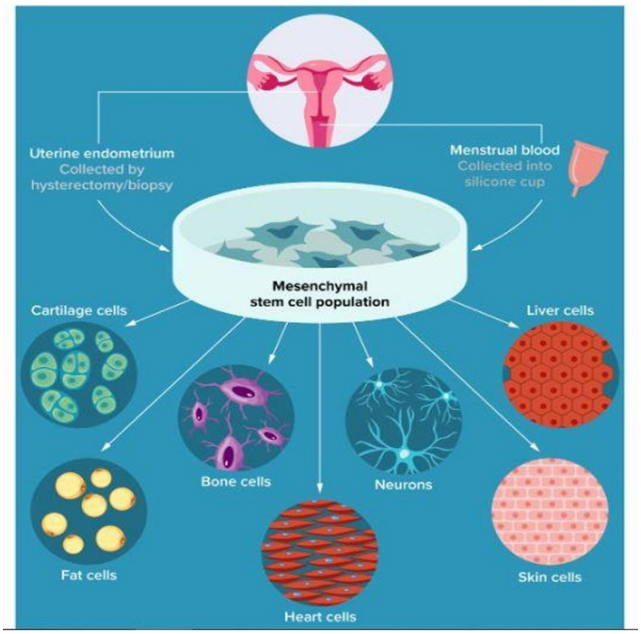
- Objects with a lot of mass bend spacetime more around them. When light travels in this region, its path is bent in the same way a magnifying glass does. Images carried by the light thus appear to be larger than they really are, and this phenomenon is called lensing.
- The black hole is rotating, dragging the spacetime around it along the direction of its rotation and rendering more light in some areas. Hence the ring's southwest corner appears brighter than other parts.

Potential of Stem Cells in Menstrual Fluid

Syllabus: GS3/Science and Technology

In Context

- Through more equitable investments, researchers hope menstruation will be recognised as a new frontier in regenerative medicine.



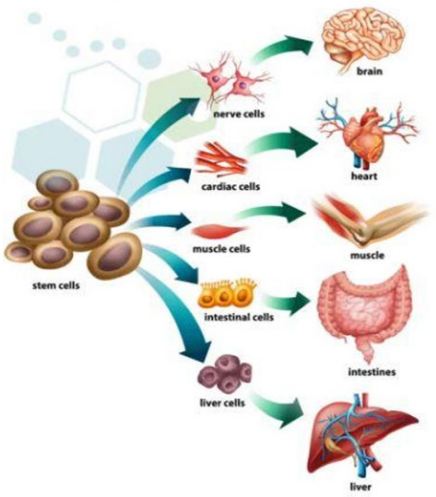
About

- Researchers had long hypothesised that the endometrium contained stem cells, given its remarkable capacity to regrow itself each month.
- The tissue, which provides a site for an embryo to implant during pregnancy and is shed during menstruation, undergoes roughly 400 rounds of shedding and regrowth before a woman reaches menopause.
- But although scientists had isolated adult stem cells from many other regenerating tissues — including bone marrow, the heart, and muscle, no one had identified adult stem cells in the endometrium.

What are Stem Cells?

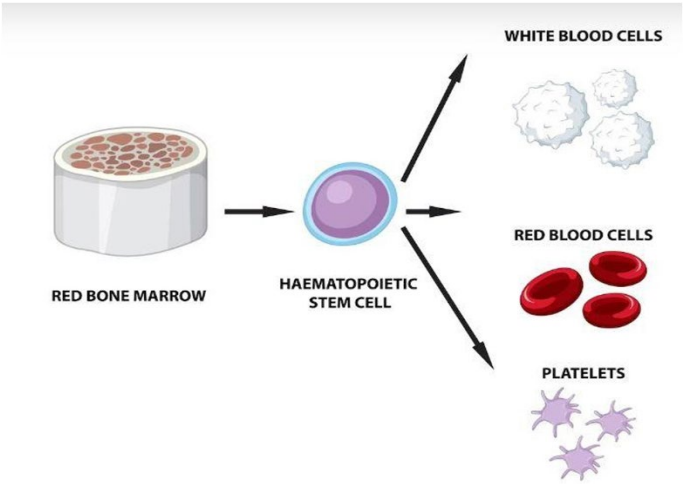
- A stem cell is a cell with the potential to form many of the different cell types found in the body.
- When stem cells divide, they can form more stem cells or other cells that perform specialized functions.
- Somatic Stem Cells: These are the Adult Somatic Cells (ASCs). They are in bone marrow that makes the blood.
- These are found in the liver that give rise to hepatocytes and secretory cells.
- There are stem cells in neural tissue that give rise to neurons and astroglial cells.

- Embryonic Stem Cells: These are derived in about six- to eight-day embryos, and these are cells with even more potential than the adult cells, because an embryonic stem cell derived in the proper way can give rise to neural cells, muscle cells, and liver cells.



What is Stem Cell Therapy?

- Stem cell therapy utilizes the unique properties of stem cells, including self-renewal and differentiation, to regenerate damaged cells and tissues in the human body or replace these cells with new, healthy and fully functional cells.
- It is also known as regenerative medicine, promotes the repair response of diseased, dysfunctional or injured tissue using stem cells or their derivatives.
- It is the next step in organ transplantation and uses cells instead of donor organs, which are limited in supply.
- Stem cells are grown in the labs, these stem cells are manipulated to specialize into specific types of cells, such as heart muscle cells, blood cells or nerve cells.
- The specialized cells can then be implanted into a person.
- For over 90 years now, hematopoietic stem cell transplantation has been used to treat people with conditions such as leukaemia and lymphoma.
- After chemotherapy or radiation therapy wrecks the patient's healthy cells (along with the cancerous ones), a donor's healthy bone marrow reintroduces functional stem cells to replicate inside of a patient and to produce additional normal blood cells.



India Faces WTO Pressure on Farm Subsidies

Syllabus: GS3/Issues related to direct and indirect farm subsidies

Context:

- The government acceding to the protesting farmers demand for a legal guarantee of MSP)is somewhat limited given India is under pressure on its farm subsidies at the WTO.

About:

- The Cairns Group – comprising Australia, Brazil and Canada among others members — have claimed that India's public stockholding (PSH) programme is highly subsidised and the farm support that India gives is "distorting" global food prices and "hurting" food security of other countries.

WTOs Agreement on Agriculture (AoA)

- It was designed to remove trade barriers and to encourage transparent market access and integration of global markets.
- **AoA stands on 3 pillars:**

1. Domestic Support: Subsidies such as guaranteed minimum price or input subsidies which are direct and specific to a product.

This can be divided into:

1. Green Box: Subsidies which are not or least market distorting. It includes measures such as income-support payments, safety-net programs, payments under environmental programs and agricultural research and development subsidies.
2. Blue Box: These production-limiting subsidies cover payments based on acreage, yield or number of livestock in a base year. The government is given the room to fix 'targets price' if the 'market prices' are lower than the farm prices.
3. Amber Box: Those are trade distorting subsidies which need to be curbed. These reduction commitments are expressed in terms of a "Total Aggregate Measurement of Support" (Total AMS) which includes all supports.
    - These supports are subject to limits- "De minimis". This threshold is generally 5% of the value of agricultural production for developed countries, 10% for most developing countries.
    - Peace Clause is a product of the Bali Summit, 2013. Article 13 of AoA contains a "due restraint" or "peace clause" which controls the application of other WTO agreements to subsidies.

2. Market Access requires that tariffs, which have been fixed (like custom duties) by individual countries, should be cut progressively to facilitate free trade.
- It also encompasses removal of non-tariff barriers (e.g. quotas on import).

3. **Export subsidies are limited to four situations:**
   (i) product-specific reduction commitments within the limits;
   (ii) any excess of budgetary outlays for export subsidies;
   (iii) export subsidies consistent with the special and differential treatment provision; and
   (iv) export subsidies other than those subject to reduction commitments provided that they are in conformity with the anti-circumvention disciplines of Article 10 of the Agreement on Agriculture.

- A Special Safeguard Mechanism (SSM) was designed as a safety valve, allowing developing countries to impose additional (temporary) safeguard duties in the event of an abnormal surge in imports or the entry of unusually cheap imports.

Challenges for India at WTO regarding subsidies

- Agriculture: India's extensive agricultural subsidies are often deemed WTO-noncompliant, exceeding allowed limits and distorting global markets.
- Examples include minimum support prices, input subsidies, and export subsidies. Developed countries like the US and EU challenge these at the WTO, arguing they harm global farmers.
- Industrial subsidies: Some Indian industrial subsidies may also be challenged, particularly those deemed to have specific export promotion or trade-distorting effects.
- Examples include the Production Linked Incentive(PLI) scheme for electronic goods.
- Developed vs. developing country distinctions: India advocates for fairer treatment based on development levels, arguing that the subsidy rules need to consider the needs of developing countries like India to promote economic growth and support vulnerable sectors.
- Complexities of subsidy rules: WTO rules around subsidies are complex and open to interpretation, leading to disputes and protracted litigation.
- Negotiation difficulties: Achieving consensus-based solutions at the WTO is often challenging, with developed and developing countries having differing priorities and interests.
- Geopolitical dynamics: The broader geopolitical context can influence the willingness of countries to engage constructively in subsidy negotiations.

Ongoing efforts by India:

- To attain greater flexibility to offer farm support, India is in the process of pushing for a permanent solution at the upcoming inter-ministerial summit at Abu Dhabi from February 26 to 29.

- India is not only pushing for measures to amend the formula to calculate the food subsidy cap but also to include programmes implemented after 2013 under the ambit of 'Peace Clause'.

Way Ahead:

- Addressing subsidy concerns will be crucial for India to participate effectively in the global trading system and ensure a level playing field for its exports.
- India needs to actively engage in WTO negotiations, seeking reforms that address its concerns about developed country subsidies while also working towards greater transparency and compliance with its own subsidy obligations.
- Exploring alternative frameworks like plurilateral agreements or sectoral negotiations might be needed to find workable solutions.

INSAT-3DS

Syllabus :GS 3/Space

In News

- INSAT-3DS will be launched by the Indian Space Research Organisation (ISRO).

About INSAT-3DS

- INSAT-3DS Satellite is a follow-on mission of Third Generation Meteorological Satellite from Geostationary Orbit.
- Launch vehicle :The GSLV aims at deploying the INSAT-3DS meteorological satellite into the Geosynchronous Transfer Orbit (GTO).
- Subsequent orbit-raising maneuvers will ensure that the satellite is positioned in a Geo-stationary Orbit.
- It is fully funded by the Ministry of Earth Sciences (MoES).
- It is designed for enhanced meteorological observations and monitoring of land and ocean surfaces for weather forecasting and disaster warning.
- The satellite will augment the Meteorological services along with the presently operational INSAT-3D and INSAT-3DR satellites.

Objectives of the mission

- To monitor Earth's surface, carry out Oceanic observations and its environment in various spectral channels of meteorological importance.
- To provide the vertical profile of various meteorological parameters of the Atmosphere.

- To provide the Data Collection and Data Dissemination capabilities from the Data Collection Platforms (DCPs).
- To provide Satellite Aided Search and Rescue services.

MILAN 2024

Syllabus : GS 3/Defense

In News

- MILAN 2024 is the 12th edition of the Multilateral Naval Exercise scheduled from 19-27 Feb 24 at Visakhapatnam, 'the City of Destiny'.

About MILAN

- It is hosted by India, and made a modest beginning in the Andaman and Nicobar Islands in 1995.
- The navies of Indonesia, Singapore, Sri Lanka and Thailand participated in this edition.
- It is a biennial congregation of friendly navies.
- Previous Edition: The previous edition, MILAN 2022 was held in Visakhapatnam, the City of Destiny under the aegis of Eastern Naval Command.
- MILAN 2022 observed participation of 39 friendly foreign countries across continents.
- MILAN 2024 : It is scheduled under the aegis of Eastern Naval Command with invitation extended to 58 countries.
- The central aim of MILAN 2024 is to enhance professional interaction between friendly navies and gain experience in multilateral large force operations at sea.

Cannabis ban in Thailand

Syllabus: Prelims/Current Events of national importance

Context:

- Two years after Thailand made cannabis legal, the country appears set to crack down on its freewheeling drug market with a ban on "recreational" use of Marijuana.

About:

- Thailand was the first country in Asia to legalise cannabis in June 2022.

- The government introduced regulations that made cannabis a "controlled herb" that requires a license for planting or selling, as well as banning online sales,sales to pregnant women and people under 20, and public smoking.
- But cannabis can be purchased easily by practically anyone at many unlicensed establishments or online.
- Legal cannabis has fuelled Thailand's tourism and farming trades but it is facing public backlash over perceptions that under-regulation has made the drug available to kids and caused crime.

Cannabis/Marijuana

- It is a generic term used to denote the several psychoactive preparations of the plant Cannabis sativa.
- The Mexican term 'marijuana' is frequently used in referring to cannabis leaves or other crude plant material in many countries.
- The major psychoactive constituent in cannabis is tetrahydrocannabinol (THC) and compounds structurally similar to THC are referred to as cannabinoids.

Side-effects Cannabis use

- Its immediate effects include impairments in memory and in mental processes, including ones that are critical for driving.
- Long-term use of cannabis may lead to the development of addiction of the substance, persistent cognitive deficits, and of mental health problems like schizophrenia, depression and anxiety.
- Exposure to cannabis in adolescence can alter brain development.

Legal Status in India:

- Narcotic Drugs and Psychotropic Substances Act (NDPS Act) of 1985: Classifies cannabis as a Schedule I drug, meaning it has high potential for abuse.
- Possession and consumption: Punishable with imprisonment for up to 6 months or a fine of 10,000 or both.
- Cultivation and sale: More severe penalties, including imprisonment for up to 10 years and fines.
- Exclusions: Bhang, which is made with the leaves of the plant, is not mentioned in the NDPS Act.

Recent changes:

- 2020: CBD (cannabidiol) extracted from hemp plants legalized for medical purposes.
- 2023: Uttarakhand High Court ruled that the NDPS Act does not prohibit the cultivation of cannabis for research purposes.

Use of AI to Clone Voices for Creative Purposes

Syllabus: GS3/Developments in Science and Technology

Context

- Recently, music composer A.R. Rahman used an Artificial Intelligence (AI) software to recreate the voices of singers Bamba Bakya and Shahul Hameed who are now dead.

About

- A report by Market US has revealed that the global market for these voice cloning applications stands at $1.2 billion in 2022 and is estimated to touch almost $5 billion in 2032 with a CAGR above 15-40%.

Voice cloning

- Voice cloning technology employs sophisticated AI algorithms to replicate the intricacies of human speech patterns.
- This innovative process hinges on the principle of training neural networks, a fundamental aspect of artificial intelligence, using extensive datasets of recorded speech.
- There's a host of these applications online with popular ones like Murf, Resemble and Speechify.
- Recently, former Pakistani Prime Minister Imran Khan's political party used an AI-generated speech from the now imprisoned leader in an attempt to rally for votes.

Applications

- Preserving legacy: Can keep the voices of loved ones alive for future generations.
- Apple introduced a voice cloning feature in iOS 17 intended to help people who may be in danger of losing their voice to a degenerative disease.
- Personalized experiences: Custom virtual assistants, interactive storytelling, and more immersive digital interactions.
- Gaming: Prominent tech companies also have a hand in the AI voice game. Recently, Meta launched SeamlessM4T, which can understand nearly 100 languages from speech or text and generate translations in real-time.
- Accessibility: Can offer voice to those who have lost it or will lose it due to illness or disability.
- Song creations: YouTube took a similar route and announced Dream Track that allows them to create song clips featuring AI vocals with permission from pop stars like Demi Lovato, Sia and John Legend.
- Creative applications: Enhancing storytelling, audio games, and immersive experiences.

Issues/Concerns

- Scams: In April 2023, a family living in Arizona, U.S. was threatened to pay ransom for a fake kidnapping pulled off by an AI cloned voice.
- Reporting issues: Several cases went unreported and only some came to light.
- Fake news: Easy access to AI voice clones also spawned disinformation.
- Harry Potter actress Emma Watson allegedly read out a portion of the Mein Kampf.
- Privacy and consent: Concerns about unauthorized recording and use of voices without consent need to be addressed.
- Ethical considerations: Potential for exploitation, manipulation, and emotional harm through impersonation and misuse.
- Social implications: Impact on identity, trust, and communication dynamics in the digital age.
- Hate speech: Recently, users started flocking to free AI voice cloning tools to generate celebrity hate speech.
- Conservative political pundit Ben Shapiro allegedly made racist comments against Democrat politician Alexandra Ocasio-Cortez.

India: a major target for AI voice clone scams

– A report titled 'The Artificial Imposter' published in May last year revealed that 47% of surveyed Indians have either been a victim or knew someone who had fallen prey to an AI generated voice scam.

– The numbers are almost twice the global average of 25%. In fact, India topped the list with the maximum number of victims to AI voice scams.

a. In December, a Lucknow resident fell prey to a cyberattack that used AI to impersonate the voice of the victim's relative, requesting the person to transfer a substantial amount through UPI.

– Indians have been found to be particularly vulnerable to scams of this nature.

a. According to McAfee, 66% of Indian participants admitted that they would respond to a voice call or a phone call that appeared to be from a friend or family member in urgent need of money.

b. The report also shared that 86% Indians were prone to sharing their voice data online or via voice notes at least once a week which has made these tools potent.

Measures

- Regulatory frameworks: Robust legal and ethical guidelines are crucial to prevent misuse and protect privacy.
- The U.S. Federal Trade Commission is considering the adoption of a recently-proposed Impersonation Rule that will help deter deceptive voice cloning.
- Technological safeguards: Watermarking and other authentication mechanisms can help identify and verify cloned voices.

- Public awareness and education: Educating the public about voice cloning technology and its potential risks is vital.
- The US Federal Trade Commission has also launched a Voice Cloning Challenge which asked the public to send in their ideas to detect, evaluate and monitor cloned devices.
- Responsible development and application: Promoting ethical and transparent use of voice cloning for positive societal impact.

Way Ahead

- The future of voice cloning hinges on responsible development and utilization, balancing its potential benefits with ethical considerations and safeguards to avoid its misuse.

Farm Sector Growth

Syllabus: GS3/Agriculture

Context

- India's farm sector Gross Value Added (GVA) is likely to see little or no growth in the second half of 2023- 24, with the full year-clocking about 1% growth, rating firm ICRA said recently.

About

- It cites the weak kharif crop estimates, mixed trends in rabi sowing and concerns regarding crop yields.
- The mild growth in the agriculture, forestry and fishing GVA this fiscal, compared with FY23's 4% uptick, would weigh on rural demand in the near term.
- It also added that if the coming monsoon was normal, sectoral GVA growth may recover to 3.4% in 2024-25.

Farm sector growth in India

- India is the second-largest producer of farm produce globally, contributing significantly to the national economy and rural livelihoods.
- India is the world's largest producer of milk, pulses and jute, and ranks as the second largest producer of rice, wheat, sugarcane, groundnut, vegetables, fruit and cotton.
- Recent years have seen modest growth in the agricultural sector, averaging around 3%.

Recent trends

- The Economic Survey 2022-23 noted that the agriculture sector in the country grew by 3% in 2021-22, lower than an average growth of 4.6% in the last six years.
- In 2020-21, the growth in this sector was 3.3%. In 2016-17, the growth rate was 6.8%, followed by 6.6% in 2017-18, 2.1% in 2018-19 and 5.5% in 2019-20.
- The Survey said private investment in agriculture increased to 9.3% in 2020-21. The public investment, however, remained at 4.3%, the same as 2019-20.
- In 2011-12, the public investment in agriculture was 5.4%.

Challenges

- Low productivity: Despite being a large producer, India's farm yields are significantly lower than global averages due to factors like fragmented landholdings, limited irrigation, and inadequate adoption of technology.
- Market volatility: Price fluctuations and inadequate market access make farm incomes unstable, discouraging investment and innovation.
- Climate change: Extreme weather events, rising temperatures, and water scarcity pose threats to agricultural productivity and farmer livelihoods.
- Post-harvest losses: Lack of proper storage, transportation, and processing infrastructure leads to significant losses, impacting farmer income and food security.
- Rural-urban migration: This creates a shortage of skilled agricultural labor, further hindering productivity growth.

Measures

- Investments in research and development: Focus on high-yielding, climate-resilient crop varieties, precision agriculture technologies, and improved irrigation methods.
- Improving market access: Develop and strengthen e-commerce platforms, farmer producer organizations (FPOs), and direct marketing channels to connect farmers to better markets.
- Investments in rural infrastructure: Build better roads, storage facilities, and cold chains to reduce post- harvest losses and improve market access.
- Climate-smart agriculture: Promote practices like conservation agriculture, water management, and drought-resistant varieties to adapt to climate change.
- Skill development: Train farmers in modern agricultural technologies, market awareness, and financial management to enhance their capabilities.
- Financial inclusion: Ensure easy access to credit and insurance schemes for farmers to invest in their farms and mitigate risks.
- Land reforms: Address issues like land fragmentation and tenancy regulations to improve land use efficiency and access to resources.

- Promoting diversification: Encourage farmers to adopt allied activities like horticulture, animal husbandry, and aquaculture to supplement their income and reduce dependence on traditional crops.

Government Initiatives

- The Agricultural Technology Management Agency (ATMA) Scheme: Grants-in-aid are released with the goal of supporting State Governments' efforts to make available the latest agricultural technologies and good agricultural practices in various thematic areas of agriculture and allied sector.
- Krishi UDAN: The scheme proposes assistance and incentive for the movement of agri-produce by air transport.
- Pradhan Mantri Kisan Samman Nidhi Yojana (PM-Kisan: An income support of 6,000/- per year in three equal installments will be provided to all land holding farmer families.
- Pradhan Mantri Krishi Sinchai Yojana (PMKSY): Aimed at the development of irrigation sources for providing a permanent solution to drought.
- FDI: The Government of India has allowed 100% FDI in the marketing of food products and in food product E-commerce under the automatic route.
- Kisan Credit Card : Access to institutional credit is being provided through Kisan Credit Card and other channels.
- e-NAM initiative: Markets across the nation are now open to farmers, to enable them to get more remunerative prices for their produce.
- Pradhan Mantri Annadata Aay SanraksHan Abhiyan (PM-AASHA): Ensures Minimum Support Price (MSP) to farmers for various Kharif and Rabi crops while also keeping a robust procurement mechanism in place.
- Pradhan Mantri Kisan SAMPADA Yojana (PMKSY): To increase the level of the food- processing industry and encourage rural entrepreneurship across the country including rural areas.
- PM Formalization of Micro Food Processing Enterprises (PMFME) Scheme: Provides financial, technical and business support for setting up/upgradation of 2 Lakh micro food processing enterprises through credit-linked subsidy.

Way Ahead

- Transforming Indian agriculture requires addressing challenges and leveraging opportunities.
- By investing in technology, infrastructure, market access, and farmer empowerment, India can achieve sustainable and inclusive farm sector growth, ensuring food security and rural prosperity.

Public Account Committee on Plastic Waste Pollution

Syllabus: GS3/Conservation of Environment

Context

- The Public Account Committee report on 'pollution caused by plastic' was tabled in Parliament recently during the budget session.

Central Pollution Control Board (CPCB)

– CPCB is a statutory organization established under the Water (Prevention and Control of Pollution) Act, 1974.

A. It is also entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981.

– Parent ministry: Ministry of Environment, Forest and Climate Change (MoEFCC).

– Functions: Principal Functions of the CPCB, as spelt out in the Water Act, 1974, and the Air (Prevention and Control of Pollution) Act, 1981 are (i) to promote cleanliness of streams and wells in different areas of the States by prevention, control and abatement of water pollution, and (ii) to improve the quality of air and to prevent, control or abate air pollution in the country.

Highlights of the report/Challenges

- Huge waste generation: Increased substantially from 15.9 lakh tonnes per annum (TPA) in 2015-16 to 41.2 lakh TPA in 2020-21.
- Inadequate waste management infrastructure: Data from 2019-20 shows that 50% of the total plastic waste in the country (34.7 lakh TPA) remained unutilised, leading it to pollute air, water and soil, and ultimately affect human health.
- Data gap: The PAC noted a big data gap, observing from CAG's 2022 audit findings that many state pollution control boards (SPCBs) did not provide data on plastic waste generation for the period 2016-18 to the CPCB and there were inconsistencies in data shared by urban local bodies (ULBs) with SPCBs.
- It expressed disappointment with the Central Pollution Control Board over dealing with the plastic waste problem in the country.
- Recycling inefficiencies: The existing recycling system is largely informal and unregulated, leading to low- quality recycled plastic and limited environmental benefits.
- Public awareness: Lack of widespread awareness about the harmful impacts of plastic pollution hinders responsible waste management practices.

Suggestions/Measures

- Reliable assessment method: Underlining gaps in data, the panel expressed the need to have a "reliable assessment" of the amount of plastic waste being generated and said it should be the first step towards managing the problem efficiently.
- Mandatory" reporting: It recommended "mandatory" reporting of data online on the national dashboard.
- Comprehensive policy: A comprehensive policy is required for containing pollution caused by plastics.
- Alternatives: It observed that "finding a cost effective and dependable alternative to plastic" by providing funds for R&D was a prerequisite for its elimination.
- Awareness:Spreading awareness about eco-friendly alternatives and ill-effects of SUP is crucial.
- Other measures: Making implementing agencies accountable, promoting use of recycled plastic content and increasing recycling facilities may be taken to efficiently enforce the ban on SUP on ground.

Government initiatives:

- Plastic Waste Management Rules, 2016: This regulation prohibits manufacture, sale, and use of certain single-use plastic items like carry bags, straws, and cups.
- Ban on SUP: The ministry of environment had banned hard-to-collect/recycle, single use plastic (SUP) items with effect from July 1, 2022.
- Prohibition: Prohibited manufacture, import, sale and use of plastic carry bags thinner than 120 microns from December 31 2022.
- National Policy on Solid Waste Management, 2016: This policy emphasizes waste minimization, source segregation, and scientific processing, including plastic waste.
- EPR rules: It also notified extended producer responsibility (EPR) rules to streamline collection and recycling of plastic waste.
- Swachh Bharat Abhiyan: This mission includes promoting waste segregation at source, composting biodegradable waste, and setting up waste processing facilities, contributing to plastic waste management indirectly.
- Indian Swachhata League:It is an unique youth-led, inter-city initiative to promote engagement of young people in the Swachata related activities.

Way Ahead:

- Addressing plastic waste pollution requires a multi-pronged approach involving government, industry, civil society, and individual citizens.
- Effective implementation of existing regulations, technological advancements, and a shift towards a circular economy are crucial for a cleaner and healthier environment.

Terai Arc Landscape

Syllabus :GS 3/Environment

In News

- The Terai Arc Landscape (TAL) has been recognized and honored as one of the seven UN World Restoration Flagships .

About Terai Arc Landscape(TAL)

- It extends over 900 km from the Bagmati River (Nepal) in the east to the Yamuna River (India) in the west.
- It comprises the Shivalik hills, the adjoining bhabhar areas and the Terai flood plains.
- It is spread across the Indian states of Uttarakhand, Uttar Pradesh and Bihar, and the low lying hills of Nepal.
- The landscape boasts of some of India's most well-known Tiger Reserves and Protected Areas such as Corbett Tiger Reserve, Rajaji National Park, Dudhwa Tiger Reserve, Valmiki Tiger Reserve and Nepal's Bardia Wildlife Sanctuary, Chitwan National Park, and Sukhla Phanta Wildlife Sanctuary
- Importance: TAL envisions a globally unique landscape where biodiversity is conserved, ecological integrity is safeguarded, and the socio-economic well-being of the people is secured

Do you know ?

– The World Restoration Flagship awards are part of the UN Decade on Ecosystem Restoration – led by UNEP and FAO.
– It aims to prevent, halt, and reverse the degradation of ecosystems on every continent and in every ocean.
– The awards track notable initiatives that support global commitments to restore one billion hectares – an area larger than China.

OpenAI's Sora

Syllabus: GS 3/S&T

In News

- OpenAI, the creator of the revolutionary chatbot ChatGPT, has launched a new generative artificial intelligence (GenAI) model "Sora"

About Sora

- Sora is an AI model that can create realistic and imaginative scenes from text instructions.
- Sora can generate videos up to a minute long while maintaining visual quality and adherence to the user's prompt.
- Sora is able to generate complex scenes with multiple characters, specific types of motion, and accurate details of the subject and background.
- Concerns : The current model has weaknesses. It may struggle with accurately simulating the physics of a complex scene, and may not understand specific instances of cause and effect.
- Future Outlook : Open AI is building tools to help detect misleading content such as a detection classifier that can tell when a video was generated by Sora.
- Open AI will be engaging policy makers, educators and artists around the world to understand their concerns and to identify positive use cases for this new technology.

Broom Grass

Syllabus: GS3/Indian Agriculture

Context:

- Recently, the Tribal people have been carrying broom grass at a village in Karbi Anglong district of Assam.

About Broom Grass:

- It is also known as Thysanolaena maxima, is a type of grass that is native to the Indian subcontinent and Southeast Asia.
- Karbi Anglong, in Assam, is the largest producer of brooms in India.

Cultivation:

- The cultivation of broom grass is comparatively easy and requires small financial inputs.
- It can be grown on marginal lands, wasteland, and in Jhum fallow land.
- The planting can be done by seeds or rhizomes.

Significance:

- It is a cash crop, and its cultivation is a significant source of income for many farmers, and has the potential to generate local employment and can be used to enhance rural income.

Swaminathan Panel Recommendations

Syllabus: GS3/Agriculture

Context

- The first of the 12 demands made by protesting Punjab farmers was for a legal guarantee to MSP, and for the determination of crop prices as per the recommendations of the Dr Swaminathan Commission.

About

- On November 18, 2004, the Ministry of Agriculture constituted a National Commission on Farmers (NCF) under Prof Swaminathan.
- The NCF submitted five reports in favor of farmers, and made several recommendations, including on MSP but it did not recommend either a legal guarantee for MSP or the formula for its calculation that the farmers' unions are now demanding.
- The 10-point terms of reference of the commission, included suggesting a "comprehensive medium-term strategy for food and nutrition security", and ways of "enhancing productivity, profitability, and sustainability of the major farming systems" in the country.

Major Findings/Recommendations Public investment:

- The acute agricultural distress in the country, is the symptom of a deep seated malady arising from inadequate public investment and insufficient public action.

Marketing:

- Trading :The Commission recommended futures and options trading in agricultural commodities, with supervision and regulation by a "SEBI like autonomous body".

- Risk factors: The risk factor and the marketing and post harvest expenses which are not taken into account while deciding MSP by CACP, which could look into.
- Amend acts: There is an urgent need to undertake a review of the Essential Commodities Act and other legal instruments covering marketing, storing and processing of agricultural produce.

Women farmers:

- It called for the setting up of a National Board for New Deal for Women in Agriculture under the Union Food and Agriculture Minister.

MSP:

- MSP should be at least 50% more than the weighted average cost of production.
- As such, "The 'net take home income' of farmers should be comparable to those of civil servants," the report said.
- Consider cost escalation: Purchase by Government should be MSP plus cost escalation since the announcement of MSP. This will be reflected in the prevailing market price.
- Avoid delay: Delay in issue of the Minimum Support Price (MSP) particularly in respect of Kharif crops needs to be avoided.
- Regional balance: Implementation of MSP across regions needs improvement as it is highly concentrated in Punjab, Haryana, UP, and Andhra Pradesh.
- Continuation: Despite weaknesses, MSP may have to be continued in the foreseeable future and its implementation improved.
- Formula to determine prices: The swaminathan panel referred to earlier Committee on Long Term Grain Policy, 2002 led by economist Abhijit Sen.
- It recommended C2 cost of production (i.e., all costs including imputed costs of family labour, owned capital and rental on land) in more efficient regions and A2 + FL costs (i.e., costs actually paid plus imputed value of family value labour) for relatively high cost regions.
- But this recommendation did not find mention in the recommendations of the Swaminathan Commission.

Innovation:

- Farm Schools should be established in the fields of innovative farmers, in order to spread their message and methods.
- Promoting 50,000 Farm Schools across the country will require an investment of Rs 150 crore, the report said.
- Establishing a grain bank and community food and fodder banks, promoting insurance, and setting up a national network of advanced soil testing labs.

Contract farming:

- Report of the NCF titled From Crisis to Confidence recommended a farmer centric 'Code of Conduct' for contract farming arrangements, which should form the basis of all contract farming agreements.
- Also encourage development of farmer's groups/ organisations to negotiate with the purchasers and take care of the interests of the small farmers.

APMC:

- The State APMC Acts need to be amended to provide for…encouraging the private sector or cooperatives to establish markets, develop marketing infrastructure and supporting service.
- Market fee and other charges need to be rationalized.

PDS:

- Government should procure the staple grains needed for PDS at the same price private traders are willing to pay to farmers.

CACP:

- The Commission for Agricultural Costs and Prices (CACP), should be an autonomous statutory organization with its primary mandate being the recommendation of remunerative prices for the principal agricultural commodities of both dry farming and irrigated areas.

Russia Tests Anti-Satellite Weapon

Syllabus: GS3/Science and Technology

Context

- The US has confirmed that Russia is developing a space-based weapon that is a 'serious threat to national security'.

What are anti-satellite weapons?

- Anti-satellite (ASAT) weapons are designed to debilitate and/or destroy satellites that are already in orbit and operational.
- Most of these weapons are kinetic, i.e. they destroy satellites in orbit by rocketing into them or detonating an explosive near them, and blowing them to pieces.
- Because of the low gravity and lack of an atmosphere, the resulting debris can stay in orbit for a long time depending on their size.
- ASAT weapons violate the Outer Space Treaty (OST) through

- Article VII, which holds parties to the treaty liable for damaging satellites belonging to other parties Article IX, which asks parties to refrain from the "harmful contamination" of space.

Space weapons in the past

- The U.S. in 1962 in a high-altitude test called Starfish Prime detonated a thermonuclear bomb 400 km above ground. It remains the largest nuclear test conducted in space.
- It set off an electromagnetic pulse (EMP) and the charged particles and radiation emitted was accelerated by the earth's magnetic field, distorting the ionosphere and resulting in bright aurorae.
- The Soviet Union also conducted high-altitude nuclear tests during the same period, which is Test 184.
- The resulting EMP induced a very high current in 500 km of electric cables and eventually triggered a fire that burned down a power plant.

Why has space emerged as the new battlefield?

- Military Significance of Space: Space has immense strategic importance due to its role in enabling communication, navigation, reconnaissance, and surveillance capabilities for military operations.
- Competing Interests: As space becomes more accessible and economically valuable, there is a growing competition among countries for space resources, such as valuable minerals and water on celestial bodies.
- National Security Concerns: Countries perceive safeguarding their space assets as critical to their national security interests. As a result, they invest in deploying capabilities to protect their assets and degrade those of potential adversaries, leading to militarization of the space.
- Technological Advances: Advances in technology have led to the proliferation of capabilities that could be used for offensive purposes in space, such as anti-satellite (ASAT) weapons, cyber warfare tools targeting space systems, and directed energy weapons.

Outer Space Treaty (OST)

- The Treaty was opened for signature by the three depository Governments (the Russian Federation, the United Kingdom and the United States of America) in January 1967, and it entered into force in October 1967.
- **It provides the basic framework on international space law, including the following principles:**
- The exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind;
- Outer space shall be free for exploration and use by all States;

- Outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means;
- States shall not place nuclear weapons or other weapons of mass destruction in orbit or on celestial bodies or station them in outer space in any other manner;
- The Moon and other celestial bodies shall be used exclusively for peaceful purposes;
- Astronauts shall be regarded as the envoys of mankind;
- States shall be responsible for national space activities whether carried out by governmental or non- governmental entities;
- States shall be liable for damage caused by their space objects; and
- States shall avoid harmful contamination of space and celestial bodies.

Mission Shakti

– Defence Research and Development Organisation (DRDO) in 2019 successfully neutralized a satellite in space with its anti-satellite (ASAT) missile in Mission Shakti.

– The satellite downed by the ASAT missile was Microsat-R, an imaging satellite in the Low Earth Orbit (LEO) at 300 km in space.

– Significance: Anti-satellite weapons provide the capability to shoot down enemy satellites in orbit thereby disrupting critical communications and surveillance capabilities.

A. ASAT missiles also act as a space deterrent in dissuading adversaries from targeting the country's satellite network.

Satyendra Nath Bose's Contribution to Physics

☛ **Syllabus: GS3/Achievements of Indians in Science & Technology**

Context

- The year 2024 marks 100 years of Bose's discovery of the correct set of equations to use to work out the behaviour of collections of photons (particles of light).

Satyendra Nath Bose

- Satyendra Nath Bose (1894-1974) was one of India's most eminent scientists.
- He was a renowned Indian physicist whose fundamental contribution to quantum mechanics, known as Bose-Einstein statistics, revolutionized our understanding of the subatomic world.

Breakthrough Contribution

- Inspired by Albert Einstein's work on light quanta, Bose sent Einstein a paper titled "Planck's Law and the Hypothesis of Light Quanta."
- This paper, based on novel statistical principles, aimed to explain the distribution of radiation energy.
- Planck's law, named after Max Planck, describes the pattern that physics worked differently in the microscopic and all hot objects — from a bowl of hot soup to the Sun — emit radiation in a range of frequencies.
- Bose-Einstein statistics: Recognizing the paper's groundbreaking potential, Einstein translated it into German and published it in a leading scientific journal.

Legacy

- Together with Meghanand Saha he published the first English translation of Einstein's papers on general relativity.
- Bose-Einstein condensates: Laid the foundation for Bose-Einstein condensates (BECs), a crucial concept in physics with diverse applications.
- Applications of BECs: Range from understanding superconductivity and superfluidity to developing ultra- precise atomic clocks and exploring quantum computing possibilities.
- Quantum theory: Bose's work not only contributed significantly to quantum theory but also paved the way for further advancements in various scientific fields.
- Higgs boson: Though not formally acknowledged, his contribution to the discovery of the Higgs boson, later awarded the Nobel Prize, highlights the significance of his pioneering work.
- Awards: His dedication to research and scientific integrity earned him numerous accolades, including the Padma Vibhushan and the Fellowship of the Royal Society.

Beyond Physics

- Bose's intellectual pursuits extended beyond physics. He actively participated in promoting Bengali literature and scientific education in India.
- He translated scientific papers into Bengali and contributed to the development of science textbooks in his native language.

Saturn's Moon Mimas

Syllabus: GS 3/Space

In News

- Astronomers believe Mimas may have a liquid ocean around 20-30 km under its heavily cratered ice shell.

About Mimas

- Mimas was discovered in 1789 by English astronomer William Herschel.
- It is less than 123 miles (198 kilometers) in mean radius.
- The crater-covered Mimas is the smallest and innermost of Saturn's major moons.
- Its low density suggests that it consists almost entirely of water ice, which is the only substance ever detected on Mimas.
- It takes only 22 hours and 36 minutes to complete an orbit.
- Its most distinguishing feature is a giant impact crater – named Herschel
- Mimas appears to be frozen solid is puzzling because Mimas is closer to Saturn.

Odysseus' Moon lander

Syllabus: GS3/Developments in Science and Technology

Context

- A SpaceX Falcon 9 rocket recently lifted off from the Kennedy Space Center in Florida, USA, carrying the private "Odysseus" moon lander.

About

- If Odysseus completes its journey and soft lands on the Moon, it will make it the first privately-led mission to do so.
- Israel's Beresheet attempted in 2019, Japan's Hakuto in 2023 and the American Peregrine in 2024.
- All of them failed to land on the Moon, with Astrobiotic's Peregrine suffered a propellant leak hours after launch and eventually burned up in Earth's atmosphere.
- Developed by: Intuitive Machines, a private entity.

Significance & Potential Impact

- If successful, this mission would mark a significant milestone in lunar exploration, opening doors for further private ventures and diversifying space partnerships.
- Data collected would be valuable for NASA's Artemis program, aiming to land astronauts on the Moon by 2025.
- Will show technological advancements in robotic exploration and landing systems and explore resources and potential future Moon bases.

Private Investments in India's Nuclear Energy Sector

Syllabus: GS3/Science and Technology

Context

- India is planning to invite private companies to invest approximately $26 billion in its nuclear energy sector.

About

- The government plans to build 11,000 megawatts (MW) of new nuclear power generation capacity by 2040.
- Under the funding plan, the private companies will make the investments in the nuclear plants, acquire land, water and undertake construction in areas outside the reactor complex of the plants.
- However, the rights to build and run the stations and their fuel management will rest with the Nuclear Power Corporation of India (NPCIL).
- The plan will not require any amendment to India's Atomic Energy Act of 1962 but will need a final go-ahead from the Department of Atomic Energy.
- Though, Indian law bars private companies from setting up nuclear power plants but allows them to supply components, equipment and sign construction contracts for work outside of the reactors.

Benefits of Private Investment

- Achieve the energy target: The proposed funding is crucial for India to achieve its target of having 50% of its installed electric generation capacity sourced from non-fossil fuels by 2030, compared to the current 42%.
- Increased Efficiency: Private companies bring in more efficient management practices, technological advancements, and innovation to the sector.
- Innovation and Research: Private investment incentivizes the development of advanced reactor designs, fuel cycles, safety systems, and waste management solutions, leading to long-term sustainability and competitiveness in the sector.

- Financial Resources: Private investment provides additional financial resources for the development and expansion of nuclear infrastructure.

What is Nuclear Energy?

- Nuclear energy is the energy released during nuclear reactions, either through fission (splitting of atomic nuclei) or fusion (merging of atomic nuclei).
- In nuclear fission, heavy atomic nuclei, such as those of uranium or plutonium, are split into lighter nuclei, releasing a large amount of energy.
- This process is utilized in nuclear power plants to generate electricity.

India's Nuclear Programme

- Nuclear Energy is a non-carbon-emitting energy source that contributes less than 2% of India's total electricity generation.
- NPCIL owns and operates India's current fleet of nuclear power plants, with a capacity of 7,500 MW, and has committed investments for another 1,300 MW.
- India imports uranium fuel for nuclear plants from Russia, Kazakhstan, Uzbekistan, France and Canada under bilateral agreements.

Advantages of Nuclear Energy

- Energy Security: Nuclear energy with its high power output can solve the energy crisis that the world is facing today. The fuel to power output ratio for nuclear energy is incredibly high. A relatively small amount of uranium can be used to fuel a 1000 Megawatts electric plant, thus providing enough electricity to power a city of about half a million people.
- Clean energy: Nuclear power plants have a low greenhouse gas footprint. The World Nuclear Association found that the average emissions for nuclear power are 29 tonnes of CO2 per gigawatt-hour (GWh) of energy produced.
- This compares favorably with solar (85 tonnes per GWh), wind (26 tonnes per GWh) and fossil fuels like lignite (1,054 tonnes per GWh).
- Low Operating Costs: Nuclear power produces very inexpensive electricity and is cheaper than gas, coal, or any other fossil fuel plants.

Disadvantages of Nuclear Energy

- Risky source of energy: The risks of nuclear power are ultimately uncontrollable. The Chernobyl disaster of 1986 and Fukushima disaster in Japan in 2011 have already shown the dangers of nuclear power.
- Not really renewable: Uranium, the nuclear fuel that is used to produce nuclear energy, is limited and cannot be produced again and again on demand.
- Radioactive Waste Disposal: A nuclear power plant creates 20 metric tons of nuclear fuel per year, and with that comes a lot of nuclear waste. The greater part of this waste transmits radiation and high temperature, causing damage to living things in and around the plants.

FDI in Space Sector of India

Syllabus: GS3/Space Technology; Indigenization of Technology

Context

- Recently, the Union Government approved 100% FDI in the Space sector.

India and Space Sector

- The Indian Space Economy is estimated at around $8.4 billion (around 2-3% of global space economy).
- India has privatised space launches and is targeting a five-fold increase in its share of the global launch market.
- Budgetary Allocation: The Department of Space has received a nominal hike of 4% in its allocation in the Interim Union Budget for 2024-25, from 12,545 crore to 13,043 crore.
- It is expected that with the implementation of the Indian Space Policy 2023, $44 billion Indian space economy can be achieved by the year 2033.
- The number of Space Start-Ups have gone up, from just 1 in 2014 to 189 in 2023 as per DPIIT Start-Up India Portal.
- The investment in Indian Space Start-Ups has increased to $ 124.7 Million in 2023.

Policy Changes and FDI in Space Sector

- The proposed reforms seek to liberalise the FDI policy provisions in the space sector by providing FDI in Satellites, Launch Vehicles and associated systems or subsystems, Creation of Spaceports for launching and receiving Spacecraft and manufacturing of space related components and systems.
- The liberalised entry routes under the amended policy are aimed to attract potential investors to invest in Indian companies in space.

The Entry Routes:

- Up to 74% under Automatic route: Satellites-Manufacturing & Operation, Satellite Data Products and Ground Segment & User Segment.
- Beyond 74% these activities are under government route.
- Up to 49% under Automatic route: Launch Vehicles and associated systems or subsystems, Creation of Spaceports for launching and receiving Spacecraft.
- Beyond 49% these activities are under government route.
- Up to 100% under Automatic route: Manufacturing of components and systems/ sub-systems for satellites, ground segment and user segment.

Other key initiatives to boost space sectors in India

– Indian Space Policy 2023: It laid down roles and responsibilities of organisations such as ISRO, NewSpace India Limited (NSIL) and private sector entities.

A. It aims to enhance the participation of research, academia, startups and industry.

– Tax Incentives: It needs to take more initiatives for tax exemptions/tax holidays/ accelerated depreciation for companies directly or indirectly engaged in space sector activities.

– Strategic Proposals by SIA: The Space Industry Association – India (SIA-India) in its Pre-Budget Memorandum for the FY 2024-25 has proposed a substantial increase in India's space budget.

A. It aims to support India's expanding space program, foster private sector involvement, drive technological advancements, and position the nation as a key player in the dynamic global space ecosystem.

Significances of FDI in Space Sectors

- Private Sector Participation: The Indian space structure is moving from building India's capabilities under ISRO to further capitalization of space-based technology for commercial applications as well as industry involvement in the sector.
- It is expected to integrate Indian companies into global value chains.
- Space Missions: India has achieved many considerable feats in space missions and has established its name in the global picture as a provider of reliable and cost-effective space solutions.
- Technology Absorption and Global Integration: It will enable modern technology absorption.
- With increased investment, companies could achieve sophistication of products, global scale of operations, and enhanced share of the global space economy.
- It is expected to integrate Indian companies into global value chains.
- Boost Manufacturing: Companies will be able to set up their manufacturing facilities within the country, encouraging the Government's 'Make In India' initiative.
- Ease of Doing Business: The FDI policy reform will enhance Ease of Doing

Foreign direct investment (FDI)
- It is a category of **cross-border investment**.
- It requires a substantial investment in, or the outright acquisition of, a company based in another country.
- **Ownership of 10%** or more of the voting power in an enterprise in one economy by an investor in another economy is evidence of such a relationship.

Importance:
- It is a **key element in international economic integration** because it creates stable and long-lasting links between economies.
- It is an important channel for the **transfer of technology between countries, promotes international trade** through access to foreign markets, and can be an **important vehicle for economic development.**

Business in the country, leading to greater FDI inflows and thereby contributing to the growth of investment, income, and employment.

- Promote Research and Innovations: FDI in space will promote technology transfer and research innovations.

Concerns and Challenges

- Limited Investor Interest: There is limited investor interest at later stages of development.
- This could be due to the high-risk nature of space investments and the long-term return on investment.
- Talent Pool: The talent pool for space tech startups needs to grow.
- There is a need for more skilled professionals in the field of space technology.
- Policy Clarity: There is a need for more policy clarity.
- Clear and consistent policies can help attract more foreign investors.
- Simplifying the FDI Process: The process for foreign direct investment needs to be simplified.
- A complex process can deter potential investors.
- Capital-Intensive Requirements: Space technology is capital-intensive.
- This means that it requires a significant amount of capital investment, which can be a challenge for startups and smaller companies.
- Conflict of Interest with ISRO: Foreign investors have been on the fence about investing in the Government monopolised Indian space sector.
- The conflict of interest with ISRO as a competitor had perpetuated apprehension in the minds of foreign investors.

Conclusion

- India's space sector is poised for a bright future, with significant policy changes, increased FDI, and a focus on private sector participation.
- The sector is set to make a lasting impact on space exploration and technology, fostering significant growth and paving the way for a new era of space exploration.

MTEX-24

Syllabus :GS 3/Defense

In News

- The Maritime Technical Exposition (MTEX-24) stands as a special attraction in the MILAN 2024 taking place in Visakhapatnam.

About MTEX-24

- It is a three-day exposition and fosters collaboration and knowledge exchange between industry leaders, researchers, and defence professionals
- It showcases the latest advancements in naval technology viz shipbuilding, communication systems, cybersecurity, and sustainable energy solutions.

Importance:

- It will be driving technological advancements and strengthening professional relations with friendly foreign navies.
- It will propel the Indian maritime industry forward, contributing to a more secure and prosperous future.

MILAN

– It is a biennial multilateral naval exercise held under the aegis of the Eastern Naval Command.

– This edition is the largest and more complex than previous editions, with the participation of Indian ships and 16 foreign warships, one Maritime Patrol Aircraft and delegations from friendly countries.

Human Rating and Gaganyaan Mission

Syllabus: GS3/Science and Technology, Space

Context:

- Recently, ISRO has successfully completed the human rating of its CE20 cryogenic engine, which represents a major boost to India's attempt to launch humans into space under the Gaganyaan mission.

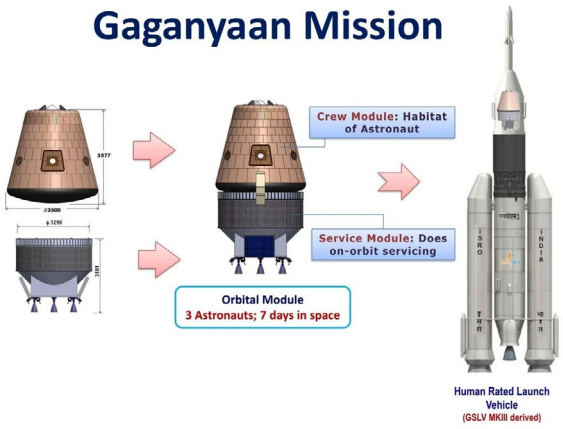
About the Gaganyaan Mission:

- India's first human spaceflight program, aims to send astronauts into a low earth orbit.

- A critical aspect of this mission is the concept of 'human rating', which refers to the process of certifying a system capable of safely transporting humans.

Human Rating of CE20 Cryogenic Engine:

- ISRO has accomplished a major milestone in the human rating of its CE20 cryogenic engine, which powers the cryogenic stage of the human-rated LVM3 launch vehicle for Gaganyaan missions.



Human Rating of L110-G Vikas Engine:

- Earlier, ISRO has completed the **final long-duration hot test of the human-rated L110-G Vikas engine** for the planned qualification duration of 240 seconds.
- The **air-lit liquid core stage** of the human-rated launch vehicle (LVM3-G) uses **two L110-G Vikas engines** in a clustered configuration.
- The successful completion of this test marks a major milestone in the human space flight programme, Gaganyaan.

- In order to qualify the CE20 engine for human rating standards, four engines have undergone 39 hot firing tests under different operating conditions for a cumulative duration of 8,810 seconds against the minimum human rating qualification standard requirement of 6,350 seconds.
- The ground qualification tests for the human rating of the CE20 engine involved life demonstration tests, endurance tests, and performance assessment under nominal operating conditions as well as off-nominal conditions with respect to thrust, mixture ratio, and propellant tank pressure.
- The final test was the seventh of a series of vacuum ignition tests carried out at the High Altitude Test Facility at ISRO Propulsion Complex, Mahendragiri, to simulate flight conditions.

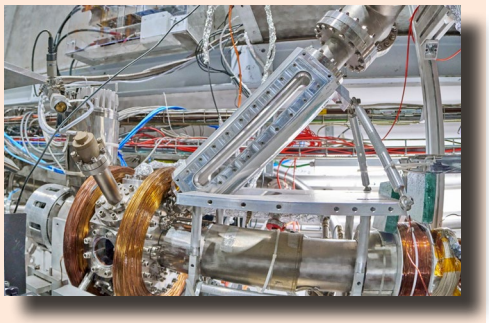
Importance of CE20 Cryogenic Engine:

- It aims to power the upper stage of the human-rated LVM3 vehicle and has a thrust capability of 19 to 22 tonnes with a specific impulse of 442.5 seconds.
- ISRO has successfully completed the acceptance tests of the flight engine identified for the first unmanned Gaganyaan (G1) mission, tentatively scheduled for Q2 of 2024.
- The successful human rating of the CE20 cryogenic engine and the L110-G Vikas engine marks a significant step towards the realisation of the Gaganyaan mission.
- These developments demonstrate ISRO's commitment to ensuring the safety and success of India's first human spaceflight program.

CERN scientists carry out laser cooling of Positronium

Syllabus: GS3/Developments in Science and Technology

Context:



- In a first, an international team of physicists from the Anti-hydrogen Experiment: Gravity, Interferometry, Spectroscopy (AEgIS) collaboration has achieved a breakthrough by demonstrating the laser cooling of Positronium.

About

- Physicists representing the Antihydrogen Experiment: Gravity, Interferometry, Spectroscopy (AEgIS) collaboration announced this scientific achievement.
- AEgIS is a collaboration of physicists from 19 European and one Indian research group.
- The primary scientific goal of the AEgIS is the direct measurement of the Earth's gravitational acceleration, g, on antihydrogen.

The experiment:

- The experiment was performed at the European Organization for Nuclear Research, more popularly known as CERN, in Geneva.
- Experimentalists achieved laser cooling of Positronium atoms initially from ~380 Kelvin to ~170 Kelvin, and demonstrated the cooling in one dimension using a 70-nanosecond pulse of the alexandrite-based laser system.
- The lasers deployed, researchers said, were either in the deep ultraviolet or in the infrared frequency bands.

Do you know?

– Positronium, comprising a bound electron (e-) and positron (e+), is a fundamental atomic system.
– Due to its very short life, it annihilates with a half life of 142 nano-seconds.
– Its mass is twice the electron mass and enjoys the unique distinction of being a pure leptonic atom.
– This hydrogen-like system, with halved frequencies for excitation, makes it a great contender for attempting laser cooling and thereby performing tests of fundamental theories in physics.

Significance

- This is an important precursor experiment to the formation of antiHydrogen and

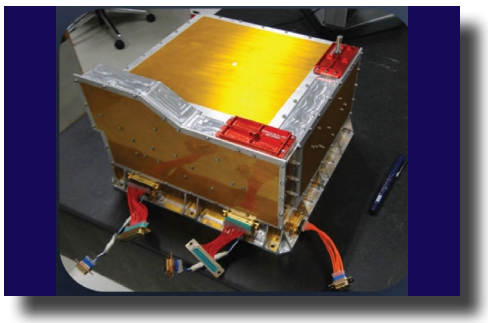
the measurement of Earth's gravitational acceleration on antihydrogen in the AEgIS experiment.

- In addition, this scientific feat could open prospects to produce a gamma-ray laser that would eventually allow researchers to look inside the atomic nucleus and have applications beyond physics.
- This experiment will pave the way for performing spectroscopic comparisons required for the Quantum Electrodynamics (QED), the study of the light and its interaction with charged matter, and a possible degenerate gas of Positronium down the road.
- According to CERN, the new scientific development will allow high-precision measurements of the properties and gravitational behaviour of this exotic but simple matter–antimatter system, which could reveal newer physics.
- It also allows the production of a positronium Bose–Einstein condensate, in which all constituents occupy the same quantum state.
- Such a condensate has been proposed as a candidate to produce coherent gamma-ray light made up of monochromatic waves that have a constant phase difference between them.

Plasma Analyser Package for Aditya-L1 (PAPA)

Syllabus: GS3/Achievements of Indians in Science and Technology

Context:



- Recently, ISRO informed that the Plasma Analyser Package for Aditya (PAPA) payload onboard the Aditya-L1 has been operational and performing nominally.

About the Plasma Analyser Package for Aditya-L1 (PAPA)

- It is one of seven scientific payloads aboard the 1,480-kg Aditya-L1 (India's first mission to study the Sun), the solar probe of the ISRO which was inserted into a halo orbit at L1 in early January 2024.
- It is developed by the Space Physics Laboratory (SPL) at the Vikram Sarabhai Space Centre (VSSC).
- It is designed to understand and gain deeper insights into the phenomenon of the 'solar winds' (outward expansion of plasma or a collection of charged particles) from the sun's corona and their composition.
- Solar winds pose a threat to communications networks.
- It is an energy and mass analyzer designed for in-situ measurements of solar wind

electrons and ions in the low energy range.

- The preliminary analysis shows that PAPA science data are of very good quality and the results match similar observations made by other instruments which are being operated at or around Lagrangian point L-1 by other space agencies.

Other Payloads in Aditya-L1

– Visible Emission Line Coronagraph (VELC): It allows viewing of the corona (the outermost part of the sun's atmosphere) by masking the glare of the photosphere (sun's surface). It could help explain why the corona is 200 to 500 times hotter than the photosphere.

– Solar Low Energy X-ray Spectrometer (SoLEXS): It studies solar flares. The sun's interiors contort the magnetic field, throwing out high-energy particles that reach Earth in the form of solar flares, disrupting radio communication and damaging satellites.

– High Energy L1 Orbiting X-ray Spectrometer (HEL1OS): It is designed to study solar flares in high-energy X-rays, with the acceleration and propagation of energetic electrons in the flare.

– Solar Ultraviolet Imaging Telescope (SUIT): It is a UV telescope to image the solar disk in the near ultraviolet wavelength range to study complex active regions of the sun (where the magnetic field is more concentrated) and Coronal Mass Ejections.

– Aditya Solar wind Particle EXperiment (ASPEX): It comprises two subsystems:

a. Solar Wind Ion Spectrometer (SWIS): is a low energy spectrometer designed to measure the proton and alpha particles, the two primary ion components of solar winds.

b. Suprathermal and Energetic Particle Spectrometer (STEPS): is designed to measure high-energy ions of the solar wind. They allow scientists to study the properties of plasmas and their role in the transfer of mass, momentum, and energy from the sun to Earth.

– MAGNETOMETER: It will study the sun's low intensity interplanetary magnetic field, which is carried by solar winds.

Key Features of PAPA

- PAPA contains two sensors that are equipped to measure the direction of arrival of solar wind particles:
- The Solar Wind Electron Energy Probe (SWEEP): It measures the solar wind electron flux.
- The Solar Wind Ion Composition AnalyseR (SWICAR): It measures ion flux and composition as a function of direction and energy.

Role in the Aditya-L1 Mission

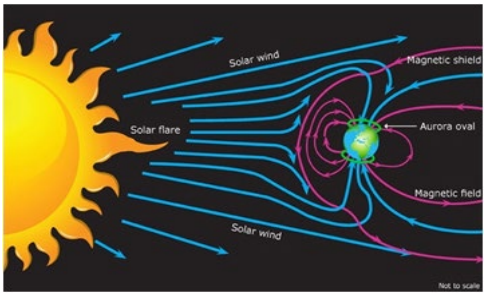
- The Aditya-L1 mission was launched aboard the Polar Satellite Launch Vehicle-C57 mission on September 2, 2023.
- As Aditya traversed the 1.5 million km distance to L1, the PAPA payload was switched on for the first time on November 8.
- The high voltage (HV) commissioning of the payload and science data observations were started on December 11.

About Coronal Mass Ejections (CMEs)

– They are large expulsions of plasma and magnetic fields (frozen in flux) from the Sun's corona.

a. These are stronger than the background solar wind interplanetary magnetic field (IMF) strength.

– They can travel in any random direction and cut through solar winds, and they are sometimes associated with flares but can occur independently.



– CMEs are capable of driving the Space Weather in near-Earth space.

a. If CMEs are Earth-directed, they can cause severe implications.

Conclusion

- PAPA payload onboard the Aditya-L1 Mission remains healthy and the scientific data sent by it are of very good quality.
- The successful operation of PAPA is a testament to the capabilities of ISRO and its contribution to our understanding of the solar wind.

Synthetic Antibody to Neutralize Snake Bite Toxin

Syllabus:GS3/Science and Technology

Context

- Scientists at the Indian Institute of Science (IISc) in Bengaluru have developed a synthetic human antibody that can neutralize a potent neurotoxin produced by the Elapidae family of snakes.

About

- Snake Bites cause thousands of deaths every year, especially in India and sub-Saharan Africa.

- The Elapidae family of snakes are highly toxic and include the cobra, king cobra, krait and black mamba.

Current Strategy for Developing Anti-Venom

- It involves injecting snake venom into equines like horses, ponies and mules, and collecting antibodies from their blood.
- Challenges: These animals get exposed to various bacteria and viruses during their lifetime.
- As a result, anti-venom also includes antibodies against microorganisms, which are therapeutically redundant.
- Research has shown that less than 10% of a vial of antivenom actually contains antibodies that are targeted towards snake venom toxins.

The Synthetic Antibody

- The antibody developed by the team targets a conserved region found in the core of a major toxin called the three-finger toxin (3FTx) in the elapid venom.
- Although different species of elapids produce different 3FTxs, a handful of regions in the protein are similar.
- The team zeroed in on one such conserved region – a disulphide core.
- They designed a large library of artificial antibodies from humans and tested the antibodies ability to bind to 3FTxs from various elapid snakes around the world.
- They found one antibody that could bind strongly to various 3FTxs.

First Private Spacecraft Landing on Moon

Syllabus: GS3/Science and Technology, Space Prelims

Context

- The Odysseus lunar lander, has become the first US-made spacecraft to touch down on the moon in 50 years.

About

- Spacecraft Odysseus built and flown by Texas-based company Intuitive Machines landed near the south pole of the moon.
- It is also the first commercial spacecraft to make a touchdown on the moon.
- Odysseus is the first craft launched from the US to land on the moon's surface since Apollo 17 in 1972.

Significance

- The lunar lander is designed to evaluate the environment at the moon's south pole

as NASA prepares to send a crewed mission in 2026 with Artemis III.

- The mission is expected to pave the way under NASA's Commercial Lunar Payload Services (CLPS) program, designed to deliver instruments and hardware to the moon at lower costs.

Large Language Model (LLMs)

Syllabus: GS3/ Science & Technology

In Context

- The ability of Generative AI models to "converse" with humans and predict the next word or sentence is due to something known as the Large Language Model, or LLM.

About

- It is to be noted that while not all generative AI tools are built on LLMs, all LLMs are forms of Generative AI which in itself is a broad and ever-expanding category or type of AI.
- LLMs are large general-purpose language models that can be pre-trained and then fine-tuned for specific purposes.
- An LLM is like a super smart computer program that can comprehend and create human-like text.

Meaning of LLMs

- Firstly, the 'Large' indicates two meanings — the enormous size of training data; and the parameter count.
- In Machine Learning, parameters, also known as hyperparameters, are essentially the memories and knowledge that a machine learned during its model training.

How Many types of LLMs are there?

- Various types are there, type depends on the specific aspect of tasks they are meant to do.
- On the basis of architecture, there are three types — autoregressive, transformer-based, and encoder- decoder.
- Autoregressive: GPT-3 is an example of an autoregressive model as they predict the next word in a sequence based on previous words.
- Transformer-based: LaMDA or Gemini (formerly Bard) are transformer-based as they use a specific type of neural network architecture for language processing.
- Encoder-decoder: Models that encode input text into a representation and then decode it into another language or format.
- Open-source: LLaMA2, BlOOM, Google BERT, Falcon 180B, OPT-175 B are

some open-source LLMs
- Closed-source: Claude 2, Bard, GPT-4

How do LLMs work?

- It works on the principle of "deep learning". It involves the training of artificial neural networks, which are mathematical models which are believed to be inspired by the structure and functions of the human brain.
- For LLMs, this neural network learns to predict the probability of a word or sequence of words given the previous words in a sentence.
- Once trained, an LLM can predict the most likely next word or sequence of words based on inputs also known as prompts.

Applications & Advantages of LLMs

- These models are trained to solve common language problems of humans such as text classification, question answering, text generation, document summarisation, aiding in marketing strategies etc.
- They have the ability to continuously improve their performance when provided with more data sets.

Blanets

☛ **Syllabus: GS 3/Space**

In News

- The dust clouds around supermassive black holes are the perfect breeding ground for Blanets.

About Blanets

- Scientists in Japan have theorised that planets could form in the massive dust and gas clouds.

Formation

- planets are formed when the dust and gas swirling around a young star collide and clump together.
- A similar process could be in play near supermassive black holes, where planets take shape inside the disc and eventually become blanets.
- Blanets would be able to grow and reach sizes up to 3,000 times the mass of Earth, because of the active galactic nucleus and will have to orbit the black hole at a distance of about 100 trillion km.
- A blanet would have an extremely long orbital period, taking
- around a million years to complete an orbit around its host black hole.

Chapter 6

Social Issues

Multidimensional Poverty in India

Syllabus: GS1/Social Issues

Context

- Recently, the Union Finance Minister informed that nearly 25 crore people have been raised from multi- dimensional poverty in the last 10 years.

About the Poverty

- It is a state or condition in which a person or community lacks the financial resources and essentials for a minimum standard of living, such as housing, clean water, healthy food, and medical attention.
- Traditionally, poverty is calculated based either on income levels or, if income data are not available, on expenditure levels.
- The 'poverty lines' are actually expenditure levels that are considered minimum enough for someone to be called poor.
- A person who is poor can suffer multiple disadvantages like poor health or malnutrition, a lack of clean water or electricity, poor quality of work or little schooling.
- Focusing on one factor alone, such as income, is not enough to capture the true reality of poverty.

What is the Multidimensional Poverty Index (MPI)?

- **Globally, the MPI uses 10 indicators covering three main areas:**
  - Health includes nutrition and child & adolescent mortality indica- tors.
  - Education includes years of schooling and school attendance indicators.
  - Standard of living includes six household-specific indicators: hous- ing, household assets, type of cooking fuel, access to sanitation, drinking water, and electricity.
- **• The Indian MPI has two additional**

Escaped Multidimensional Poverty (2013-14-2022-23)

	Estimated in lakh
Bihar	377.09
Madhya Pradesh	230.00
Maharashtra	159.07
Odisha	102.78
Rajasthan	187.12
Uttar Pradesh	593.69
West Bengal	172.18
INDIA	2,482.16

indicators:

- Maternal Health (under the health dimension) and;
- Bank Accounts (under the standard of living dimension).

- **Multidimensional Poverty in India Since 2005-06:**
- It is published by NITI Aayog with technical inputs from the United Nations Development Programme (UNDP) and the Oxford Policy and Human Development Initiative (OPHI).
- It uses indicators covering three main areas: health, education, and standard of living.
- It was found to decline from 29.17% in 2013-14 to 11.28% in 2022-23 with about 24.82 crore people escaping poverty during this period.
- At the States' level, Uttar Pradesh topped the list with 5.94 crore people escaping poverty followed by Bihar at 3.77 crore and Madhya Pradesh at 2.30 crore.
- However, the largest number of poor people in the world — 228.9 million — lived in India in 2020.

Related Data

- The NFHS-5 (2019-21): About 14.96% of India's population are multidimensionally poor compared to 24.85% of the population that was multidimensionally poor based on the 2015-16 (NFHS-4).
- It shows that nearly 135 million individuals escaped poverty during the 5-year period.
- A UNDP study highlighted that 415 million Indians came out of multidimensional poverty in the last 15 years.
- According to the IMF, the 'extreme poverty' was as below 1% in 2020 due to the Pradhan Mantri Garib Kalyan Ann Yojana (PMGKY).

Reason for Poverty in India

- Economic Slowdown and Policy Decisions: The economy has been slowing for nine quarters prior to the outbreak of the novel coronavirus pandemic.
- Unemployment had reached a 45-year high in 2017-18.
- Child Malnutrition: India's poor score comes almost entirely from the child stunting and wasting parameters.
- Almost 35% of Indian children are stunted, and although this is much better than the 54.2% rate of 2000, it is still among the world's worst.
- Almost 17.3% of Indian children under five are wasted, which is the highest prevalence of child wasting in the world.
- Pandemic Impact: The pandemic led to a 'sudden increase in poverty'.
- Over an eight month period (March to October 2020), average incomes of the bottom 10% of households were lower by Rs 15,700.

- Homelessness: Increasingly, a large number of persons are being rendered homeless across the world.
- There are both natural as well as man-made reasons that are contributing to this crisis

Government Efforts

- Interventions through Policies/Schemes: The government has expanded the social security net through schemes like Pradhan Mantri Suraksha Bima Yojana (Accident Insurance), Atal Pension Yojana (Unorganized Sector), and Pradhan Mantri Jeevan Jyoti Yojana (Life Insurance).
- The MUDRA Yojana has enabled about eight crore people to start new businesses.
- Rural Development: The Ministry of Rural Development has implemented various programs to increase livelihood opportunities, empower rural women, provide a social safety net, and improve infrastructure in rural areas.
- The main focus is on increasing livelihood opportunities, empowering rural women, providing a social safety net, skilling rural youth, infrastructure development, increasing land productivity, etc.
- Nutrition and Health: Despite the progress in economic development, a significant portion of the Indian population cannot afford healthy food.
- Initiatives like Poshan Abhiyan and Anaemia Mukt Bharat have been launched to address this issue.
- State-Level Efforts: States like Uttar Pradesh, Bihar, and Madhya Pradesh have recorded the largest decline in the number of multidimensionally poor people.

Various Committees

- There are various committees formed with the objective to estimate the number of people living in poverty in India. These are:
  - The Working Group of 1962;
  - V N Dandekar and N Rath in 1971;
  - Y K Alagh in 1979;
  - D T Lakdawala in 1993;
  - Suresh Tendulkar in 2009;
  - C Rangarajan in 2014.
  - The Lakdawala Committee assumed that health and education is provided by the state.
  - Therefore, expenditure on these items was excluded from the consumption basket it proposed. Since expenditure on health and education rose significantly in the 1990s, the Tendulkar Committee included them in the basket.

A Way Forward

- Poverty eradication remains India's top priority, but there is still work to be done.

Strategies such as increasing livelihood opportunities, empowering rural women, providing a social safety net, and skilling rural youth, infrastructure development, increasing land productivity, etc seem to be effective in reducing poverty.

- There is a need to address the inequalities of income, education, and opportunity that are all interconnected that can foster social cohesion and boost general well-being.
- It is essential that the government should provide education and health services free of cost for the deserving citizens and those from the socially oppressed classes.

Status of Polygamy in India

Syllabus :GS1/Society

In News :

- THE Uttarakhand Legislative Assembly passed the Uniform Civil Code (UCC) Bill, 2024.
- The Bill explicitly bans polygamy in the state .

About Polygamy

- Polygamy is the practice of having more than one spouse (wife or husband at the same time.
- It has two forms, namely, polygyny (marriage of a man to several women at a time) and polyandry (marriage of a woman to several men at a time).

Data Analysis

- Government data on polygamy can be obtained from two main sources — the decadal census and the National Family Health Survey (NFHS).
- The NFHS-5 : It showed the prevalence of polygamy (the percentage of women who reported their husbands had other wives) was highest among Christians (2.1%), followed by Muslims (1.9%), and Hindus (1.3%), looking at religion.
- Overall, Scheduled Tribes reported the highest incidence at 2.4%.
- Census data : According to the census of 2011, there are 28.65 crore married men in India, compared to 29.3 crore married women. The difference between the two numbers — 65.71 lakh — can be explained either by the incidence of polygamy or men gone abroad.

Status in India

- It is governed both by personal laws and the Indian Penal Code (IPC).
- Polygamy is illegal under the Indian Penal Code (IPC), but Muslim men are allowed to have up to four wives under Sharia Islamic law.

POLYGAMY NUMBERS BY COMMUNITY

Census 2011 data on marriages by religion

Religion	Married Population			Total Population	Share of Polygamous Population
	Male	Female	Difference		
Hindu	23,35,20,803	23,78,77,097	43,56,294	96,62,57,353	0.45
Muslim	36,06,5,863	37,61,6,038	15,50,175	17,22,45,158	0.90
Christian	62,99,570	65,93,705	2,94,135	2,78,19,588	1.06
Sikh	52,72,175	53,54,042	81,867	2,08,33,116	0.39
India	28,65,07,311	29,30,77,472	65,70,161	121,08,54,977	0.54

Per cent of currently married women who said that their husbands had other wives besides themselves by background characteristics, NFHS-3 to NFHS-5

- The Special Marriage Act (SMA), 1954 allows individuals to perform inter-religious marriages, but it forbids polygamy.
- Besides, polygamy also exists in many tribal communities.

Impacts and Consequences of Polygamous Marriages

- Social and Cultural Impact: In societies where polygamy is culturally accepted, it may not carry the same social stigma as in cultures where monogamy is the norm. Polygamy can influence gender dynamics, potentially reinforcing traditional gender roles and hierarchies.
- Economic Consequences: Polygamous households may face challenges in distributing resources such as time, attention, and finances among multiple spouses and their children.
- Emotional and Psychological Impact: Emotional challenges, including jealousy and rivalry among spouses, may arise. Children in polygamous families might face emotional complexities, including issues related to sibling relationships and parental attention.
- Legal and Marital Rights: In many jurisdictions, polygamous marriages are not legally recognized, leading to potential legal and financial issues. Complications may arise concerning inheritance rights and custody arrangements for children.
- Cultural and Religious Considerations: Polygamous marriages may be accepted or rejected based on cultural or religious beliefs. In regions where polygamy is not the cultural norm, individuals in polygamous marriages may face social isolation or discrimination.
- Impact on Society: In societies with widespread polygamy, there can be demographic consequences, such as uneven gender ratios. The acceptance or rejection of polygamy can influence social stability and cohesion.

Constitutional View & Supreme Court's Observations

- India is a secular state, wherein no religion is considered superior or subordinate to another, and each religion is treated with equality under the law.
- The Indian Constitution ensures fundamental rights for all citizens, and any legislation conflicting with these rights is deemed unconstitutional.
- Article 13 of the Constitution specifies that any law contravening Part III of the Constitution is invalid.
- Article 14 of the Constitution guarantees equal treatment and protection under the law to every individual within the territory of India.
- The Supreme Court, in a verdict uploaded in 2021, had mentioned that India recognizes a plural legal system, wherein different religious communities are permitted to be governed by different 'personal laws'.
- but personal laws must meet the test of constitutional validity and constitutional morality, in as much as, they cannot be violative of Articles 14, 15,21 of the Constitution.

Employability of Women in India

Syllabus: GS2/Social Issues; Vulnerable Section

Context:

- Recently, the Supreme Court of India said that termination of a woman's employment due to marriage is gender discrimination, and unconstitutional.

Status of Working Women in India:

- As per the Union Budget 2022, the overall workforce participation rate in India is 20.3%, of which 18.2% is in Urban India.
- Women's employability stands at 51.44% for 2022, compared to 41.25% in 2021.
- Periodic Labour Force Survey Report 2022-23: It shows that the Female Labour Force Participation Rate in the country has improved significantly by 4.2% points to 37.0% in 2023, as per the 'usual status' concept of measuring labour force participation.
- The presence of girls/women in Science, Technology, Engineering and Mathematics (STEM) is 43%, which is one of highest in the world.
- India is presently one of the only 15 countries in the world with a woman Head of State.
- National Family Health Survey 5 (NFHS 5): It says 88.7% women participate in major household decisions today as against 84% five years ago.

- Public Sphere: In the 2019 Lok Sabha election for the first time in the country since independence, 81 women were elected as Members of Lok Sabha.
- There are over 1.45 million or 46% women elected representatives in Panchayati Raj Institutions (against mandatory representation of 33%).

Challenges faced by the working women:

- Work-Life Balance: Indian working women often struggle to balance their professional responsibilities with their roles at home.
- Workplace Complications: Women face complications in the workplace, including discrimination, bias, and sometimes even harassment.
- Gender Bias: There is a prevalent assumption that women are only suitable for specific tasks, leading to discrimination among those who work with them.
- Pay Disparity: Despite laws declaring equality in remuneration, it is not always followed.
- The ingrained belief that women are incapable of doing difficult work and are less effective than men impacts the payment of differential salaries and compensation for the same job.
- Security Issues: Safety and security are major concerns for working women, especially those who work at night or in remote locations.

Initiatives to tackle the issue:

- Flexible Working Hours: Organisations are increasingly offering flexible working hours to accommodate the needs of their female employees.
- Equal Women Representation: There is a growing emphasis on ensuring equal representation of women in planning and decision-making roles within organisations.
- Gender Equality Initiatives: Organisations are driving transformative change for gender equality, which includes initiatives like leadership development programs, increased female recruitments, and transparent communication.
- Support Services: Support services such as counselling sessions are being provided to help women cope with workplace challenges.
- Safety and Security Measures: Organisations are implementing proper safety and security measures to ensure a safe working environment for women.
- Effective Child Care Policies: Organisations are introducing effective child care policies to support working mothers.
- Appropriate Grievance Redressal Mechanisms: Appropriate grievance redressal mechanisms are being put in place at workplaces to address issues faced by women.

Related Supreme Court's Observations:

- Marriage, Employment, and Gender Discrimination: The Supreme Court has stated that rules that edge out women from employment for getting married are

'coarse', unconstitutional.

- It observed that terminating employment because a woman has got married is a coarse case of gender discrimination and inequality.
- Acceptance of such patriarchal rule undermines human dignity, right to non-discrimination and fair treatment.
- Safe Working Environment: The Supreme Court recognized that under Article 14 (2), 19 (1) (g), and 21 of the Constitution, the fundamental rights also include the right to a safe working environment.
- Sexual Harassment: The Apex court commissioned the Vishaka Guidelines (1997) that defined sexual harassment and put the onus on the employers to provide a safe working environment for women.

Constitutional Provisions related to Women:

- Article 14: Equality before law for women.
- Article 15 (1): The State not to discriminate against any citizen on grounds only of religion, race, caste, sex, place of birth or any of them.
- Article 15 (3): The State to make any special provision in favour of women and children.
- Article 16: Equality of opportunity for all citizens in matters relating to employment or appointment to any office under the State.
- Article 39(a): The State to direct its policy towards securing for men and women equally the right to an adequate means of livelihood.
- Article 39(d): Equal pay for equal work for both men and women.
- Article 42: The State to make provision for securing just and humane conditions of work and for maternity relief.
- Article 46: The State to promote with special care the educational and economic interests of the weaker sections of the people and to protect them from social injustice and all forms of exploitation.
- Article 51(A) (e): To promote harmony and the spirit of common brotherhood amongst all the people of India and to renounce practices derogatory to the dignity of women.
- Article 243 D(3), Article 243 D (4), Article 243 T (3), and Article 243 T (4) are related to reservation of seats for the women belonging to Scheduled Castes; and the Scheduled Tribes.

Statutory and Legal Provisions

- The Prohibition of Sexual Harassment of Women at Workplace Act, 2013: It provides a definition of sexual harassment and mandates employers to develop a complaint mechanism.
- It also outlines procedural requirements for employers, including the establishment of an Internal Complaints Committee (ICC), conducting orientation and awareness

programs, and displaying details of the penal consequences of indulging in acts of sexual harassment.

- The Maternity Benefit Act, 1961: It regulates the employment of women in certain establishments for a certain period before and after childbirth and provides for maternity and other benefits.
- The Factories Act, 1948: It mandates that any factory employing 30 or more women workers must provide creche facilities for the use of children under the age of 6 years.
- It also stipulates that women cannot be made to lift more than the prescribed weight and cannot be made to clean or oil any moving machine.
- The Equal Remuneration Act, 1976: It provides for the payment of equal remuneration to men and women workers for the same work or work of a similar nature.
- Minimum Wages Act, 1948: It sets the minimum wages that must be paid to skilled and unskilled labourers.

Way Forward: What more to be done?

- Work from Home: A survey conducted by UNICEF's public-private youth platform YuWaah and U-Report revealed that 55% of women prefer to work from home so they can manage household chores.
- It suggests that flexible work arrangements could be beneficial.
- Access to Information and Opportunities: The same survey found that 52% of respondents believe that access to information and opportunities or support from families are key factors that influence young women's decision to develop job-ready skills and join the workforce.
- Family Influence: The survey also found that 56% of respondents believed that parents/family or partners are important actors in choosing aspirations and career options.
- Education and Unemployment: A study by the Indian Institute of Management (IIM), Lucknow, found a rise in the unemployment rate with education levels.
- It suggests that more job opportunities need to be created for educated women.
- Labour-Intensive Manufacturing Sector: The researchers suggested that a conscious effort to identify and promote the labour-intensive manufacturing sector will help in accomplishing inclusive growth.

Women of ASHA : Overworked & Underpaid

Syllabus: GS1/Society, GS2/ Governance, Health

Context

- A recent study highlights the marginalization of ASHA workers for being Overworked and Underpaid.

Who are ASHA workers?

- ASHA workers are volunteers from within the community who are trained to provide information and aid people in accessing benefits of various healthcare schemes of the government.
- They act as a bridge connecting marginalized communities with facilities such as primary health centers, sub-centres and district hospitals.
- The role of these community health volunteers under the National Rural Health Mission (NRHM) was first established in 2005.

Eligibility for ASHA workers

- ASHA must primarily be a woman resident of the village married/ widowed/ divorced, preferably in the age group of 25 to 45 years.
- She should be a literate woman with due preference in selection to those who are qualified up to 10th standard wherever they are interested and available in good numbers.
- This may be relaxed only if no suitable person with this qualification is available.

Roles and responsibilities of ASHA workers

- Facilitating access to health care services.
- Building awareness about health care entitlements especially amongst the poor and marginalized.
- Promoting healthy behaviors and mobilizing for collective action for better health outcomes.
- Meeting curative care needs in the area.
- Challenges faced by ASHA workers
- Triple Shift: ASHA workers endure a triple shift encompassing duties at home, in the community, and at health centers, leading to extreme exhaustion and time constraints.
- Layers of marginalization: ASHAs face intersecting power dynamics of gender, caste, and informal economy, exacerbating their marginalization within the system.

- Limited Autonomy: ASHAs have limited control over their time, finances, and well-being, highlighting their lack of autonomy within the healthcare system.
- Erratic Meals: ASHAs experience erratic meal schedules and often receive the least priority in food allocation within their families, reflecting broader gender inequalities in India.
- Violence Embedded in Role: Economic, physical, and psychological violence is embedded in the ASHAs' role, perpetuated by a system that fails to recognize their contributions.
- Occupational Hazards Denied: ASHAs are considered volunteers and denied recognition as 'workers'.
- Hence hazards such as extreme heat, further compromising their health and safety.
- Vulnerability to Health Issues: Poor eating habits, irregular meals, and lack of nutritious food make ASHAs vulnerable to malnutrition, anemia, and non-communicable diseases.
- Financial Strain: ASHAs often experience delayed wages and incur out-of-pocket expenses for job-related costs, diminishing their ability to afford healthcare for themselves.
- Lack of Status as Healthcare Workers: ASHAs are not accorded the status of healthcare workers, which underpins many of the challenges they face within the system.

Government Steps

- In the Interim Budget 2024-2025, the Central government announced to provide free health insurance cover for all ASHAs and Anganwadi workers and helpers under the Ayushman Bharat Scheme.
- In 2018, the Ministry of Health and Family Welfare approved an ASHA benefit package, providing coverage for accidents, deaths and disability.

Way Ahead

- A continual, systematic investment to strengthen the ASHA program is inextricably linked to advancing India's child and maternal health outcomes.
- Without policy changes, ASHAs remain framed as mere volunteers, neglecting their rights and welfare.
- India needs to acknowledge ASHAs as full-fledged workers, providing them with decent pay and proper care to ensure their physical and emotional fitness, ultimately benefiting women, children, and society as a whole.

Chapter 7

International Relation

Rising tensions in the Korean peninsula

Syllabus:GS2/International Relations

Context

- The ongoing tensions in the Korean peninsula have raised concerns about the deterioration of the international security environment.

Background

- The Korean peninsula was divided into two by the end of World War II, after imperial Japan who occupied the territory was defeated.
- The North went under the ambit of the Soviet Union and the South under the U.S., resulting in the creation of two ideologically different regimes which mirrored either sides of the Cold War divide.

The Korean war (1950-53)

- The Korean war broke out as a result of the North's attempt to take over the South — the first "hot war" of the Cold War.
- Today even after the cessation of active conflict and the end of the Cold War, the two countries are still divided over ideology and political leanings.
- The North Korea being an authoritarian dynastic regime allied with China and Russia, and the South Korea being a liberal democracy allied with the U.S.
- India's role in the Korean war: During the War , both the warring sides accepted a resolution sponsored by India, and the ceasefire was declared on 27 July 1953 with the Korean Armistice Agreement.

Recent tensions in Korean Peninsula

- Over the past couple of decades, North Korea has demonstrated its nuclear weapons capability by testing several missiles.
- The key external stakeholders of the Korean peninsula are the very same nuclear powers who are locked in a global strategic competition — the U.S., China and Russia.
- Russia and China have boosted its engagement with North Korea. China has always been consistently supportive of North Korea, being the single largest

trading partner of the country.

- On the other hand South Korea,, has enhanced its military alliance with the U.S., hosting not just U.S. troops, but also advanced missile defense systems.

Threat to International security

- North Korea has conducted provocative actions ranging from military drills to shelling South Korean islands and even threatening nuclear attacks.
- It supposedly has the ability to even target the U.S. mainland with its nuclear arsenal, and it has also become a major source of cyber-attacks across the world.
- Currently the World is witnessing the activation of historically rooted conflicts such as Russia-Ukraine and Israel-Palestine.
- Now the nuclear ambitions of North Korea are posing security challenges to the international community.
- Also Russia and China are gaining from North Korea by creating a distraction for the U.S. by opening a "third front".

Way ahead

- There is a growing concern among the international community that the tensions between North and South Korea may be heading towards conflict.
- Hence to ensure the global security interest and peace in the region denuclearisation of North Korea is necessary along with ending the US hostile Policy towards it.

India-Republic of Korea Bilateral (ROK) Relations

– Diplomatic relations: They established diplomatic relations in 1973.

A. Both countries formed a "Strategic Partnership"in 2010, which was elevated to "Special Strategic Partnership" in 2015.

– Economic Relations: Trade and economic relations gathered momentum following the implementation of CEPA in 2010.

A. India and ROK launched an initiative 'Korea Plus' to promote and facilitate Korean investments in India.

B. Bilateral trade in 2022 reached record levels of US$ 27.8 billion. India's import volume stands at US$ 18.8 billion, while the export volume is US$ 9 billion.

– Defense Relations: The Defence Ministers of ROK and India have been interacting regularly since 2015.

A. Service level talks across the three arms of the military are held annually

B. A Roadmap for Defence Industries Cooperation was signed between the two countries in 2019.

– Indian Community: The total number of Indian nationals living in ROK is estimated to be around 15,000.

a. During the past few years, many professionals mainly in the areas of IT, shipping and automobile have come to ROK.

India-UA E: Bilateral Investment Treaty

Syllabus: GS2/International Relations

Context:

- Recently, the Union Cabinet approved the signing and ratification of a Bilateral Investment Treaty (BIT) with the United Arab Emirates (UAE) to significantly boost bilateral economic engagement, including Foreign Direct Investment (FDI).

About the Bilateral Investment Treaty (BIT):

- It is an agreement between two countries that sets the terms and conditions for private investment by nationals and companies of one state in another.
- It is a part of the International Investment Agreements (IIAs) under the United Nations Conference on

Trade and Development (UNCTAD).

- It is expected to improve investor confidence, increase foreign investments and overseas direct investment opportunities, and have a positive impact on employment generation.

India and BIT

- India has been actively negotiating Bilateral Investment Treaties (BITs) with various countries to boost foreign direct investment (FDI).
- India's Position on BITs: Recent Interim Budget highlighted that India is negotiating BITs with trade

partners to boost FDI inflow.

- It emphasised that these negotiations are being conducted from a position of strength.
- India's Model BIT: India adopted the model BIT in 2016.
- The objective is to provide appropriate protection to foreign investors in India and Indian investors in the foreign country, while maintaining a balance between the investor's rights and the Government obligations.
- India's Economic Integration with Western Nations: India is pursuing economic integration with western nations such as the United Kingdom (UK) and the European Union through Free Trade Agreements and investment treaties.

Significances of BITs

- Investor Confidence: BITs can boost the confidence of investors by providing a level playing field and non- discrimination in all matters.
- They provide an independent forum for dispute settlement by arbitration.
- Foreign Direct Investment (FDI): BITs can help increase the inflow of FDI.
- For example, India is negotiating BITs with trade partners to improve its ease of enforcing contracts, which is currently a hurdle for FDI inflows.
- The FDI inflow during 2014-23 was $596 billion.
- Economic Growth: By attracting foreign investment, BITs can contribute to economic growth and employment generation in the host country.
- Legal Protection: BITs offer legal protection to investors, which can be particularly important for investments in countries where the domestic legal framework is unpredictable or unstable.
- BITs impose obligations under international law on host states to protect foreign investment from the other state.

Challenges associated with the BITs

- Unequal Distribution of Rights and Obligations: BITs often create an unequal distribution of rights and obligations between developed countries, which are the source of most foreign direct investment, and developing countries, which are mainly recipients.
- Risk of Litigation: BITs lead to an increased risk of litigation. Some developing countries have been sentenced by international arbitral tribunals to pay millions of dollars as a result of alleged violations to these treaties.
- Ambiguous Legal Standards: Most of these awards are based on expansive interpretations of ambiguous legal standards and concepts such as 'fair and equitable treatment' and 'indirect expropriation'.
- Limitations in Addressing Issues: BITs can't address every problem that companies face abroad.
- For example, American companies in China face challenges in protecting and enforcing their intellectual property rights (IPR).
- Loss of Policy Space: BITs can lead to a loss of policy space for the host country, limiting its ability to regulate in the public interest.
- Treaty Shopping: Investors might take advantage of the most favourable nation clause in BITs to sue a host country under a treaty to which it is not a party.

Conclusion and Way Forward

- Current trends in the world economy and global politics provide evidence that the global south is at 'normal capitalism', bringing with it new patterns of uneven development, inequality, and injustice.

- They are seen as a tool to boost the confidence of investors by assuring a level playing field and non-discrimination in all matters while providing for an independent forum for dispute settlement by arbitration.
- However, the negotiation and implementation of BITs can be complex and require careful balancing of interests.
- The challenges need for careful negotiation and implementation of BITs, balancing the interests of both the investing and host countries.

India-U.S. Nuclear Cooperation

Syllabus: GS2/India & Major Power Relations

In News

- The U.S. Assistant Secretary of State for Energy Resources recently said, India-U.S. nuclear cooperation envisaged under the nuclear deal two decades ago is "an important piece of unfinished business".

More about the News

- Speaking on clean energy and climate change, he stressed on getting away from Chinese domination of clean technology supply chains.
- He also emphasises using India's capacities in manufacturing and labour costs to build up a real alternative supply chain.

India-U.S. Nuclear Cooperation History and Milestones:

- 1974: India conducts its first nuclear test, leading to U.S. sanctions and limited cooperation.
- 2005: The landmark U.S.-India Civil Nuclear Agreement is signed, paving the way for civil nuclear trade and cooperation.
- 2008: The U.S. Congress approves the agreement, allowing nuclear fuel and technology transfers to India.
- 2010: The first U.S.-built nuclear power plant in India begins construction in Kudankulam.
- 2015: The Westinghouse Electric Company signs an agreement to build six nuclear reactors in India in Kovvada, Andhra Pradesh.

The U.S.-India Civil Nuclear Agreement

- The U.S.-India Civil Nuclear Agreement, also known as the 123 Agreement, is a landmark agreement signed in 2005 that marked a significant shift in the nuclear relationship between the two countries.

Key Provisions:

- Separation of Programs: India agreed to separate its civilian and military nuclear facilities, placing civilian facilities under International Atomic Energy Agency (IAEA) safeguards.
- Nuclear Trade: The agreement allowed the U.S. to supply nuclear fuel and technology to India for its civilian nuclear program.
- Non-proliferation Commitments: India reaffirmed its commitment to non-proliferation and agreed to additional safeguards against transferring sensitive nuclear technology or materials.

Expected benefits for India:

- Energy Security: Reduced dependence on fossil fuels for electricity generation, which is crucial for a growing economy. Cleaner energy source with lower greenhouse gas emissions.
- Economic Growth: Creation of jobs in the nuclear power sector, potential for attracting investments and technology transfers.
- Strategic Partnership: Stronger relationship with the U.S., with implications for regional security and global non-proliferation efforts.
- Access to Advanced Technology: Acquisition of modern nuclear reactors and fuel, promoting technological advancements and improved safety standards.
- Environmental protection: Reduced reliance on coal-fired power plants, contributing to lower air pollution and greenhouse gas emissions.
- Regional stability: Cooperation on nuclear energy could foster trust and collaboration between India and neighboring countries.
- Global leadership: Demonstrating responsible nuclear cooperation could set a positive example for other countries.

Current Status:

- Even after eight years of announcing that the nuclear deal was done in 2015, there is still no techno- commercial offer.
- The progress has been slower than initially expected due to various Challenges.
- Domestic challenges in India: Complex regulatory procedures, limited infrastructure, and liability concerns.
- Geopolitical considerations: Evolving global nuclear landscape and concerns about technology transfer.
- U.S. domestic politics: Concerns about non-proliferation and Congressional approval processes.

Measures/Suggestions:

- India and the U.S. needs to make fresh efforts for practical cooperation in the civil nuclear energy sector.
- Also, India needs to revise laws to enable private companies to participate in the civil nuclear sector.
- Further, there is a "shared interest" to move forward, both on the large traditional reactors which were foreseen as part of the nuclear deal and also on Small and Modular Reactor (SMR) technology.

Way Ahead:

- Despite the challenges, both countries remain committed to the agreement and continue to work towards expanding cooperation.
- The success of the agreement will depend on addressing outstanding challenges and building mutual trust to unlock its full potential.

Quadrilateral Security Dialogue (Quad)

Syllabus: GS2/International Relations

Context

- Recently, American envoy Garcetti said that the Quad summit is more likely after the U.S. Elections.

About the Quadrilateral Security Dialogue (Quad)

- It is an informal strategic forum comprising the United States, India, Australia, and Japan.
- The core objective of the Quad is to secure a rules-based global order, freedom of navigation, and a liberal trading system, along with to work for a free, open, prosperous, and inclusive Indo-Pacific region.
- It is seen as to reduce Chinese domination in the Indo- Pacific region.
- The Quad leaders held their first formal summit in 2021.
- US Ambassador to India Eric Garcetti informed that the Quad can be the 'model for the world' as it is 'very strong and stable'.

Enhanced Surveillance of the Indo-Myanmar Border (Border Management)

Syllabus: GS3/Internal Security

In Context

- The government has decided to construct a fence along the entire 1643-kilometer-long Indo-Myanmar border to facilitate better surveillance.

About

- Two pilot projects of fencing through a Hybrid Surveillance System (HSS) are under execution.
- The fencing will be completed in the next four-and-half years. Anyone coming through will have to get a visa.

Free Movement Regime

- The FMR is a mutually agreed arrangement between the two countries that allows tribes living along the border to travel up to 16 km inside the other country without a visa.
- Under the FMR, every member of the hill tribes, who is either a citizen of India or a citizen of Myanmar and who is resident of any area within 16 km on either side of the border can cross over on production of a border pass with one-year validity and can stay up to two weeks.

Brief on India- Myanmar Relations

– Location: India shares a long land border of over 1643 kms with Myanmar as well as a maritime boundary in the Bay of Bengal.

a. Four northeastern states, viz., Arunachal Pradesh, Nagaland, Manipur and Mizoram, have a boundary with Myanmar.

– Diplomatic Relations: Diplomatic relations between India and Myanmar have generally been friendly, with high-level visits and engagements strengthening ties at the governmental level.

a. India and Myanmar signed a Treaty of Friendship in 1951.

– Historical and Cultural Ties: Both Nations share deep historical and cultural connections, with influences from Buddhism, Hinduism, and trade routes shaping their interactions over millennia.

– Geopolitical Significance: Myanmar holds significant geopolitical importance for India due to its strategic location, acting as a bridge between South Asia and Southeast Asia.

a. India is seeking to enhance its cooperation with Myanmar in line with our 'Act East' and 'Neighborhood First' Policies.

– Economic Cooperation: Economic cooperation between the two nations has been steadily growing since the trade agreement in 1970, with India being one of Myanmar's largest trading partners.

a. The bilateral trade stood at US$ 1.03 billion in 2021-22. Bilateral trade is conducted under ASEAN-India Trade in Goods Agreement (AITIGA) and India's DutyFree Tariff Preference (DFTP) scheme.

– Security Cooperation: Both countries share concerns over border security, insurgency, and cross-border trafficking. They have cooperated on security issues, including intelligence sharing and joint patrolling along the border.

– Connectivity Projects: India is involved in various connectivity projects aimed at improving infrastructure and connectivity between the two countries.

a. The Kaladan Multi-Modal Transit Transport Project and the India-Myanmar-Thailand Trilateral Highway are notable examples.

– Development Assistance: India has been providing development assistance to Myanmar in various sectors, including infrastructure, healthcare, education, and capacity building.

Borders in India

- India currently has more than 15000 km of land borders and more than 7500 km of maritime borders.
- It shares borders with seven countries including
- Afghanistan, Pakistan, China, Nepal, Bhutan, Bangladesh and Myanmar.

Border Management in India

- Border guarding responsibility initially was with the state forces post-independence, however, the same was found inadequate to handle the challenges and threats.
- Central armed police forces (CAPFs) were raised under the Ministry of Home Affairs (MHA) and were tasked to guard the borders under the control of the ministry.

Pakistan & Bangladesh	BSF (Border Security Forces)
China	ITBP (Indo Tibetan Border Police)
Nepal & Bhutan	SSB (Sasashtra Seema Bal)
Myanmar	Assam Rifles (AR)

- In case of active hostilities, the Army is given the responsibility to man the borders.
- Need for Border Management
- India- Pakistan Border: The border with Pakistan has been a problematic one since India's independence.
- Despite the accession of Jammu and Kashmir (J&K) to India as per the Indian Independence Act of 1947, Pakistan fought four conventional wars with India namely in 1947-48, 1965, 1971 and 1999.
- It has also been engaged in a proxy war as well both in the state of J&K and Punjab.
- The border is active in the form of LC where the Army has been deployed in addition to the BSF.
- India-China Border: India has disputed borders with China in Ladakh, Middle Sector, and in Arunachal Pradesh. Despite many levels of talks, very little progress has been made to resolve the dispute.
- India-Bangladesh Border: The relations between India and Bangladesh have been moving up and down based on the government in power.
- The current relations with Bangladesh are good but Pakistani efforts to create a religious divide, Chinese inroads and presence of inimical elements have made the peace process prone to disruption.
- India-Bhutan Border: India is responsible for the defence of Bhutan and therefore responds to Chinese aggression even in Bhutan which happened in Doklam in 2017.
- The Chinese threat manifesting through Bhutan always remains which rises the need to secure this border.
- India-Nepal Border: Due to close relations between India and Nepal, Nepalese working in the Indian Army as soldiers and porous border management remains a challenge.
- Several Chinese activities in terms of infrastructure development and language centers have come up in Southern Nepal close to Indian borders.
- Pakistan's ISI is also using the porous nature of this border to infiltrate militants for anti-national activities in India.
- India-Myanmar Border: India and Myanmar share a large land boundary with the northern end bordering China and the southern end bordering Bangladesh.
- The border remains porous as local communities are divided into both sides of the border.
- The current arrangement also allows insurgents to have camps in the dense jungles of Myanmar across the border.
- There are a large number of refugees moving into the northeastern (NE) states, primarily in Manipur.

Challenges In Managing the Borders

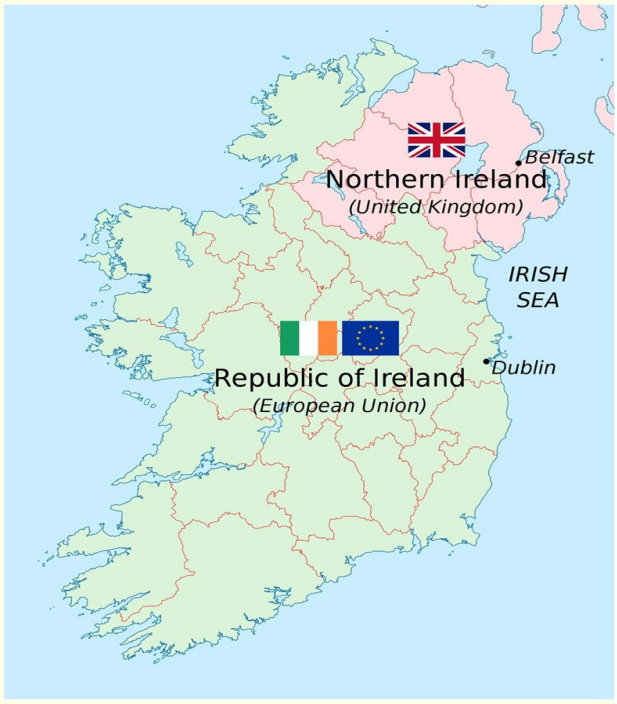
- Length and Diversity: India shares borders with multiple countries totaling thousands of kilometers.
- Each of these borders has unique geographical features, ranging from mountains to rivers and plains, making effective monitoring and control challenging.
- Porosity of Borders: Many parts of India's borders are porous, allowing illegal crossings of people, goods, and contraband such as drugs and weapons.
- The difficult terrain, along with dense forests and riverine areas, facilitate such activities, posing a significant challenge to border security forces.
- Cross-Border Terrorism: India faces threats of cross-border terrorism, particularly from Pakistan-based militant groups operating in Jammu and Kashmir.
- These groups exploit the porous borders to infiltrate into Indian territory and carry out attacks, leading to security concerns and tensions between the two countries.
- Transnational Crime: Transnational criminal activities, including smuggling of narcotics, arms, and counterfeit currency, thrive along India's borders.
- Ethnic and Tribal Dynamics: India's border regions are often inhabited by diverse ethnic & tribal communities with historical, cultural, and social ties across borders.
- Managing these communities' aspirations, addressing their grievances, and preventing their exploitation by external forces require nuanced approaches to border management.
- Dispute over Borders: India has unresolved border disputes with neighboring countries, most notably with China and Pakistan.
- These disputes lead to occasional tensions & confrontations, necessitating constant vigilance and diplomatic efforts to maintain peace and stability along the borders.
- Infrastructure Development: Many border areas in India lack basic infrastructure such as roads, communication networks, and border outposts, hampering the effectiveness of border management efforts.
- Developing infrastructure in these remote and often inhospitable regions is crucial for enhancing surveillance capabilities and response mechanisms.
- Humanitarian Concerns: India shares borders with countries experiencing political instability, humanitarian crises, and refugee influxes.
- Managing such situations while upholding humanitarian principles and international obligations poses additional challenges for border management authorities.

Conclusion

- Addressing these challenges requires a multi-pronged approach involving robust border surveillance and security measures, enhanced cooperation with neighboring countries, diplomatic initiatives to resolve disputes, development of border infrastructure, and engagement with local communities to address their concerns and aspirations.

Northern Ireland Conflict

Syllabus: GS2/International



Context

- Recently Michelle O'Neill, a pro-Irish unity politician became the first Nationalist First Minister of Northern Ireland, with the end of a two-year long political deadlock.

Background

- Northern Ireland was created in 1921 by partitioning Ireland, and consists of the six northeastern counties (territorial division) of the island.
- In 1922, the rest of Ireland gained independence from the British (today's Republic of Ireland, with its capital in Dublin).
- Northern Ireland remained with the United Kingdom, but tensions simmered between the side which were loyal to the Crown, mostly Protestants, and the other side which wanted to join the Republic of Ireland, mostly Catholics.
- Today, the side loyal to the British Union are called Unionists, while those who support a united and free Ireland are called Nationalists.

Conflict in Northern Ireland

- By the end of the 1960s, a bloody conflict was raging in Northern Ireland among those who wished to remain with the UK and those who wanted to join Ireland.
- The British Army and the police, frequently accused of excesses, worsened the violence.
- Finally, in 1998, the Good Friday Agreement was signed to end the bloodshed.

What is the Good Friday Agreement?

- The Good Friday Agreement is a unique peace treaty signed to end the 30-year-old civil war in Northern Ireland.
- The treaty had three main aspects;
- The Northern Ireland government would be formed on the sovereign wishes of both Republicans and the Unionists and that they would share governance equally; the people of Northern Ireland could seek reunification with Ireland any time subject to a referendum; and
- The citizens of Northern Ireland can seek Irish or British nationality or both.

- It also abolished border checks and encouraged the freedom of movement of people across the U.K. and Ireland.

Collapse of parliament in 2022

- After Brexit Northern Ireland now shared a land border with an EU member, the Republic of Ireland.
- Now border checks were introduced between Great Britain (England, Scotland, and Wales) and Northern Ireland instead of Northern Ireland to Ireland.
- This system angered the Unionists, who believed it undermined Northern Ireland's position with the UK. Hence the leader of Democratic Unionist Party (DUP), refused to allow government formation after Northern Ireland went to polls in May 2022.
- Now, a new deal has been reached, published as a command paper called 'Safeguarding the Union' by the UK government.

Good Friday Agreement

Syllabus: GS2/International Relations

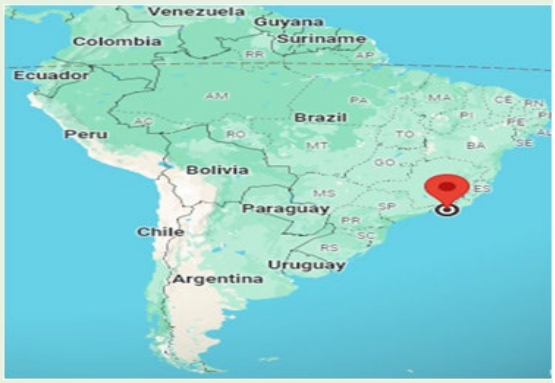
Context

- Recently, the US President was in Belfast to mark 25 years of the Good Friday Agreement, the deal that ended 3 decades of bloodshed.

About Good Friday Agreement

- It was signed on April 10, 1998 at Belfast, the capital city and principal port of Northern Ireland, which was a significant milestone in the history of Ireland.
- It is also known as the Belfast Agreement.
- It ended more than three decades of bloody conflict, known as the 'Troubles'.
- The agreement had two parts:
- A 'multi-party agreement' between Northern Ireland's major parties, and;
- An agreement between the governments of the UK and the Republic of Ireland.
- The economic integration and soft borders between the two Irelands were one of the key aspects.
- The agreement legitimised the demands of both sides:
- The majority in Northern Ireland wanted to remain a part of the UK and;
- A substantial minority in Northern Ireland as well as the majority in the rest of the island, wanted a 'United Ireland'.

Rio De Janeiro



Syllabus: GS3/ Places in News

In News

- Rio De Janeiro Declared a Dengue Health Emergency

About Rio De Janeiro

- Rio de Janeiro is a city in Brazil and it is shaped by interaction with mountains and sea.
- It lies in the narrow strip of alluvial plain between Guanabara Bay and the Atlantic Ocean.
- It is widely recognized as one of the world's most beautiful and interesting urban centres.

Brazil

- Brazil is a country in South America and It is the fifth largest country in the world.
- It borders every South American country except Chile and Ecuador. To the north, it shares a boundary with Colombia, Venezuela, Guyana, Suriname, and French Guiana. To the northwest, it meets Peru and Bolivia, to the west Argentina and Paraguay, to the southwest Uruguay, and to the south it is bounded by the Atlantic Ocean.

Iran

- Iran announced visa-free travel for Indians and citizens of several other nations for a maximum stay of 15 days.

About Iran

- Iran is a mountainous, arid, and ethnically diverse country of southwestern Asia.
- The capital is Tehrān
- Iran is bounded to the north by Azerbaijan, Armenia, Turkmenistan, and the Caspian Sea, to the east by Pakistan and Afghanistan, to the

south by the Persian Gulf and the Gulf of Oman, and to the west by Türkiye and Iraq.

- Mountains: Elburz Mountains and Zagros Mountains
- Iran's highest point, Mt. Damavand
- River : Karun
- Lake : Urmia

Indians who faced death row in Qatar return home

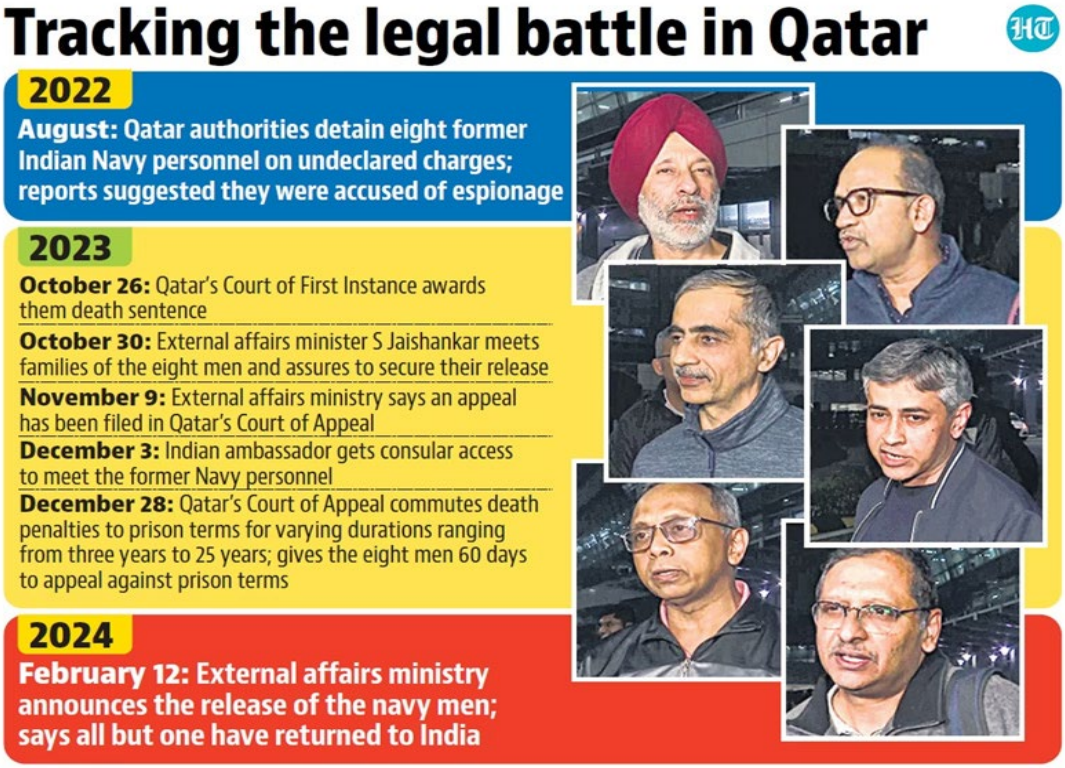
☛ **Syllabus: GS2/ International Relations**

Context

- The release of eight Indian Navy veterans from Qatari custody marks a significant diplomatic achievement and is a good achievement of India's foreign policy.
- The episode shows how deep and broad bilateral ties have become.

Background

- The Indian nationals were arrested by the Qatar intelligence agency in August 2022, on allegations of espionage.
- Qatar's Court of First Instance handed over death sentences to them on October 26, 2023 which came as a surprise for the Indian government.



- As the Ministry of External Affairs launched extensive diplomatic efforts, the Court of Appeal on December 28, 2023 reduced the capital punishment to jail terms for varying durations to each of eight Navy veterans.

India-Qatar Relations

- India and Qatar share a long and multifaceted relationship characterized by strong economic, political, cultural, and social ties.

Historical ties:

- India was among the few countries which recognized Qatar soon after its independence in 1971 and also established diplomatic relations in 1973.
- Year 2023, marks the 50 years of bilateral diplomatic relations.
- Regular high-level visits and exchanges between leaders strengthen engagement.

Economic relations:

- Largest trading partner: Qatar is India's largest trading partner in the Middle East.
- Energy trade: India imports a significant portion of its Liquefied Natural Gas (LNG) from Qatar.
- Investments: Both countries have significant investments in each other's economies.
- Joint ventures: Collaboration in various sectors like infrastructure, healthcare, and IT.

Political relations:

- Strategic partnership based on shared interests in regional security and stability.
- Support for each other's candidatures/policies in international organizations.
- Qatar was a co-sponsor of India's resolution for declaration of June 21 as International Yoga Day.

Defence relations:

- Cooperation on counter-terrorism and maritime security.
- India and Qatar have signed a Defence Cooperation Agreement and also hold Exercise Zair-Al-Bahr.

Cultural relations:

- Large Indian expatriate community in Qatar (around 8 lakh sending remittances worth$ 750 million) contributes to cultural vibrancy.
- Cultural events organised by community organizations affiliated to the Indian Cultural Centre (ICC).
- Growing popularity of yoga and Indian cinema in Qatar.

Challenges

- Trade imbalance in favor of Qatar due to energy imports.
- Need for diversification of trade beyond energy.
- Geopolitical complexities in the region can impact relations.
- Religious issue: The remarks made by the Indian politicians about the Prophet led to adverse reactions from Qatar in the past.

Way Ahead

- Both countries see immense potential for further strengthening their strategic partnership.
- Focus on expanding cooperation in areas like renewable energy, education, and technology.
- Regular dialogue and collaboration are crucial to address challenges and navigate regional complexities.

Revival of Weimar Triangle

Syllabus:GS2/International Relations

Context

- The Foreign Ministers of Poland, France and Germany have discussed reviving the Weimar Triangle in a meeting in Paris.

About

- France, Germany and Poland would unveil a new cooperation agreement to combat foreign disinformation operations.
- The ministers discussed creating a joint mechanism to detect and respond to potential Russian internet attacks.
- The Statements came after Former U.S. President Donald Trump appeared to invite Russia to invade NATO members that do not meet their defense spending obligations.

Weimar Triangle

- The "Weimar Triangle" is a regional alliance of France, Germany, and Poland created in 1991 in the German city of Weimar.
- The group is intended to promote cooperation between the three countries in cross-border and European issues.
- It also aimed at assisting Poland's emergence from Communist rule.

North Atlantic Treaty Organization (NATO)

– NATO, also called the North Atlantic Alliance, is an intergovernmental military alliance.
– Headquarters: Brussels, Belgium
– Background: It was established by 12 countries from Europe and North America with the signing of the North Atlantic Treaty (also known as Washington Treaty) in 1949 in Washington, D.C

A. The objective was to provide collective security against the Soviet Union attack in the aftermath of World War II.

– Collective Defense: According to Article 5, NATO works on the principle of collective defense, where an attack on any NATO member is considered an attack on all NATO members.

A. So far, Article 5 has been invoked once – in response to the 9/11 terrorist attacks in the United States in 2001.

– Members: It comprises 31 member states – two North American countries (USA and Canada) and 28 European countries and one eurasian country (Turkey).

A. Finland became the 31st member in 2023.

– Criteria for Membership of NATO:

A. Under NATO's "open door policy" based on Article 10, membership at present is open to only European nations.
B. These countries must fulfill certain criterias such as "a functioning democracy based on a market economy; fair treatment of minorities; a commitment to resolve conflicts peacefully; and making military contribution to NATO operations.
C. New members are admitted with the unanimous consent of all members.

RuPay, UPI rolled out in Mauritius, Sri Lanka

Syllabus: GS2/India and its Neighbourhood Relations

Context:

- RuPay cards and UPI connectivity between India and Mauritius, as well as UPI connectivity between India and Sri Lanka were established recently.

About

- These projects had been developed and executed by NPCI International Payments Ltd (NIPL) along with partner banks / non-banks from Mauritius and Sri Lanka, under the guidance and support of the RBI.

- It is to deepen financial integration and to facilitate digital payments among citizens of the three countries, the Reserve Bank of India (RBI) said.

Implications

- An Indian traveller to Mauritius will now be able to pay a merchant in Mauritius using UPI.
- Similarly, a Mauritian traveller will be able to pay a merchant in India using the Instant Payment System (IPS) app of Mauritius.
- Further, with the adoption of RuPay technology, the MauCAS card scheme of Mauritius will enable banks in Mauritius to issue RuPay cards domestically.
- Such cards can be used at ATMs and PoS terminals locally in Mauritius as well as in India.
- With this, Mauritius becomes the first country outside Asia to issue cards using RuPay technology.
- Indian RuPay cards would also be accepted at ATMs and PoS terminals in Mauritius.
- The digital payments connectivity with Sri Lanka will enable Indian travelers to make QR code-based payments at merchant locations in Sri Lanka using their UPI apps.

About RuPay

- RuPay is the first-of-its-kind global Card payment network of India, with wide acceptance at ATMs, POS devices and e-commerce websites across India.
- The name, derived from the words 'Rupee and 'Payment', emphasizes that it is India's very own initiative for Card payments.
- RuPay fulfils RBI's vision of initiating a 'less cash' economy and NPCI recognises the need for tech-driven innovations in the retail payments system to drive operational efficiencies among a larger Indian audience.
- RuPay is a product of National Payments Corporation of India (NPCI), the umbrella organisation that powers retail payments in the country.
- The provision under the Payment and Settlement Systems Act, 2007, empowered the Reserve Bank of India (RBI) and Indian Banks' Association (IBA) to create a secure electronic payment and settlement system in India.
- NPCI is an initiative of RBI and the Indian Banks' Association (IBA) under the provisions of the Payment and Settlement Systems Act, 2007. It has been incorporated as a "Not for Profit" Company under the provisions of Section 25 of Companies Act 1956 (now Section 8 of Companies Act 2013).

About Unified Payments Interface (UPI)

- UPI is a system that powers multiple bank accounts into a single mobile application (of any participating bank), merging several banking features, seamless fund routing & merchant payments into one hood.

- It also caters to the "Peer to Peer" collect request which can be scheduled and paid as per requirement and convenience.

☛ UPI - Benefits to the Ecosystem participants

Banks

- Single click Two Factor authentication
- Universal Application for transaction
- Leveraging existing infrastructure
- Safer, Secured & innovative
- Safer, Secured & innovative
- Payment basis Single/ Unique identifier
- Enable seamless merchant transactions

Customer

- Round the clock availability
- Single Application for accessing different bank accounts
- Use of Virtual ID is more secure, no credential sharing
- Single click authentication
- Raise Complaint from Mobile directly

Merchants

- Seamless found collection from customers - single identifiers
- No risk of storing customer's virtual address like in cards
- Tap customers not having credit/debit cards
- Suitable for e-Com & m-Com transaction
- Resolves the COD collection problem
- Single click 2FA facility to the customer - seamless pull

NATO Funding

Syllabus :GS 2/IR

In News

- Former US President Donald Trump accused NATO allies of not spending enough on defence.

About NATO

- The foundations of NATO were officially laid down in 1949 to counter the Soviet Union with Cold War tensions rising with the signing of the North Atlantic Treaty, more popularly known as the Washington Treaty.

Member Countries

- NATO currently has 31 members – most of them European nations, plus the United States and Canada.
- The newest member is Finland, which joined in 2023 in reaction to Russia's 2022 invasion of Ukraine.
- Sweden applied to join along with Finland but is waiting for Hungary to ratify its application as the final major step before membership.

Funding

- NATO is resourced through the direct and indirect contributions of its members.
- NATO's common funds are composed of direct contributions to collective budgets and programmes, which equate to only 0.3% of total Allied defence spending
- In 2006, NATO Defence Ministers agreed to commit a minimum of 2% of their Gross Domestic Product (GDP) to defence spending to continue to ensure the Alliance's military readiness.

Mandate :

- NATO's purpose is to guarantee the freedom and security of its members through political and military means.
- Political : NATO promotes democratic values and enables members to consult and cooperate on defence and security-related issues to solve problems, build trust and, in the long run, prevent conflict.
- Military : NATO is committed to the peaceful resolution of disputes.
- If diplomatic efforts fail, it has the military power to undertake crisis-management operations. These are carried out under the collective defence clause of NATO's founding treaty – Article 5 of the Washington Treaty or under a United Nations mandate, alone or in cooperation with other countries and international organisations.

- Enshrined in Article 5 of its founding treaty is the principle of collective defence – the idea that an attack on one member is considered an attack on all of them.

Do you know ?

- "NATO plus" refers to a security arrangement of NATO and the five treaty allies of the U.S. — Australia, New Zealand, Japan, Israel, and South Korea as members — to enhance "global defence cooperation" .

China's Model Villages Along LAC

Syllabus: GS2/India and its Neighbourhood Relations

Context:

- Chinese nationals have started occupying several of their model "Xiaokang" border defence villages across India's north-eastern borders which the country has been building along the Line of Actual Control (LAC) since 2019.

About:

- The Chinese have started occupying a couple of these villages built on its side of the LAC across from Lohit Valley and the Tawang sector of Arunachal Pradesh.
- China has been constructing 628 such "well-off villages" along India's borders with the Tibet Autonomous Region, including Ladakh and Arunachal Pradesh for over five years now.
- While the exact nature of these villages is unclear, the dwellings are understood to be "dual-use infrastructure" — for both civil and military purposes.

India's response:

- Border infrastructure: In the last three to four years, India has also stepped up work on its border infrastructure — this includes improving forward connectivity, constructing alternate routes to the LAC as well as connecting them.
- Work is also underway to improve connectivity to the passes, establish laterals for inter-valley connectivity and on construction of helipads and advanced landing grounds at various locations.
- Vibrant Villages programme: India plans to develop 663 border villages into modern villages with all amenities in the first phase.
- Of them, at least 17 such villages along the borders with China in Ladakh, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh, have been selected for development as a pilot project under the programme.
- Highways: In Arunachal Pradesh, three major highways are at different stages of

construction: the Trans-Arunachal Highway; the Frontier Highway; and the East-West Industrial Corridor Highway.

Line of Actual Control (LAC)

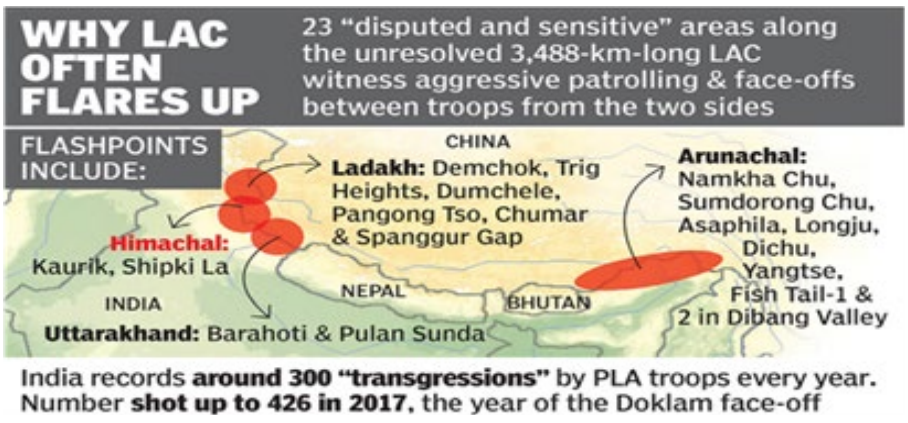
- LAC refers to the disputed border between India and China, spanning approximately 3,488 kilometers.

History:

- The precise alignment of the LAC is undefined and contested in several sectors, particularly in eastern Ladakh (Aksai Chin), Arunachal Pradesh, and western Uttarakhand.
- Historical treaties and agreements, like the McMahon Line, are disputed by China, leading to border clashes and standoffs.
- Territorial disputes escalated into major conflicts like the 1962 war, highlighting the historical complexities.

Current Status:

- Since 2020, tensions have risen in eastern Ladakh with standoffs and military deployments by both sides.
- The 2020 Galwan Valley clash has resulted in casualties on both sides and heightened tensions.
- Efforts are ongoing through diplomatic channels and military meetings to disengage and de-escalate the situation.
- Infrastructure development by both sides near the LAC further complicates the situation.



Challenges:

- Lack of a clearly defined LAC makes territorial claims ambiguous and prone to misinterpretations.
- Historical mistrust and differing geopolitical perspectives hinder reaching a mutually agreeable solution.
- Increased military presence and infrastructure development near the LAC raise concerns about potential escalation.

Measures/Suggestions:

- Diplomacy and dialogue: Prioritize peaceful resolution through sustained diplomatic engagement and dialogue with China.

- Military preparedness: Maintain strong military presence along the LAC to deter any misadventures.
- Infrastructure development: Enhance infrastructure in border areas for better connectivity and logistical support.
- International support: Build consensus and seek international support for India's position on the LAC issue.
- Domestic consensus: Maintain a united national perspective and build domestic consensus on border issues.

Way Ahead:

- India-China border dispute requires sustained efforts from both sides to address the challenges and build mutual trust and understanding.
- The LAC issue is complex and multifaceted, with historical, political, economic, and strategic dimensions.
- There is no easy solution, and a multi-pronged approach is necessary to address the challenges.

Schengen Zone

Syllabus: GS2/International Relations

Context:

- Recently, Kosovo secured visa-free access to the Schengen zone, facing opposition due to its declaration of independence from Serbia.

About the Schengen Zone:

- It's an area in the European Union without internal borders, allowing for the free and unrestricted movement of people.
- It allows for passport-free travel, work and living in an EU country without special formalities between countries that fall within the European zone.
- The Schengen Agreement was signed in 1985 at a Schengen village in Luxembourg (bordering France and Germany).
- The Schengen Zone covers most of the EU countries, except Cyprus and Ireland, and it includes few non-EU countries like Norway, Iceland, Switzerland, and Liechtenstein.

India and the Schengen Visa:

- Indian passport holders can stay in the Schengen area for up to 90 days within any 180-day period.

Cybersecurity in India

Syllabus: GS3/Internal Security

In Context

- An Indian parliamentary house panel has asked the government to strengthen the cyber security of central and state government websites after it was revealed that 373 websites were hacked between January 2018 and September 2023.

About

- The committee also pointed out that some government offices were using outdated software on laptops and computers, which made them vulnerable to cyber-attacks.
- The Committee emphasised on the adherence to the guidelines and recommended the Ministry to update entire government infrastructure regarding handling of cyber threats.

What is a Cyberattack?

- A cyber attack refers to any deliberate, malicious attempt to breach the security measures of a computer system, network, or device, with the intent to disrupt, steal, alter, or destroy data, information, or infrastructure.
- These attacks can target individuals, organizations, governments, or even entire nations.

Cyberattacks in India

- A report by Microsoft in 2023 revealed that India was amongst the world's major targets of cyber attacks by nation-state actors.
- India accounts for 13 percent of cyber-attacks in the Asia-Pacific (APAC) region, making it one of the top three most attacked countries by nation-state actors.
- State-sponsored cyber attacks against India increased by 278% between 2021 and September 2023.
- During this period, targeted cyber attacks on government agencies went up by 460%.

India's Cybersecurity Concerns

- Cyber Attacks on Critical Infrastructure: Critical infrastructure sectors such as power, transportation, finance, and healthcare are increasingly digitized, making them vulnerable to cyber attacks.

- In 2022, five servers of the All India Institute of Medical Sciences (AIIMS) had been hacked by ransomware.
- An estimated 1.3 terabytes of data was encrypted. The hackers had made it impossible for AIIMS to access its own data.
- Financial Cybercrime: With the rapid expansion of digital banking and e-commerce, financial institutions and consumers are at risk of various cyber threats, including online banking fraud, phishing scams, ransomware attacks, and payment card fraud.
- Cyber Espionage and State-Sponsored Attacks: India is a prime target for cyber espionage by state-sponsored actors seeking to steal sensitive government, military, or corporate information.
- Such attacks can compromise national security, economic competitiveness, and diplomatic relations.
- Cyber Terrorism and Radicalization: Extremist groups and terrorists exploit online platforms for propaganda, recruitment, and coordination of attacks.
- India faces the challenge of countering cyber radicalization while ensuring the protection of free speech and civil liberties.
- Emerging Technologies: The adoption of emerging technologies such as Internet of Things (IoT), artificial intelligence (AI), and cloud computing introduces new cybersecurity risks.
- Cybersecurity Skills Gap and Capacity Building: India grapples with a shortage of skilled cybersecurity professionals and a lack of awareness among users and organizations about best practices for cyber hygiene and risk management.
- Experts have also pointed to the need for job creation in the cybersecurity industry.
- Regulatory Compliance and Enforcement: While India has enacted cybersecurity laws and regulations, enforcement and compliance remain challenging.
- While digitisation has accelerated the need for cybersecurity, India's cybersecurity regulations are weak and inadequate.
- Infrastructural Gap: India struggles, despite a digitally forward government and the world's largest IT- enabled service sectors.
- The powerful tech force lacks critical infrastructure and weak cybersecurity regulation.

Government Initiatives

- National Cyber Security Policy (NCSP): It was introduced in 2013 to provide a framework for addressing cybersecurity challenges and ensuring a safe and secure cyberspace for citizens, businesses, and government entities.
- It outlines strategies for capacity building, cooperation with stakeholders, and protection of critical information infrastructure.
- Indian Cybercrime Coordination Centre (I4C): It was established by MHA to provide a framework and eco-system for Law Enforcement Agencies (LEAs) for dealing with Cybercrime in a coordinated and comprehensive manner.

- Indian Computer Emergency Response Team (CERT-In): CERT-In is the national nodal agency responsible for coordinating responses to cybersecurity incidents, providing early warning and advisories, and promoting cybersecurity awareness and capacity building initiatives across various sectors.
- Cyber Swachhta Kendra (Botnet Cleaning and Malware Analysis Centre): Launched by CERT-In, the Cyber Swachhta Kendra aims to detect and remove botnets and malware infections from computers and devices across the country.
- It provides free tools and services to users for securing their systems against cyber threats.
- National Cyber Crime Reporting Portal (Cybercrime.gov.in): The government launched this portal to enable citizens to report cybercrimes online and seek assistance from law enforcement agencies.
- Information Security Education and Awareness (ISEA) Project: The ISEA project focuses on promoting cybersecurity awareness and education initiatives among various stakeholders, including students, professionals, government officials, and the general public.
- Cyber Surakshit Bharat Initiative: This initiative aims to enhance cybersecurity awareness and hygiene practices among individuals, organizations, and enterprises across India.

Conclusion

- These initiatives collectively contribute to building a resilient cybersecurity ecosystem in India, safeguarding critical infrastructure, protecting digital assets, and promoting trust and confidence in the digital economy.
- With India's embrace of broader digitalization, it has to have a cybersecurity-first attitude, without which there could be large scale data theft, with personal as well as financial implications.
- Ongoing efforts are essential to adapt to emerging cyber threats, strengthen regulatory frameworks, and foster a culture of cybersecurity awareness.

Red Sea Mission of EU

☛ **Syllabus: GS2/International Relations**

Context:

- Recently, the European Union (EU) has launched a naval mission to protect Red Sea shipping from Yemen's Houthi rebels.

About the Red Sea Mission:

- It comes in response to a series of attacks on commercial vessels, disrupting maritime traffic, hampering trade, and driving up prices.

- It is named as Aspides (Greek for 'shield') aims to safeguard the vital shipping lane of the Red Sea.
- It aims to provide maritime situational awareness, accompany vessels, and protect them against possible multi-domain attacks at sea.
- Unlike the U.S. and British forces, which have conducted retaliatory strikes on the Houthis, the EU mission will not partake in any military strikes and will only operate at sea.

Red Sea:

- It is a seawater inlet of the Indian Ocean, lying between Africa and Asia.
- Its connection to the ocean is in the south, through the Bab-el-Mandeb strait and the Gulf of Aden.
- To its north lie the Sinai Peninsula, the Gulf of Aqaba, and the Gulf of Suez (leading to the Suez Canal).
- The sea separates the coasts of Egypt, Sudan, and Eritrea to the west from those of Saudi Arabia and Yemen to the east.
- It is home to a kaleidoscopic ecosystem teeming with life.

A. It could become the world's 'last coral refuge' as global heating eradicates reefs elsewhere.

Importance:

- About 80% of the outbound shipments to Europe take place through the Red Sea region.
- It is vital for 30% of global container traffic and 12% of global trade.
- The disruption has led to an increase in freight costs, insurance premiums, and longer transit times, potentially making imported goods significantly more expensive.

A. It could significantly impact India's exports to Europe

9th edition of Raisina Dialogue

Syllabus: GS2/International Relations

Context

- Prime Minister Modi will inaugurate the 9th edition of Raisina Dialogue in New Delhi.

About

- The three-day Raisina Dialogue will witness the participation of representatives from over 100 countries including Ministers, Technology Leaders, Academics, Scholars on Strategic Affairs etc.
- Prime Minister of Greece, Kyriakos Mitsotakis, will join the inaugural session as the Chief Guest.
- The theme of th2 2024 edition is "Chaturanga: Conflict, Contest, Cooperate, Create".
- Over the event, attendees will engage in discussions on six thematic pillars:
- Tech Frontiers: Regulations & Realities;
- Peace with the Planet: Invest & Innovate;
- War & Peace: Armouries & Asymmetries;
- Decolonising Multilateralism: Institutions & Inclusion;
- The Post 2030 Agenda: People & Progress; and
- Defending Democracy: Society & Sovereignty.

Raisina Dialogue

- The Raisina Dialogue is India's premier conference on geopolitics and geoeconomics committed to addressing the most challenging issues facing the global community.
- The first session was held in 2016.
- It is hosted by the Delhi-based Observer Research Foundation, in collaboration with the External affairs ministry of India.

Malta joins the International Solar Alliance (ISA)

Syllabus: GS2/International Relations

Context:

- Recently, Malta became the 119th country to join the International Solar Alliance (ISA).

About the International Solar Alliance:

- It was launched by India and France together at the U.N. Climate Change Conference in Paris in 2015, to address energy requirements through a common approach.
- It represents a significant step towards a sustainable future, harnessing the power of the sun for a brighter tomorrow.

Formation and Purpose:

- The ISA was conceived as a coalition of solar resource-rich countries, most of them located between the Tropics of Cancer and Capricorn.
- The primary objective of the alliance is to work for the efficient consumption of solar energy to reduce dependence on fossil fuels.
- The ISA has set a target of 1 TW of solar energy by 2030, which would require $1 trillion to achieve.

Membership:

- The ISA is open to 121 prospective member countries.
- So far, however, only 56 countries have signed the ISA Framework Agreement.

India's Role:

- Apart from being a founding-member, India plays a significant role in the alliance in terms of being a host as well as a major contributor to the achievement of the target.
- The ISA is the first international body that will have a secretariat in India.
- India, with a target to produce 100 GW of solar energy by 2022, would account for a tenth of ISA's goal.

Recent Developments:

- The UN General Assembly conferred Observer Status to the ISA.
- It is expected to provide for a well-defined cooperation between the Alliance and the United Nations that would benefit global energy growth and development.
- The ISA recently approved the 'Solar Facility', a payment guarantee mechanism expected to stimulate investments into solar projects.

INDUS-X Summit

Syllabus: GS2/International Relations

Context:

- Recently, the second edition of India-U.S. Defence Acceleration Ecosystem (INDUS-X) Summit was held in New Delhi, India.

About the INDUS-X Summit:

- It is a collaborative effort between India and the United States in defence innovation.
- It is organised by Innovations for Defence Excellence (iDEX) under the Department of Defence Production, Ministry of Defence, and Department of Defence (DoD), United States, in conjunction with the U.S.- India Business Council and Society of Indian Defence Manufacturers.

Significances:

- It aims to expand strategic technology partnerships and defence industrial cooperation between the Indian and U.S. governments, businesses, and academic institutions.
- It represents a pivotal moment for advancing defence innovation and collaboration between India and the United States, setting the stage for future technological advancements and strategic partnerships.

India-Oman Cooperation in the Archival Field

Syllabus: GS2/International Relations

Context

- A delegation of the National Archives of India (NAI), visited the National Records and Archives Authority (NRAA) of Oman to explore the areas of bilateral cooperation in the archival field.

What are Archives?

- Archives are the priceless documentary heritage of any nation and as the premier archival institution in the country.
- The National Archives of India plays a key role in guiding and shaping the development of archival consciousness both at the national as well as state level.

India-Oman Relation

- Economic Cooperation: India is among Oman's top trading partners. Bilateral trade in 2022-23 stood at around $12.3 billion between both the nations.
- India is the 2nd largest market for Oman's crude oil exports for the year 2022 after China.
- India is also the 4th largest market for Oman's non-oil exports for the year 2022 and 2nd largest source of its import after UAE.
- Defense Cooperation : India and Oman conduct regular biennial bilateral exercises between all three services.
- Army exercise: Al Najah
- Air Force exercise: Eastern Bridge
- Naval Exercise: Naseem Al Bahr
- Indian Diaspora: There are about 7,00,000 Indians in Oman, of which about 5,67,000 are workers and professionals.
- There are Indian families living in Oman for more than 150-200 years.
- Maritime Cooperation: Oman is at the gateway of Strait of Hormuz through which India imports one- fifth of its oil imports.
- India signed a pact with the country in 2018 to access the Duqm port of Oman.

Agreements between India and Oman

- In 2022, the Central Bank of Oman (CBO) signed a Memorandum of Understanding (MoU) with the National Payments Corporation of India (NPCI) to link the payment systems between the two countries.
- Another MOU between Oman News Agency and Asia News International was exchanged. The MOU facilitates the exchange of news and information between both countries.

Way Ahead

- Oman is a key pillar to India's West Asia Policy. The strategic location of Oman in the Gulf region and India's emergence as a global player further enhance the significance of their relationship.
- By building on their historical ties and adapting to the changing global landscape, India and Oman can continue to contribute to regional stability and prosperity.

National Archives of India (NAI)

– NAI was established in 1891, at Calcutta as the Imperial Record Department in British India. Later it was shifted to Delhi.
– Governance: It is under the administrative control of the Ministry of Culture.
– NAI is the biggest archival repository in South Asia. It has a vast corpus of records viz., public records, private papers, oriental records, cartographic records and microfilms etc.
– The Functions of the NAI are as follows:
a. The NAI is the custodian of all non-current government records, holding them for the use of administrators and scholars.
– It keeps and conserves records of the government and its organizations only, and does not receive classified documents.
– As per the Public Records Act, 1993, various central ministries and departments are supposed to transfer records more than 25 years old to the NAI, unless they pertain to classified information.

Nordic-Baltic Eight (NB8)

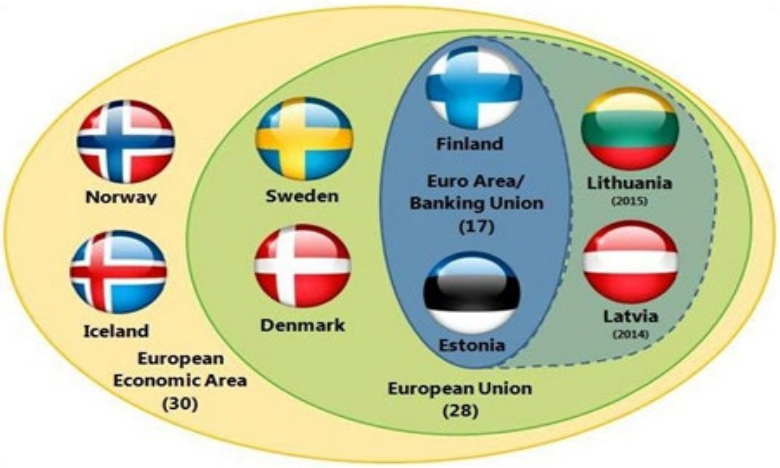
Syllabus: GS2/ International Relations

Context

- The eight Nordic-Baltic countries (NB8) participated in the recent Raisina Dialogue held in New Delhi.

Nordic-Baltic Eight (NB8)

- The NB8 is a regional cooperation format that brings together the Nordic countries and the Baltic states.
- Denmark, Finland, Iceland, Norway, and Sweden (Nordic countries),
- Estonia, Latvia, and Lithuania (Baltic states)
- Nordic countries are members of the European Union (except Iceland and Norway which are members of EFTA).
- These countries are linked geographically and share deep historical, social, economic, and cultural ties.



Importance of NB8

- They represent advanced economies that are outward-looking, innovation-driven, complementary, and fully integrated into the world's largest single market area, the European Common Market.
- The Baltic countries are leaders in IT, digitization and cyber and green technology.
- These countries share a commitment to democracy and human rights, and are all champions of an international order based on multilateralism and international law.

NB8 and India

- India's engagement with NB8 countries is expanding which includes the India-Denmark Green Strategic Partnership, India-Norway Task Force on Blue Economy, Sustainability and ICT cooperation with Finland, 'LeadIT' (Leadership for Industry Transition) intiative with Sweden.
- The cooperation with them spans fields as diverse as innovation, green transition, maritime, health, intellectual property rights, new technologies, space cooperation, and artificial intelligence.
- Trade and investment figures between the NB8 region and India are steadily increasing.
- The security of the Nordic-Baltic region and the Indo-Pacific is interlinked.

Chapter 8

Yojana

(1) India's Vision for Harnessing AI for Global Good

Artificial intelligence (AI)

- It refers to computer systems capable of performing complex tasks that historically only a human could do, such as reasoning, making decisions, or solving problems.

Some of the most common examples of AI in use today include:

- ChatGPT: Uses large language models (LLMs) to generate text in response to questions or comments posed to it.
- Google Translate: Uses deep learning algorithms to translate text from one language to another.
- Netflix: Uses machine learning algorithms to create personalized recommendation engines for users based on their previous viewing history.
- Tesla: Uses computer vision to power self-driving features on their cars.

2023 GPAI Ministerial Declaration

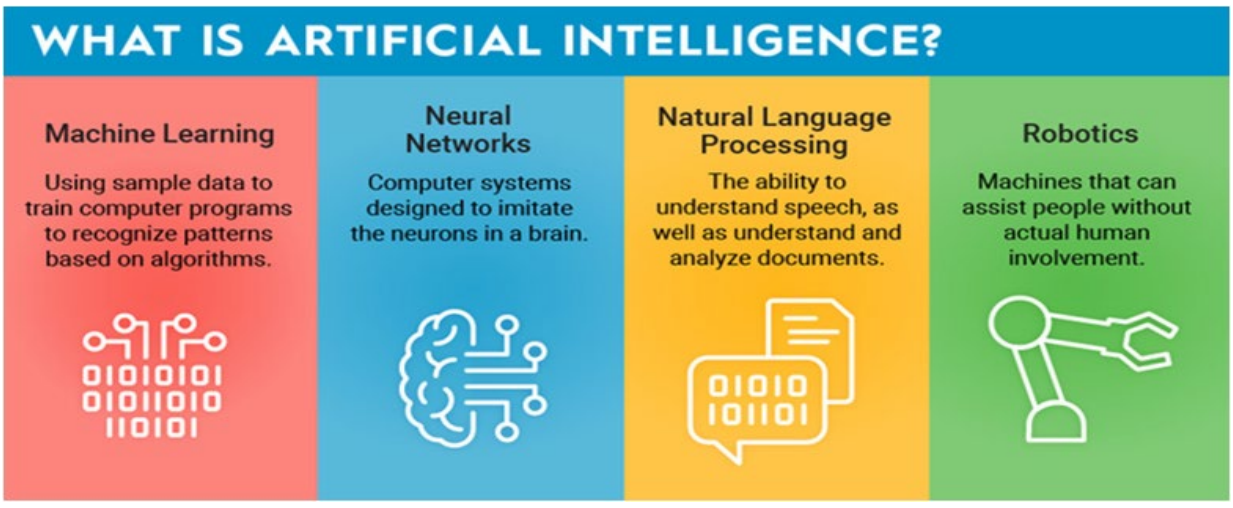
- The 2023 GPAI Summit took place in New Delhi, India, on 12-14 December 2023.
- The event brought together engaged minds and expertise from science, industry, civil society, governments, international organisations and academia to foster international cooperation on AI-related priorities.
- The Summit offered an opportunity for GPAI Working Groups to showcase the recent developments of their work around four themes:
- Responsible AI,
- Data governance,
- Future of work and innovation and
- Commercialization.
- During the summit, Prime Minister Modi emphasized India's commitment to leveraging AI for the welfare of people, ensuring that nations in the Global South are not left behind.
- He also underscored India's resolve to establish a regulatory framework that ensures AI is safe and trusted, fostering collaboration among nations for widespread and long-term implementation.

The India's Techade' Vision

- Our Prime Minister has a vision for making technology playing a key role as a catalyst in making India the fastest-growing innovation economy in the world.
- The digital economy, currently outpacing GDP growth at 2.5-2.8 times, is poised to contribute a substantial 20% to the GDP by 2026, marking a significant surge grom the modest 4.5% in 2014 and the current 11%.
- Government is actively shaping through the comprehensive mission named 'IndiaAI'.
- IndiaAI's – It's vision not only consists of support for the AI startup ecosystem but also the development of practical applications addressing real-world challenges in health-care, agriculture, language translation, governance and beyond. It also involves creating indispensable infrastructure for AI computation and curating high-quality, diverse datasets crucial for honing Indian models.
- A recent report from Stanford University's Al index underscores India's leadership in skill penetration in Al, even surpassing the United States.
- Being the world's largest connected democracy, our nation, through rapid digitalization has generated unparalleled volumes and varieties of data.
- It is one of the world's most extensive and diverse collections, promising substantial advantages for both our research and startup ecosystems.
- Complementing this effort is the development of a robust policy and legal framework, intended to not only fortify our Datasets programme but also establish it as a crucial competitive edge for India Al.

GPAI Summit 2023 New Delhi - A Landmark in Global Al Discourse

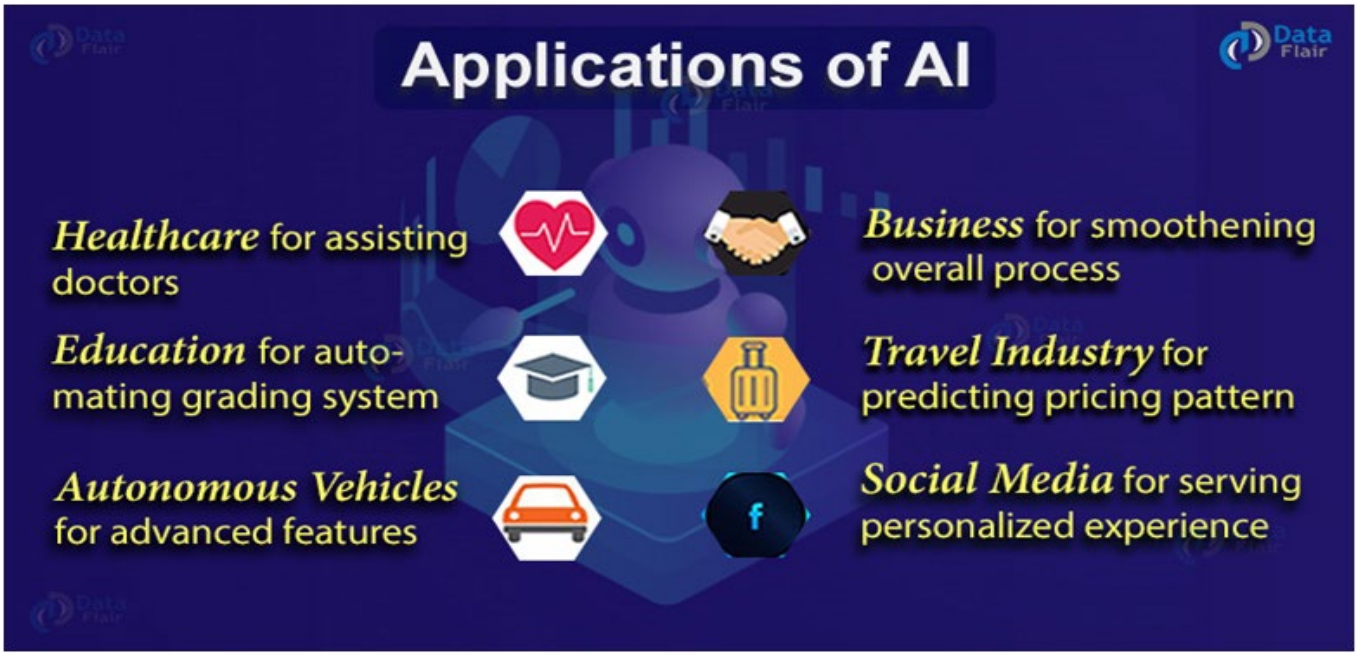
- It stands as a milestone in the ongoing global discourse on Al.
- Hosted under India's Chairmanship and attended by representatives from 28 nations, the summit solidifies international recognition of Al's impact and marks a pivotal moment in the Global Al conversation.
- The summit underscored three key pillars: Inclusion, Collaborative Al, and Safe & Trusted Al.



- It reflects India's commitment to inclusive technology, ensuring that nations worldwide, particularly those in the Global South, have access to the benefits of Al for the betterment of their citizens.
- Prime Minister's vision, focuses on catalyzing innovation while concurrently establishing guardrails and rules to ensure that it is safe and trusted.
- India's approach entails setting principles and an exhaustive list of harms and criminalities associated with Al.
- Instead of regulating Al at specific developmental stages, India is advocating for clear guidelines for platforms, addressing issues like bias and misuse during model training.
- The proposed framework outlines prohibited actions, backed by legal consequences for non-compliance.
- In the Indian context, existing IT rules provide a foundation for addressing challenges related to Al- powered misinformation, such as deepfakes.
- The amended IT Act rules, implemented in February 2021, October 2022, and April 2023, prioritize platform obligations.
- Platforms are mandated to prevent the dissemination of misinformation, with specific rules outlining impermissible user harm content. Violating these rules exposes platforms to legal prosecution, emphasizing a comprehensive regulatory approach to balance innovation with ethical Al use globally.
- Over the past nine years, India has transitioned from a mere consumer to a producer of technology, devices, and solutions, positioning it as a trusted partner in shaping the future of the Internet and Technology.
- This trajectory aligns with the principles of 'Vasudhaiva Kutumbakam'—embracing inclusion, as demonstrated by India's accessible DPI solutions that benefit countries worldwide.
- India has evolved from the Fragile 5 economies to the Top 5, with aspirations to soon be among the Top 3.
- Achieving the status of a trillion-dollar digital economy and standing among the top innovators and digital economies is well within reach, marking a momentous chapter for India on the global stage.

AI in Indian Governance and Public Services

- Today, Al can be harnessed to solve societal challenges in health care, education, and agriculture, build innovative products and services, increase efficiency, elevate competitiveness, and enable economic growth, contributing to an improved quality of life.
- Recent advances in Al have also significantly enhanced its potential to transform governance, public service delivery, citizen engagement, and catalyze large-scale socio-economic transformation.



- India is strategically poised to employ Al to transform public service delivery for efficiency in governance, innovation, and improved citizen engagement.
- A recent industry report focusing on Generative Al (GenAl) suggests that GenAl holds the potential to contribute up to 1.5 trillion dollars to India's GDP by 2030.
- The burgeoning Al landscape in India is further exemplified by a robust startup ecosystem, ranking 5" in the number of newly Funded Al Companies by geographic area and attracting significant investments exceeding $475 million in GenAl startups in the past two years.

India's Approach

- The Government of India's flagship initiative, the National Programme on Artificial Intelligence (NPAI), aims to nurture the building blocks of the domestic Al ecosystem through four key interventions:
  1. National Data Management Office (NDMO): It aims to enhance data quality, utilisation, and accessibility, modernizing government practices to fully unlock the potential of data and the Al innovation ecosystem.
  2. National Centre on Al (NCAI): It is envisaged as a sector-agnostic entity that identifies Al solutions for public sector problem statements and facilitates their nationwide deployment, aiming to drive large-scale socio-economic transformation.
  3. Skilling for Al: It aims to revamp technical education infrastructure, particularly ITIs and polytechnics by building data labs that can help equip the workforce with Al-ready skills and mitigate the disruptions caused by the accelerated adoption of Al.
  4. Responsible Al: It aims address potential biases and discrimination in Al adoption through the development of indigenous tools, guidelines, frameworks etc, and suitable governance mechanisms.

- The adoption of evidence-based decision-making, facilitated by Al, enables policymakers to access comprehensive data insights, ensuring that decisions and policies are anchored in evidence, ultimately leading to more targeted and impactful socio-economic benefits.
- Al integration in public service delivery enhances data analysis, automates repetitive tasks, and streamlines decision-making processes, unlocking new levels of efficiency, innovation, and citizen engagement across various sectors.
- Initiatives aimed at providing services to all, irrespective of geographical or socio-economic constraints, exemplify Al's potential to foster equitable access.

Key Government Initiatives Leveraging Al

- **Some initiatives that have reaped dividends with the integration of Al and related technologies have been detailed below:**

1. UMANG (Unified Mobile Application for New-Age Governance)- It is a unified platform, offering all Indian citizens a singular point of access to pan-India e-government services, spanning from central to local government bodies.
   - It provides access to 1836 vital government services of areas such as education, Covid-19 vaccinations, public transport, employment guidance, passport applications, utilities, cybercrime reporting, and more.
   - Al was leveraged to transform UMANG into a more inclusive solution.
   - UMANG, the Government's citizen-centric app, has introduced a voice-based chatbot, or virtual assistant.
2. DigiYatra- By Ministry of Civil Aviation, marks a revolutionary step towards leveraging artificial intelligence (Al) to enhance the air travel experience for citizens. DigiYatra is a biometric-based boarding system for Indian airports.
   - It is implemented through the DigiYatra App, eases entry into airports, security checks, and boarding with a seamless registration process.
3. Digital India Bhashi- It is an initiative launched by the Ministry of Electronics and Information Technology that is building speech-to-speech machine translation systems for various Indian languages and dialects and evolving a Unified Language Interface (ULI).
   - It leverages Al to establish its building blocks, such as language and speaker identification, precise speech- to-text conversion, accurate translation across multiple languages, transliteration, semantic comprehension.
   - It also includes the ability to produce speech output in the language of choice.
4. Al in Urban Governance- Several government departments across States- including municipal corporations and police, are using image recognition and Al for near-real-time monitoring of traffic and the infrastructure of the city.
   - Al model for infrastructure and traffic monitoring employs advanced image recognition and sensor data analysis to detect and report issues such as potholes, damaged manhole covers, nonfunctional traffic lights, and streetlights.

- Model is also trained to detect traffic infractions, including over speeding, rash driving, failure to wear a seatbelt, and issues such as broken taillights or headlights.
- This model facilitates timely intervention and maintenance, resulting in cost savings as well as safer and more efficiently managed urban environments.

5. Applications of Al in Health Care- DRDO's Centre for Artificial Intelligence and Robotics (CAIR) has developed ATMAN Al, an Al-based Covid detection application software using Chest X-rays (CXRs), which can classify the images into normal, Covid-19, and pneumonia classes using a limited number of sample images.

- The Ministry of Health and Family Welfare has also implemented projects wherein Al-based models are being used to analyse X-Ray and mammography images to detect tuberculosis and breast cancer.

6. Al-Based Pest Management System- CottonAce, an Al-driven early warning system, is aiding farmers in safeguarding their crops by offering timely, localised advice on pesticide application. Following the integration of this Al system, farmers have witnessed a significant 25 per cent increase in cotton crop yields.

- Lead farmers or extension workers install the CottonAce app, uploading photos of pests collected in commonly used pheromone traps.
- The Al algorithm identifies and counts the pests, determines the infestation level, and provides actionable advice to the farmer.

7. Al Applications in Agriculture- The Government of Telangana has deployed an Al solution that has the capability to leverage agricultural data and provide actionable inputs that can potentially increase crop yield.
   - The initiative involves accurately delineating field boundaries for approximately 60,000 agriculture fields, providing precise data on acreage, forested areas, and irrigation structures with an impressive 85% accuracy.
   - Another Al-based solution deploys sensors in crop fields that help estimate moisture content in the soil.
   - Mapping it with weather data regarding rains and the stage a crop is in helps make predictions of the irrigation needed, and the farmer gets prompts on his mobile phone about when he should be switching on the submersible pump for irrigation and for how long.
   - It is estimated that this simple solution can save up to 42% of water for paddy.
8. Al-Based Attendance Monitoring (Shiksha Setu)- Assam Government has developed a mobile application called 'Shiksha Setu' for recording the digital attendance of both students and teachers.
   - The application includes an Al-based facial recognition attendance system, which has been implemented across 44,000 schools in the state.
   - Through this system, proxy attendance has been eliminated.
   - This has resulted in significant cost savings for the Government in PM Poshan, school uniforms, and textbook supplies.

Way Forward

- India is adopting a multi-stakeholder approach to designing and adopting voluntary frameworks, policies, and legal mechanisms for the development, deployment, and use of Al that is safe and accessible for all. Government of India has also notified the Digital Personal Data Protection Act to protect citizens' privacy, safety, and trust concerning their personal data and enhance the accountability of entities collecting and processing personal data. India has reiterated its commitment to promoting innovation while regulating the misuse of Al on various international forums, including as the Lead Chair for the Global Partnership on Artificial Intelligence (GPAI).

(3) India's Tech Services Industry

- Companies are now focusing on scaling Al solutions, understanding their real-world impact, ensuring robust security measures, and maintaining a human-centric approach.
- Scaling Al requires robust infrastructure, efficient algorithms, and a clear understanding of market needs.
- Scaling AI Innovations
- Scaling Al requires robust infrastructure, efficient algorithms, and a clear understanding of market needs. Indian companies are investing in these areas, aiming to offer Al solutions that are not only innovative but also scalable and reliable.

Potential Areas of Opportunity for the Industry-

1. Expansion in the Addressable Market: Generative Al is poised to drive considerable market expansion in the next 5 years.
2. Delivery Excellence: The efficiency of service delivery processes is set to improve significantly. For example, in application development and BPM services, a 20 to 30 per cent productivity improvement is anticipated.
3. Sales Excellence: Generative Al will streamline the entire sales lifecycle, from lead generation to sales strategy formulation.
4. Productivity Gains: Generative Al can automate time-consuming tasks such as summarization, workflow generation, and report preparation. Key to this transition is understanding the technology's dynamic nature, including its rapid updates and the evolving risk horizon with regulatory, technological, and social implications.

India's Unique Position in the Al Landscape

- Unlike conventional top-down innovation models, India has adopted a grassroots-first approach, ensuring economic growth and digital inclusion at every level.

- Transitioning into the Al era, India must apply the same principles of opportunity and impact-oriented development, with a focus on recognizing Al as an avenue for advancement rather than solely a source of risk and embedding safety and inclusivity within the core design principles of Al technologies.

Addressing Al Security and Ethical Considerations

- As Al systems become more advanced and widespread, ensuring their security and ethical use is paramount.
- The Indian tech industry is proactively addressing these challenges by investing in secure Al development practices, robust data protection measures, and ethical guidelines.
- Companies are collaborating with academia, government, and industry partners to create standards and frameworks that ensure Al is used responsibly.
- Security considerations include protecting Al systems from malicious attacks, ensuring data privacy, and maintaining the integrity of Al applications.
- Ethical considerations involve preventing bias, ensuring transparency, and maintaining human control over decision-making processes.

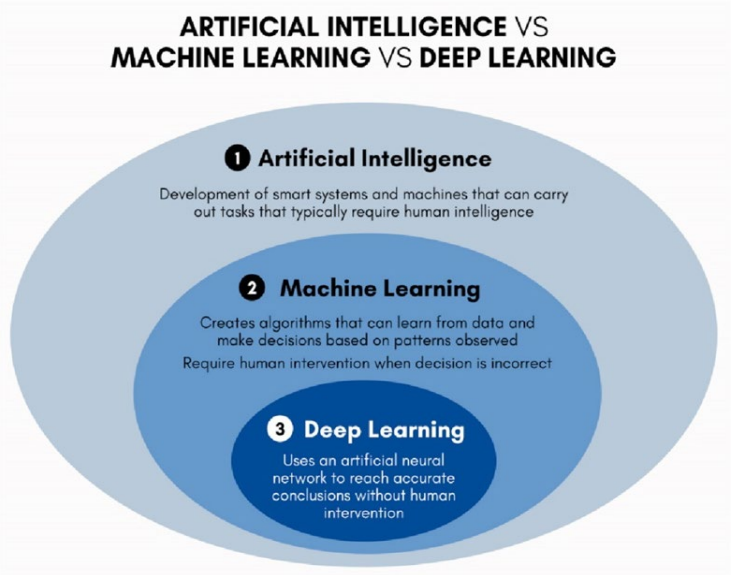
Human-Centric Al: A Core Focus

- Generative Al demands a fundamental shift towards a human-centred approach, prioritizing transparency and human oversight.
- Scrutinizing data for implicit biases is crucial to preventing harm and distortion in outcomes.This perspective is vital to ensuring Al's ethical use for humanity's benefit.

Conclusion

- The Al technology landscape is rapidly changing, and its full potential remains largely untapped in the short term. We must remain vigilant, consistently assess, and adapt to the ongoing developments in this field. The journey ahead for India's tech services sector is not just about technological adaptation but also about leading the way in innovation and setting a global precedent in the effective and ethical use of Generative Al.

(4) Unlocking the potential & challenges of Generative AI

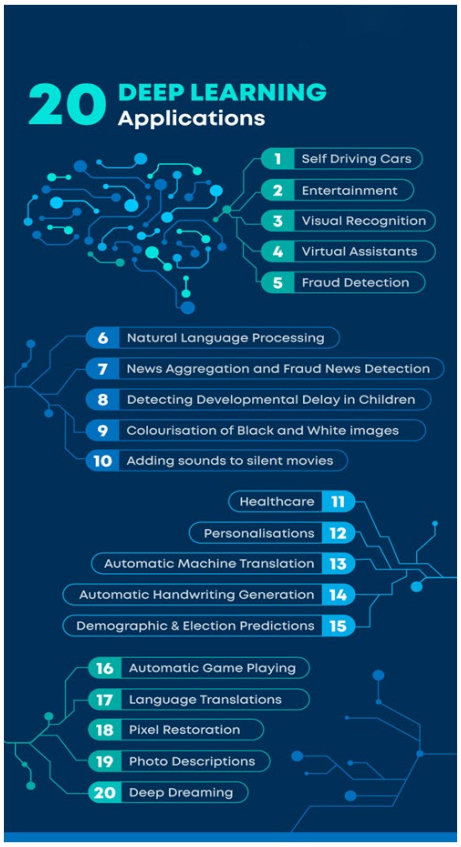


- Generative Al is a subset of deep learning, which means it uses artificial neural networks, and can process labelled data using supervised learning methods.
  - It is a type of artificial intelligence technology that can produce various types of content, including text, imagery, and audio.
  - It is also used for many special-purpose chatbot tasks, like Government chatbots, can be used to help citizens and visitors get access to the right information on various schemes and policies.
  - It has the potential to give society intelligent guidance on how to approach some of the biggest prob- lems, like climate change and pandemics.
- Deep learning is a type of machine learning that uses artificial neural networks, allowing them to process more complex patterns.
- Artificial neural networks are inspired by the human brain. They are made up of many interconnected neurons that can learn to perform tasks by processing data and making predictions.
- Generative Al is a subset of deep learning, which means it uses artificial neural networks and can process labelled data using supervised learning methods.
- ChatGPT has been trained on a large collection of web pages, books, and articles. This large-scale supervised learning technology is termed the Large Language Model (LLM).

Key areas where Generative AI is making significant im- pact are-

1. Writing- It can be used as a brainstorming companion. They can also be useful for writing press releases. However, by providing them with details of the event, Generative Al creates a detailed and insightful press release specific to the event.
2. Reading: It is also good at reading tasks. For example, an online shopping e-commerce company gets a lot of different customer emails. Generative Al can read customer emails and help quickly figure out whether an email has a complaint or not.
3. Chatting: It is used for many special-purpose chatbot tasks, like government chatbots, can be used to help citizens and visitors get access to the right information on various schemes and policies.

Some concerns about AI



- **With these amazing capabilities have also come many concerns about AI such as-**

1. Gender-Bias: One widely held concern about AI is whether it might amplify humanity's worst impulses. LLMs are trained on text from the internet, which reflects some of humanity's best qualities but also some of its worst, including some of our prejudices, hatreds, and misconceptions.
2. Job Losses: Major concern is that who will be able to make a living when AI can do our jobs faster and cheaper than any human can?
3. Hallucinations and Misinformation: AI can sometimes 'hallucinate' inaccurate information with complete confidence. It can even invent its own references, sources, and deep fakes that are non-existent.
4. Plagiarized Content: LLMs sometimes output plagiarized content.
5. Transparency and User Explainability: Generative AI models seems obey transparency rules, but the reality is that many end users do not read the terms and conditions and do not understand how the technology works.

Key dimensions of implementing responsible AI-

1. Fairness of information to ensure that AI doesn't perpetuate or amplify gender biases.
2. Transparency of information is vital to ensuring ethical decision-making. Users should have accessible, non-technical explanations of Generative AI, its limitations, and the risks it creates.
3. Privacy responsible AI by protecting user data and ensuring confidentiality.
4. Safeguarding the AI systems from malicious attacks.
5. Ethical use of data, ensuring that AI is used only for beneficial purposes.

- Because of all the attention on responsible AI, many governments have been publishing frameworks for it.
- NITI Aayog publishes discussion papers on 'Responsible AI for All, presenting a unique framework for implementing AI responsibly.

Conclusion

- Generative AI has the potential to give society intelligent guidance on how to approach some of the biggest problems, like climate change and pandemics. In the coming times, AI will contribute to longer, healthier, and more fulfilling lives worldwide if used responsibly.

(5) Use Cases of Generative Artificial Intelligence in Governance

- Generative AI (GenAI) is the part of Artificial Intelligence that can generate all kinds of data, including audio, code, images, text, simulations, 3D objects, videos, and so forth. It takes inspiration from existing data, but also generates new and unexpected outputs.

Type of tool	Nature of data	Overview of outcome it produces
ChatGPT, Replika, Jasper, YouChat, Sudowrite, Copy.ai, Writesonic	Mostly text	Can provide answers to complex queries based on public information
DALL-E, DALL-E 2, Google's Imagen, Stable Diffusion, Make-A-Scene by Meta AI, Craiyon, Midjourney and MiP-NeRF	Text and Images	Produces realistic photos based on text input
Amper Music, Aiva, Amadeus Code,Google's Magenta, Ecrett Music, Humtap, Boomy, Melodrive, Mubert & Sony's Flow Machines	Music	Produces music based on textual prompts
GitHub's CoPilot, Tabnine, DeepCode, Intellicode by Microsoft, Replit's Ghostwriter, Ponicode, SourceAI, AI21 Labs' Studio and Amazon's Code Whisperer	Software programmes	Generates lines of code based on text input
Google LaMDA and Bard, Apple Siri, Microsoft Cortana, Samsung Bixby, IBM Watson Assistant, SoundHound's Hound, Mycroft, Amazon Alexa, and Facebook's Wit.ai	Audio	Responds to audio prompts and generates actions like starting an application, playing music, etc.

Overview of Current GAI Technologies

- There are many GAI technologies currently available. While ChatGPT continues to draw most attention and has brought this technology into everyone's consciousness, there are quite a few other tools with similar capabilities.

Generative AI Use Cases for Governments

- GAI presents lots of opportunities to governments when it comes to automating internal processes and enhancing the experiences of stakeholders through faster resolutions. For example, a platform for query resolutions could be created where citizens are able to see the status of their service requests.

- GAI has the ability to improve several aspects of citizen interactions with platforms, such as citizen engagement platforms like MyGov.
- Capability that GAI to analyse large volumes of text, summarising them, or generating specific reports could become a very useful government tool.
- GAI presents an opportunity to train manpower to use technology through English prompts.

Generative AI is transforming government operations, as evidenced by the following innovative applications:

- The governments of both the United States and Singapore have initiated the integration of ChatGPT into their administrative systems.
- Similarly, in Japan, the Yokosuka City Government has begun employing ChatGPT to support its office operations (Yang and Wang, 2023).
- In Singapore, the Smart Nation initiative utilizes AI to optimize traffic management, improving urban planning and public transportation.

Challenges for Governments

- Veracity of its outputs.
- The quality of the data it ingests plays a large role in the credibility of the outputs it prepares.
- the responses of GAI to factual prompts are relatively accurate, but prompts that require subjective deliberation, GAI applications often fail to provide satisfactory responses.
- The use of GAI requires organisations to expose their data to GAI systems. This activity has to be done carefully so that the internal information assurance protocols and privacy of the data do not get breached.
- GAI systems need to establish how they can address the principles of FATE, namely Fairness, Accountability, Transparency, and Ethics in AI.
- The government needs to employ both automated and human surveillance mechanisms to protect against illegal content and misuse.

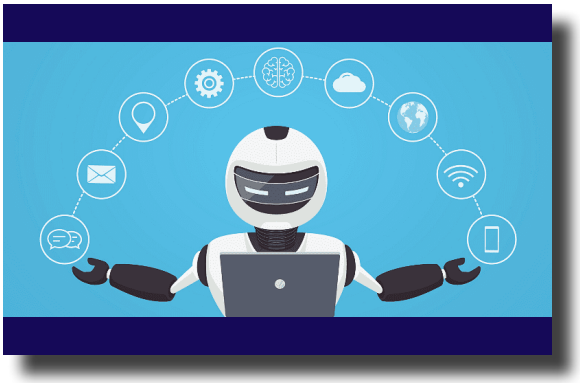
Implications for Practice and Policy

- Governments need to embrace AI in general and GAI in particular in their activities.
- Governments need to sensitise their employees towards upskilling, where the employees understand how to act on data and how to leverage these GAIl platforms for operational activities.
- It may be done through undertaking capacity enhancement programmes in areas like Data Science and Decision Science where government employees may develop a better understanding of AI.
- Governments can partner with academia to upskill their employees to leverage AI platforms and applications better.

Conclusion

- GAI, like other AI tools, could play an important and critical role in the digital transformation of governments and public sector undertakings. This technology will help governments to be nimbler and more agile in their decision- making and connect with stakeholders more effectively. While the benefits are immense, the journey needs to be planned carefully to avoid disruptions from adverse outcomes.

(6) AI and Future of Media



- Digital platforms have simply demolished the distance, without any doubt whatsoever. The downside is that the information or news does not go through the processes of curation, editing, and publishing - print, electronic, or digital.
- A decade ago, there were targeted ads, and then that progressed to targeted influencing of specific groups— age, religious, or community-related groups— for a particular outcome in a chosen action, say, elections.
- But today, no need to target anything or anyone. Al-powered engines have all the information they need about everyone and everything.
- The role of media in a society completely driven by algorithms, automation, machine learning, neural networks, large language models, holograms, augmented reality, virtual worlds, fiction and poetry filled with the Skynet etc.
- Al has become a powerful tool for media houses when it comes to news.
- Empowered by ML-based recommender systems, news and media outlets can fact-check and cross-verify large amounts of data in real time. This is something that is not possible with human journalists.
- Al s setting a benchmark for journalism, and Al has empowered media houses with the generation of large amounts of data and accurate digital storytelling.
- Al journalism, resulting in the automated generation of news stories and combing through large volumes of data in real quick time employing pattern recognition and arranging them using specific algorithms for human-readable production.
- Data journalism, Algorithm journalism, and Automated journalism are going to be the salient features of future journalism when it comes to the production and dissemination of news.
- Al-enabled data labeling and data annotation are going to make news posts reliable, easily retrievable, and deployable for any future use.
- Pattern recognition, speech-to-text synthesis and vice versa, content synthesis, sign language production-enabled text and image description, plus automatic subtitling, are slowly but surely revolutionizing the visual arts, movie industry, and audio-visual components for media houses.

Concerns and issues with AI-enabled media-

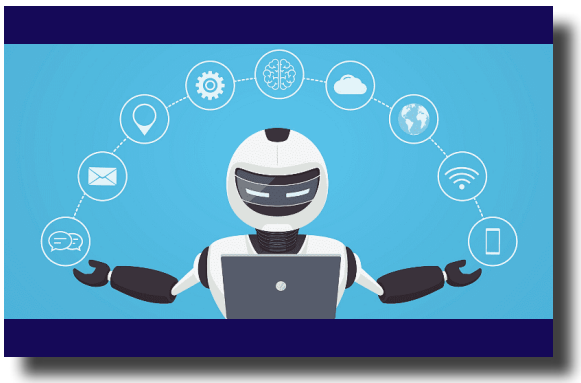
- Content generators and aggregators are the tools that make content verification and fact-checking easy for media houses, but the very same tools are used by those who want to spread misinformation.

- With large data at its disposal, surely AI tools can generate news stories or even novels and short stories in perfect language, but dishing out something completely out of context, or worse, in the wrong context, are some of the mistakes committed by ML models - be they literary creations, information, or visual arts.
- Statistical Language Processing (SLPs) is far from being relied upon, that is because human expressions not static but dynamic. The same expression can be used in a variety of circumstances, and similar expressions in similar circumstances tend to convey widely different meanings across languages.
- Pattern recognition and facial recognition tools have impacted security and privacy issues massively, but not all in a bad way. AI tools are a long way from being certainties, and deepfakes are definitely the point in question.

Conclusion

- Thus, we have already entered the era of synthetic media. Augmented Reality and other tools are going to enrich this synthetic experience, almost bordering on a synesthetic experience. That augur well for the producers and consumers of expressions of all kinds.

(7) Transformative Role of AI in media



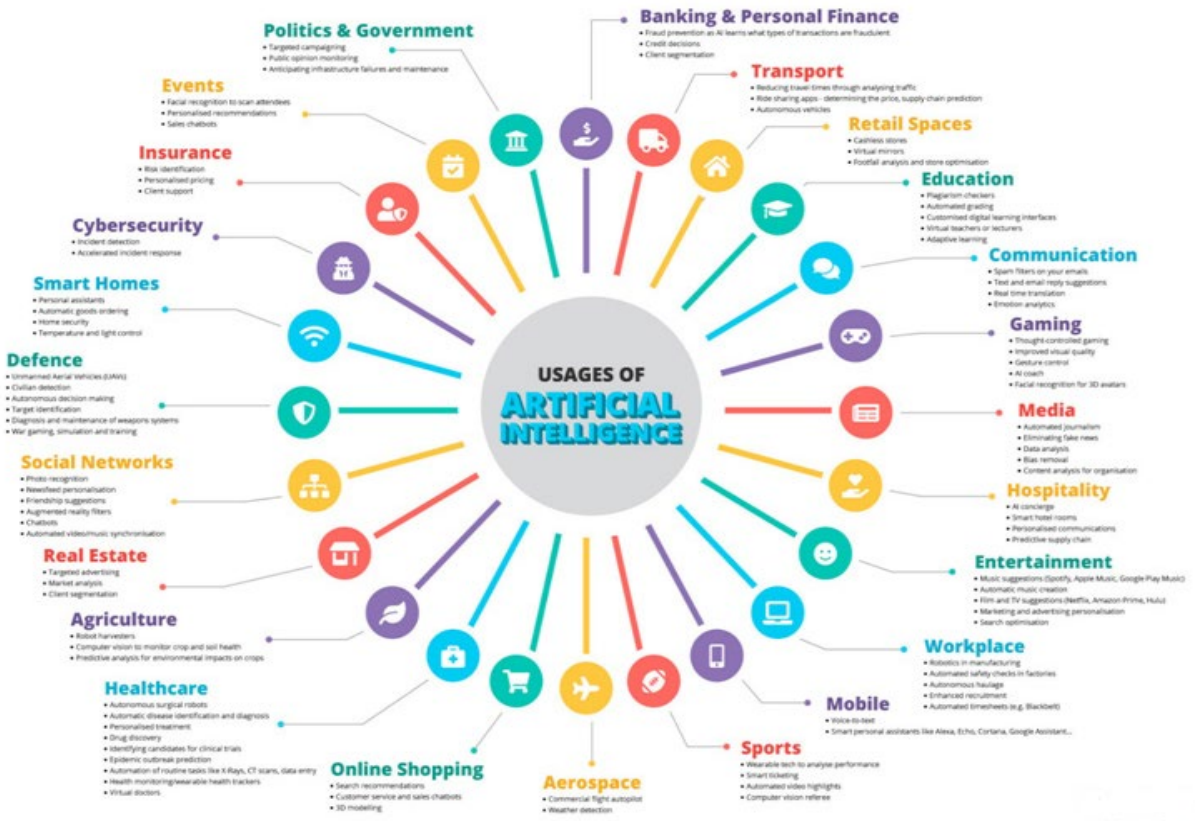
- Media organisations are increasingly adopting the use of AI for many back-office jobs like transcribing interviews, subtitling videos, analysing audience preferences and engagement patterns and also to boost SEO ranking.
- There are other newsroom tasks that are increasingly being taken over by AI. These include:
  - Content Discovery
  - Document Analysis
  - Translation (in multiple language)
  - Processing tips (verifying tips, moderating story ideas)
  - Text summarization
  - Content moderation
  - Search Engine Optisation
  - Push-alert personalization

Humas have some intrinsic qualities that AI would find difficult to replicate such as-

1. Emotions
2. Adaptability
3. Branding and Connect
4. Ethics

5. Ground Connect
6. Limited Ability to Take Decisions
- 7. Social and Environmental Consequences

(8) Role and Scope of AI for Citizen Services



- By integrating Al with Aadhaar-enabled services, the Government can ensure a more efficient and secure delivery of various public and private services while maintaining the privacy and integrity of individuals' identity information.
- By integrating Al into Government mobile applications, administrations can create more intelligent, responsive, and citizen-centric platforms that streamline processes, improve service delivery, and foster better communication between the Government and its citizens.

Al in Public Safety and Security

- Al is employed in public safety initiatives such as predictive monitoring, emergency response optimization, disaster management, video surveillance, and threat detection.
- Al technologies, including facial recognition and video analytics, are employed for public safety and security.

Al in Healthcare Services

- Al can play a significant role in healthcare-related citizen services, from diagnostic tools to personalized health recommendations.
- Remote monitoring and telehealth services with AI support can improve access to

healthcare for citizens.

- AI is utilised in analysing medical imaging data, such as X-rays, MRIs, and CT scans.
- AI is used in the drug discovery process by analysing huge datasets to recognise potential drug candidates.
- Virtual health assistants and chatbots powered by AI provide patients with instant support, answer medical queries, and offer information about symptoms and treatments.
- AI facilitates remote patient monitoring, making healthcare services more accessible, especially in rural areas where access to medical facilities is limited.
- AI is used in robotic-assisted surgery, where robots equipped with AI algorithms assist surgeons in performing procedures with precision.

AI in Financial Inclusion

- AI is employed in the financial sector to enhance inclusion and accessibility.
- Mobile banking, digital payments, and AI-driven credit scoring are notable examples.
- Despite advancements in the financial sector, a significant portion of the global population still lacks access to traditional banking services.
- Machine learning algorithms analyse alternative data sources, such as mobile phone usage and utility payments, to assess creditworthiness.
- This enhances the security of financial transactions. AI-driven mobile banking applications enable individuals to access basic financial services through their smartphones.

AI in Smart Agriculture

- AI plays a crucial role in agricultural innovation, offering solutions to enhance crop yield, sustainability, and overall efficiency in farming practices.
- AI is used to analyze agricultural data and provide farmers with real-time information or weather patterns, crop health, and best farming practices.
- AI technologies including sensors, drones, and satellite imagery, enable precision farming.
- AI algorithms analyse historical and current data to predict crop yields, pest and disease outbreaks, and optimal planting times.
- AI models analyse weather patterns to provide accurate and timely forecasts. Such information can be used to improve farming.

AI in Education and Skill Development

- Artificial Intelligence has the potential to significantly transform learning and skill development in India, addressing various challenges and contributing to a more inclusive and effective education system.
- AI can adapt educational content based on individual student needs and learning

styles, providing personalized learning experiences.

- Al can enhance the gamification of educational content, making learning more engaging and interactive.
- Smart classrooms equipped with Al-powered interactive whiteboards, virtual reality (VR), and augmented reality (AR) tools can make learning more interesting and dynamic.

Al in Smart City Development

- Smart Cities and Artificial Intelligence play an essential role in shaping urban planning for sustainable development.
- The Smart Cities Mission involves the integration of Al and loT technologies to enhance urban living.
- Al can improve waste collection and recycling processes by optimising collection routes, identifying areas with higher waste generation, and promoting recycling initiatives.
- Al contributes to the design of energy-efficient buildings and urban spaces.

Al in Tourism

- Artificial Intelligence has a significant impact on the tourism industry, transforming various aspects of travel planning, booking, and experiences.
- Al algorithms help users plan their trips by suggesting optimal itineraries based on preferences, budget constraints, and time constraints.
- These systems can dynamically adjust plans based on real-time factors like weather or events.
- The integration of Al into the tourism industry not only enhances the efficiency of operations but also provides travellers with more personalised and seamless experiences, contributing to the growth and evolution of the global tourism sector.

Al in Power Management

- It is contributing to improved efficiency, reliability, and sustainability in the energy sector.
- Al algorithms analyse historical data, weather patterns, and other relevant factors to predict future energy demand accurately.
- Al helps optimise energy consumption in various applications, from industrial processes to residential buildings.
- By leveraging Al in power management, utilities and energy operators can create more intelligent, responsive, and sustainable energy systems, contributing to a more efficient and resilient power infrastructure.

Al in Logistic Management

- Artificial Intelligence plays a transformative role in logistic management, contributing to increased efficiency, reduced costs, and improved decision-making in the supply chain.

- AI algorithms analyse historical and real-time data, considering factors like traffic conditions, weather, and road closures, to optimise delivery routes.
- This leads to reduced transit times, fuel consumption, and transportation costs.
- AI optimises air traffic management by predicting congestion, suggesting optimal routes, and assisting air traffic controllers in managing airspace more efficiently.
- AI supports automated train operation systems, enabling precise control, efficient energy use, and improved safety in railway transportation.
- AI facilitates smart toll- collection systems, allowing for automated and efficient tolling processes, reducing congestion at toll booths and improving traffic flow.
- AI helps to incorporate predictive infrastructure planning for the 'GatiShakti' Project.

AI in Automation of Routine Tasks

- AI can automate repetitive and routine tasks in citizen services by reducing the workload on government employees.
- It can lead to faster response times, improved accuracy, and increased overall efficiency.

AI in Customer Service and Interaction

- AI-based chatbots and virtual assistants are useful in improving interaction with citizens by providing prompt responses to queries, guiding users through processes, and offering information on government services.
- It can operate 24/7, ensuring continuous availability and accessibility for citizens.

AI in Personalized Services

- AI enhances the user experience and increases citizen satisfaction.
- Personalized recommendations and notifications can be delivered to citizens, keeping them informed about relevant services and updates.
- While AI offers numerous benefits, it's essential to address concerns related to privacy, bias, and ethical considerations when implementing these technologies in citizen services.

(8) Cyber Security Challenges in the Era of AI

- India's digital landscape is rapidly evolving, with internet users exceeding 800 million.
- Government actively promoting digital initiatives like Aadhaar and Digital India.
- This growth, however, attracts malicious actors who exploit vulnerabilities in critical infrastructure and personal data. In 2023 alone, India witnessed over 1 billion

cyberattacks, highlighting the urgency of robust cyber security measures.

AI-powered threats

- AI can automate threat detection and response, analyze vast amounts of data to identify anomalies, and even predict future attacks.
- However, AI-powered tools can be manipulated by attackers to launch sophisticated cyberattacks, create deepfakes for social engineering, and automate malware development.

Unique Challenges for India

- **India faces several unique cyber security challenges due to its specific socio-economic context:**

1. Large digital divide: A significant portion of the population lacks access to digital literacy and awareness making them vulnerable for cyber threat
2. Fragmented cyber security infrastructure: The responsibility for cyber security is often distributed across various government agencies and private entities, leading to a lack of coordination and comprehensive strategies.
3. Data privacy concerns: It is a cause of concern for digital payments.
4. Skill shortage: India faces a shortage of qualified cybersecurity professionals, hindering effective threat detection and response capabilities.

Addressing the Challenges

- **To overcome these challenges, India needs a multi-pronged approach:**

1. Building a robust cyber security ecosystem: This includes strengthening government agencies like CERT-In, promoting public-private partnerships, and fostering collaboration among stakeholders.
2. Investing in AI-powered cyber security solutions is crucial.
3. Promoting digital literacy and awareness is essential to build a resilient digital society.
4. Developing a strong legal framework: to deter cybercrimes, protect critical infrastructure, and ensure data privacy.
5. Investing in cyber security training and skills development: Addressing the skill shortage by providing training programs and attracting talent to the field is essential for long-term cyber security preparedness.

Focus on AI Integration

- Integrating AI responsibly into cyber security solutions can be a game-changer for India. Here are some key areas of focus:

1. Threat detection and response: AI can analyze network traffic, user behavior, and system logs to identify anomalies and potential threats in real time, enabling faster response times and minimizing damage.

2. Vulnerability management: AI can automate vulnerability scanning and patching, ensuring systems are constantly updated and protected from known exploits.
3. Fraud prevention: AI can analyze financial transactions and identify suspicious patterns to prevent online fraud and financial theft.
4. Cybercrime investigation: AI can assist in analyzing forensic data, identifying attackers, and predicting future attack patterns to improve cybercrime investigations.

Call to Action

- Cyber security in the era of AI requires a collective effort.
- The government, private sector, academia, and civil society must come together to build a robust cyber security ecosystem, promote responsible AI development, and empower individuals to navigate the digital world safely.

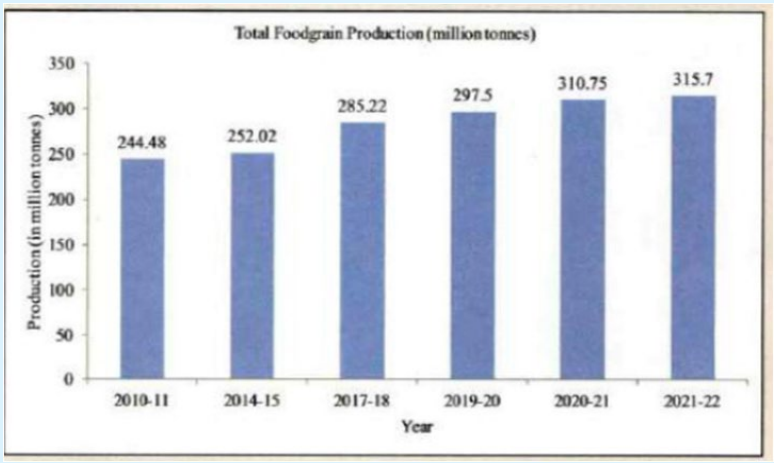
Additional Considerations

1. The ethical implications of AI in cyber security need careful consideration.
2. International cooperation is essential for combating cyber threats that transcend borders. Sharing information, best practices, and expertise will strengthen global cyber security preparedness.
3. Continuous research and development are critical to stay ahead of evolving cyber threats and develop new AI-powered solutions.

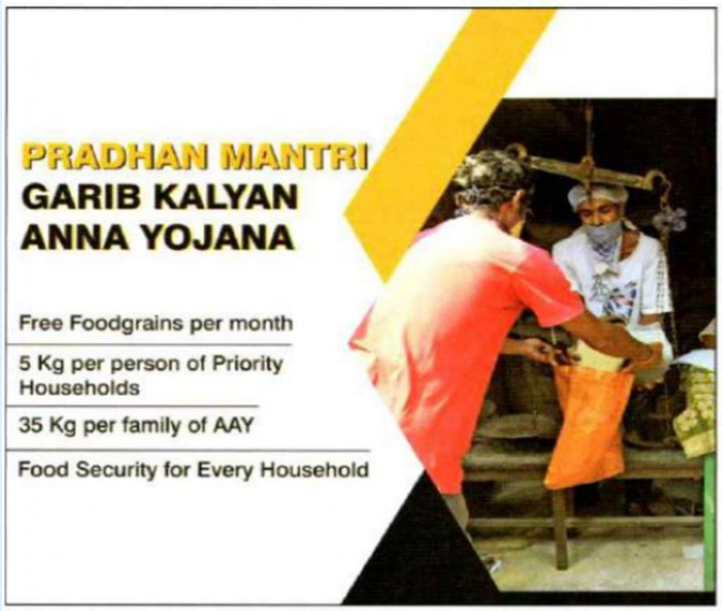
Conclusion

- Cyber security in the era of AI is a complex challenge, but by proactively addressing the vulnerabilities and leveraging the opportunities, India can create a secure and resilient digital future for its citizens and contribute to a safer global digital landscape.

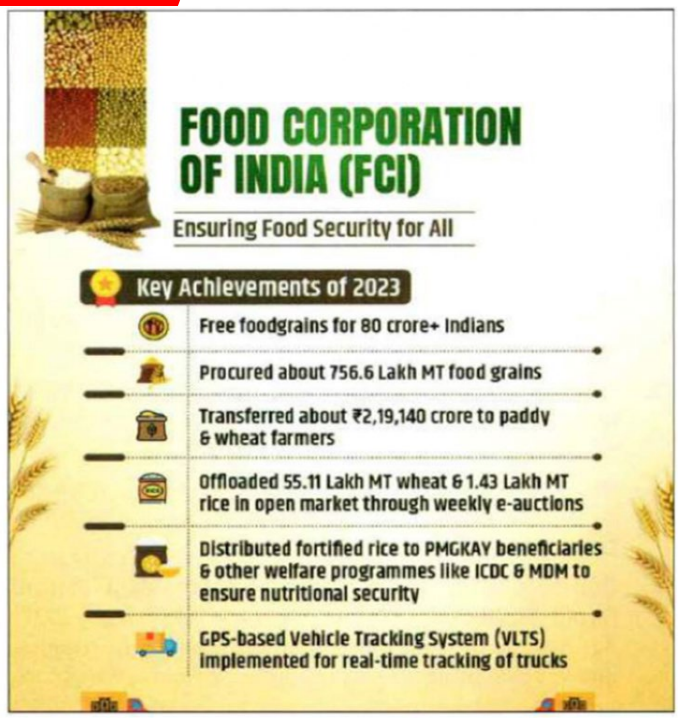
(1) Shaping Sustainable Food Systems with Storage Infrastructure



- Agriculture is the mainstay of the Indian economy, which has witnessed a magnificent transition from being a food deficit to a food surplus and is now an agriculture produce exporter to the world.
- India holds the second-largest agricultural land in the world, with over 200 countries in its export basket (Ministry of Commerce & Industry, 2023).
- Food production in India has increased significantly since the last decade, from 244 million tonnes during 2010-11 to 310 million tonnes during 2021-22.
- India is on the path of becoming a developed nation-Viksit Bharat by 2047- marking the centenary year of India's Independence.
- The vision of a developed nation by 2047 encompasses economic growth, social progress, environmental sustainability, and good governance.
- As per the FAO's State of Food and Agriculture (2019) report, around 14 percent of the world's food (valued at $400 billion per year) is lost after it is harvested and before it reaches the shops.
- UNEP's Food Waste Index Report (2021) showed that a further 17 percent of the food ends up being wasted in retail and by consumers, particularly in households (United Nations Environment Programme, 2021).
- Food that is lost and wasted accounts for 38 percent of total energy usage in the global food system.
- As per the study commissioned



by the Ministry of Food Processing Industries, the economic value of quantitative losses of 45 major crops/ commodities was found to be in the tune of Rs. 92,651 crore.



- Enhancing sustainable and world-class storage infrastructure are inevitable to boost growth in agriculture and allied sectors and achieving the targets of UN-Sustainable Development Goals.
- During 2022-23, total food grains production in the country is estimated to a record high of 329.68 million tonnes, which is higher by about 14.1 million tonnes than the production of food grains of 315.62 million tonnes achieved during 2021-22.
- India accumulates a huge stock of staple food for specific purpose of supporting the poor and needy during urgent times.
- Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY) is the World's biggest social welfare scheme aimed at ensuring national food and nutrition security and empowerment of weaker sections of the society.
- It envisions providing free food grains to about 81.35 crore beneficiaries for a period of five years with effect from 1 January 2024.
- The enhanced storage infrastructure will support meeting the food-demand, supply, and access to the nationals across the country.
- Various initiatives have been taken by the Government to encourage storage infrastructure and strengthen food systems under the
- Agriculture Infrastructure Fund (AIF),
- Agricultural Marketing Infrastructure Scheme (AMI),
- Sub-Mission on Agricultural Mechanization (SMAM),
- Pradhan Mantri Formalization of Micro Food Processing Enterprises Scheme (PMFME),
- Pradhan Mantri Kisan Sampada Yojana (PMKSY), and
- Mission for Integrated Development of Horticulture (MIDH).

Sustainable Food Systems

- The sustainable food system delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition
- for future generations are not compromised.
- Here, storage infrastructure plays a significant role in adding resilience to the food

system and will positively impact food security and food availability.

- The use of scientific storage methods can reduce these losses to as low as 1%-2%.
- At present, several structures ensure the safe storage of grains, ranging from small metal bins to tall grain elevators/silos.
- These storage structures are classified under different categories like traditional storage structures, improved storage structures, modern storage structures, and farm silos.
- Warehouses are scientific storage structures especially constructed for the protection of the quantity and quality of stored products.
- Also, advanced cold chain storage infrastructure capacity has been strengthened for perishable food commodities.
- The cold storage capacity of 8.38 lakh MT has been created under the Integrated Cold Chain and Value Addition Infrastructure scheme.

Estimations of Post-harvest Food Losses

- Studies indicated that the major post-harvest losses are reported in the allied sector, i.e, fisheries and eggs.
- Amongst the horticultural crops, the trend in losses is higher in fruits (between 6 - 16%) followed by vegetables (4-12%) than in plantations and spices (between 1-8%), respectively.

Government Initiatives

- The Food Corporation of India (FCI) is set up under the Food Corporation's Act of 1964 and is the only government agency entrusted with the movements of food grains from procuring states to consuming states through a network of storage infrastructure, owned or hired by FCI in the whole of India.
- FCI augments its storage capacity through the following schemes:- Private Entrepreneurs Guarantee (PEG) Scheme, Central Sector Scheme (CSS), Construction of Silo's under Public Private Partnership (PPP) mode, Hiring of godown from Central Warehousing Corporation (CWC)/ State Warehousing Corporations (SWCs)/State Agencies, Hiring of godown through Private Warehousing Scheme (PWS).
- As on 01.07.2023, the Food Corporation of India has a network of 1923 warehouses (Owned/Hired) with a capacity of 371.93 LMT for storage of Central Pool food grains.
- The total food grain production in India is about 311 MMT and total Storage Capacity in India is only 145 MMT, i.e., there is a shortage of 166 MMT of Storage.
- To address the shortage of food grain storage capacity in the country, the Government last year approved the 'World's Largest Grain Storage Plan in Cooperative Sector', which have been rolled out as a Pilot Project in different states/UTs of the country.
- It entails creation of various agri infrastructure at the Primary Agricultural Credit

Societies (PACS) level, including setting up decentralised godowns, custom hiring centers, processing units, Fair Price Shops, etc. through convergence of various existing schemes of the Government of India (GoI) under different Ministries.

- These Pilot projects are implemented by the National Cooperative Development Corporation (NCDC) with the support of NABARD, Food Corporation of India (FCI).
- Through schemes, PACS can avail of subsidies and interest subvention benefits for the construction of godowns/storage facilities and setting up of other agri-infrastructure.
- NABARD is also extending financial support to PACS by refinancing them at highly subsidized rates of around 1 per cent, after incorporating the benefits of 3% interest subvention under the AIF scheme for projects up to Rs. 2 Crore.
- • There has been a recent push to increase the cold storage capacity available in India — with extensive tax breaks.

Achieving Sustainable Development Goals

- Food grain storage will directly support in achieving the targets made under the Sustainable Development Goal of zero hunger, which aims to end all forms of hunger and malnutrition and double the agricultural productivity and incomes of small-scale food producers.
- Also, indicators under target 12 i.e. sustainable consumption and production can be achieved through advancement in storage infrastructures in India.

Way Forward

- The promotion of decentralized local storage system will reduce the wastage of food grains, strengthen food security, and prevent distress sales by farmers. The increased investment in modernization of warehousing, logistics, cold chain, food processing, and integrated value chain development can enable the goal of becoming a development nation and achieving the Sustainable Development Goals.

(2) Institutionalized Management of Food Security

- At present, the projected population of India is about 1.40 billion, which constitutes about 17.5% of the global headcount of 8 billion.
- The Government of India distributes free food grains under Pradhan Mantri Garib Kalyan Ann Yojana (PMGKAY) to about 81.35 crore people across the country.
- At the time FCI was established on 14 January 1965, India was a food-deficit nation that often imported food grains from other nations, particularly from United States of America (USA) under PL-480 agreements.

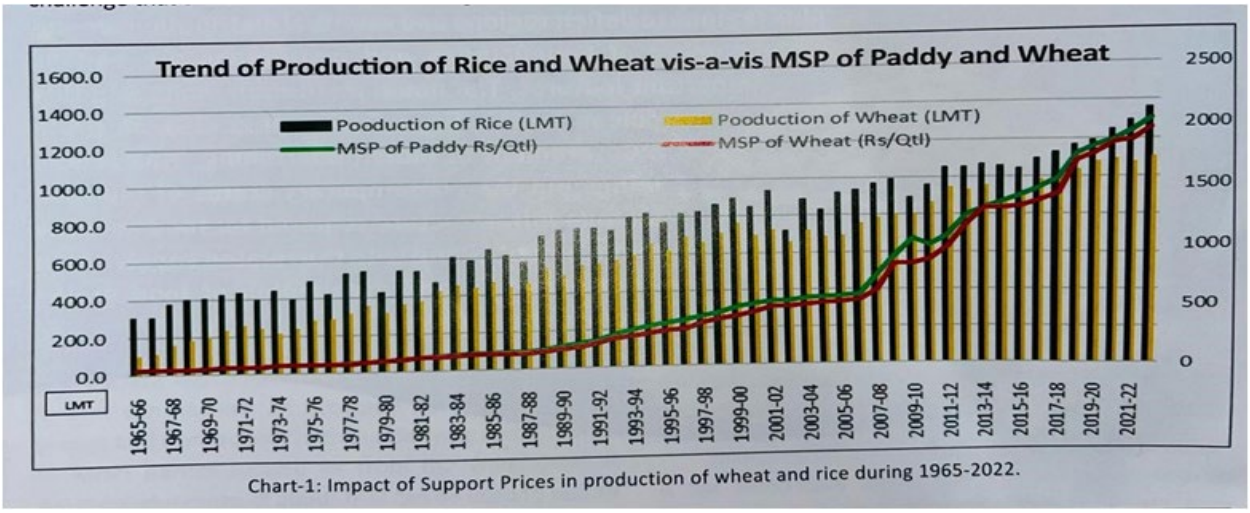


Chart-1: Impact of Support Prices in production of wheat and rice during 1965-2022.

- During this era India launched 'Green Revolution" to augment food production with the use of high yielding verities of seeds and deployment of technology in agriculture.
- MSP purchase by FCI and allied state government agencies, particularly wheat and paddy is known as central pool procurement and led to constant increase in production.
- The continued procurement from farmers encouraged them to produce more, due to which procurement share of the total production also start rising.

FCI has been mandated to-

a. To provide remunerative prices to the farmers,

b. To provide food grains to vulnerable sections of the society at affordable prices,

c. To maintain buffer stock reserves for exigencies, and

d. To intervene in market for price stabilization.

- In order to achieve these mandates, FCI had to constantly enhance its operations, particularly transportation, and distribution of food grains.

Storage Operations for Food Grains in Central Pool

- For any agricultural produce and its value-added products, it is important that they are stored properly for preservation of their qualities, future usage, and consumption.
- Food grains like wheat and rice with low-moisture and low pH activity fall under the non-perishable category and can be stored for a longer duration of 1 to 4 years.

Preservation of Food Grains during Storage

- In order to maintain and preserve the quality of stored food grains in godowns and silos, FCI regularly conducts periodical inspections by trained professional staff.
- Food grains are inspected for classification, categorisation, disinfestation, and fitness for liquidation followingthe FIFO principle.
- Food grains are kept infestation-free by prophylactic treatment with malathion

and deltamethrin and disinfected by curative treatment through fumigation with aluminum phosphide.

Storage Capacity in Central Pool

- By the end of 2023, FCl has 761.29 lakh MT storage space for safe storage of food grains at about 2000 locations.
- This storage capacity is about 125 times the storage capacity on 6.18 lakh MT at the time of its inception in 1965-66.
- While 363.69 lakh MT is with FCl, about 397.60 lakh MT is with state government agencies.

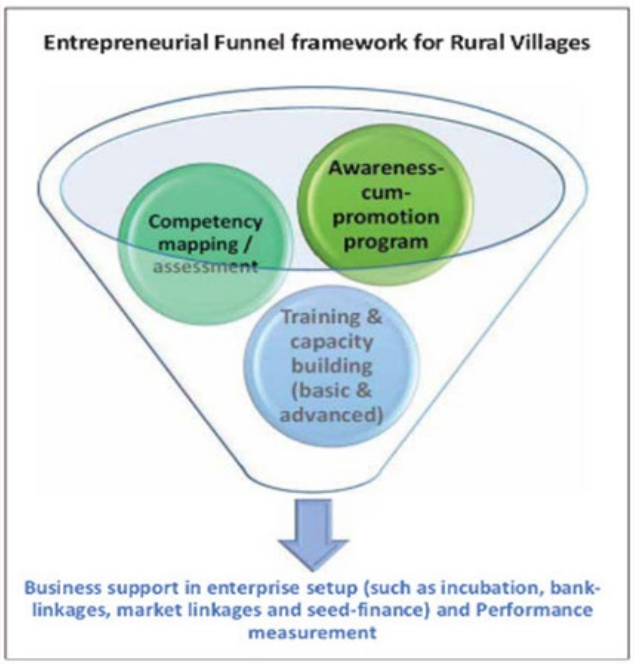
Transportation and Distribution of Food Grains

- Procured food grains from surplus states are transported to deficit states.
- Efficient transportation is pivotal in connecting surplus in-producing regions with deficit areas.
- FCl employs multimodal transportation approach, utilizing railways, roadways, and waterways.
- Typically, wheat is transported from Punjab, Haryana, and Madhya Pradesh to all other states, while rice is transported from Punjab, Haryana, Uttar Pradesh, Uttarakhand, Chhattisgarh, Odisha, Andhra Pradesh, Telangana, and Madhya Pradesh to all other states.
- The food grains transported in the deficit regions are also stored in local godowns to reach 5.45 lakh Fair Price Shops (FPSs) across the country through state government agencies.

Technology Integration and reduction in losses

- The integration of digital system for inventory management like Depot-on-Line System (DoS), GPS-enabled Vehicle Tracking System (VLTS), linking of rice mills with individual Depots/ warehouses for delivery of rice, and allocation of space at individual warehouses for absolute transparency in the procurement process (WINGS) etc have improved the accuracy and efficiency of FCI's process and also contributed to transparency and accountability throughout the supply chain.
- Conclusion- Thus, FCI's food supply chain not only ensures food security to all the needy citizens in every nook and corner of the country but also make it the world's largest food system. The efforts to modernise its operations and to take along all the stakeholders is a continuing process to improve its efficiency and effectiveness.

(3) Mega Food Storage Plan



- India is the second-largest producer of foodgrains in world, with an annual production of about 3,100 lakh tonne.
- However, currently the country has a foodgrain storage capacity of 145 million metric tonnes (MMT) against the total production of 311 MT- leaving a gap of 166 MMT.
- This means the existing storage infrastructure can only accommodate approximately 47 percent of the total produce.
- When compared to the USA and China, which process 65% and 23%, respectively, of their perishables, India is able to process a meagre 7%, which is quite negligible.
- The USA, Brazil, Russia, Argentina, Ukraine, France, and Canada have the capacity to store more food grains than they produce.
- Unfortunately, poor systems and techniques of handling, storage, and distribution result in postharvest losses of around 10-16 per cent for major cereal crops, 26 per cent in the case of wheat, and 34 per cent in the case of vegetables and fruits.
- Under the new plan, the Ministry of Cooperation has approved a network of integrated grain storage facilities through Primary Agricultural Credit Societies (PACS) across the country.
- There are more than 1,00,000 PACS spread across the country, with a huge member base of more than 13 crore farmers.
- This will be the world's largest grain storage plan in the cooperative sector.
- The integrated modular PACS will have a custom hiring centre, procurement centres, primary processing units for cleaning and winnowing, a storage shed and container storage, and silos as well.
- It purports to enhance food grain storage capacity by 70 MMT in the cooperative sector.
- The plan entails the creation of various types of agri- infrastructures

Ministry of Agriculture and Farmers Welfare	Ministry of Food Processing Industries	Ministry of Consumer Affairs, Food and Public Distribution
Agriculture Infrastructure Fund	Pradhan Mantri Formalisation of Micro Food Processing Enterprises Scheme	Allocation of food grains under the National Food Security Act
Agricultural Marketing Infrastructure Scheme	Pradhan Mantri Kisan Sampada Yojana	Procurement operations at Minimum Support Price
Mission for Integrated Development of Horticulture		
Sub Mission on Agricultural Mechanisation		

at the Primary Agricultural Credit Societies (PACS) level, including warehouses, custom hiring centres, processing units, fair price shops, etc. by leveraging the 'Whole-of-Government approach'.

- The plan is being implemented by schemes of the different ministries shown in tabular form.
- An Inter-Ministerial Ministerial Committee (IMC) has also been constituted for the effective and seamless implementation of the scheme.

Why Mega Plan Needed?

- India, the most populous country in accounts for 18 per cent (1.4 billion) of population (7.9 billion).
- It contains only 1percent (160 million hectare) of the cultivable land (1,380 million hectare).
- India runs the world's largest food programme under the National Food Security Act, 2013, that covers about 81 crore people.
- Therefore, to ensure food security of a billion plus population, a robust network of food grain storage facilities becomes essential.

Implementing Agencies

- The National Cooperative Development Corporation, with the support of NABARD, NABARD Consultancy Services, the Central Warehousing Corporation, the Food Corporation of India, etc., is implementing the pilot project in 24 PACS of 24 different States/UTs.

Why Implement

- **A number of benefits can be derived by augmentation of the Storage facilities, such as-**
  - reduce transportation costs for farmers, enabling them to maximise their profits.
  - Farmers would have a choice to sell their produce depending on the market conditions.
  - The modern silos will have the facility of computerised real-time monitoring systems.
  - Strengthening food security will ensure a more stable and consistent supply of food grains across the country, thus reducing our dependence on imports.
  - It will create numerous employment opportunities in rural areas.
  - It will led to leverage the strength of cooperatives and transform them into successful business enterprises, aligning with the vision of 'Sahakar se Samriddhi'.
  - It seeks to empower PACS, which play a significant role in the agricultural and rural landscape.

Challenges Ahead

- Conflict with FPOs: FPOs are also involved in post-harvest handling of the produce that may come in conflict with the agriculture cooperatives.
- Agri-Cooperatives: Agriculture cooperatives have been given financial responsibilities and storage infrastructure implementation.
- Infrastructure Management and Maintenance: It is easy to create infrastructure, but managing and maintaining it is a bigger challenge.
- Food Quality Management: Often the poor-quality grains are distributed under Public Distribution System, due to low quality storage infrastructure with primitive technologies.
- Multiplicity of institutions with crosscutting objectives is likely to dilute their effectiveness.
- Policies formulated for small and marginal farmers often end up serving the interest of medium and large farmers.

Possible Solutions- The latest data shows that the value of food losses (agriculture, horticulture, milk, meat, and fish) turns out above Rs. 1,40,000 crore per year. Hence, find out practical solutions for removing hurdles is necessary.

- It would be much better if this scheme is implemented in Public-Private Partnership mode.
- Modernization of the existing storage infrastructure needs to be prioritised.
- Adequate storage facilities should be provided to horticultural crops.

(4) Entrepreneurial Opportunities in Food Storage Infrastructure

- With a potential size of US$ 535 billion in 2025, India's food processing sector provides ample opportunities for entrepreneurs as well as farmers.
- The Shanta Kumar Committee (2015) has recommended modernizing storage to ensure enhanced quality of food grains, negligible loss as compared to food grains storage in bag, efficient utilization of land, higher operational efficiency, and bring in private investment into the sector.

Box 1: Entrepreneurial Opportunities in Food Storage Infrastructure
Custom hiring centres
Common facility centres
Transportation logistics
Procurement logistics
Cold storage/warehousing facilities on rental basis
Fumigation and sterilisation services for warehouses
Pest management services
Gunnies and packaging material stores
Processing units (sorting and grading, powdering etc.)
Packing houses
Various types of maintenance and repair services
Mentoring and hand holding services
Use of ICTs in storage
Energy suppliers (electricity, solar etc.)

- Entrepreneurial Possibilities in Food Storage Infrastructure Agrifood supply chains involve:
  a. Production: Inputs such as seed, feed, and harvesting services and equipment;
  b. Processing: Activities such as washing, drying and freezing food;
  c. Aggregation and Distribution: Things such as marketing cooperatives, storage facilities, brokerage services, logistics management, and delivery trucks;
  d. Retailing: All those who sell or serve food to consumers, from restaurants, grocery stores and to schools, caterers, and fast-food outlets etc.
  e. Marketing: The efforts that goes into product promotion.
  f. Capital: Finance, natural capital (i.e. land, water and other ecological resources), human capital, and social capital.
- The food industry faces huge challenges such as food supply, food security or food waste that might offer interesting opportunities for aspiring entrepreneurs developing innovative solutions to these pressing issues.
- Schemes and Programmes- Under Pradhan Mantri Kisan Sampada Yojana (PMKSY), establishment of mega food parks, massive scale cold chain structures, the development, and growth of food processing and preservation capacities, agro-processing clusters, etc. are supported.

Few of the important schemes are as discussed below-

1. Mega Food Parks: It aims to link agricultural production to markets by using a cluster approach, implemented by an SPV.
2. Cold chain, Value Addition and Preservation- It aims to provide integrated cold chain and preservation infrastructure facilities along the entire supply chain of food processing.
3. Creation of Food Processing and Preservation Capacities: It aims to create and modernize processing and preservation capacities by increasing the level of processing and value addition, leading to a reduction in wastage.
4. Creation of Backward and Forward Linkages: It aims to provide effective and seamless backward and forward integration in the processed food industry. Financial assistance is provided for setting up primary processing centers, collection centers, and modern retail outlets.
5. Food Safety and Quality Assurance Infrastructure: It aims to make India's food and agro-processing sector have a competitive edge in the market by creating infrastructure for safety and quality assurance services.
6. Agro Processing Cluster: It aims at cluster approach-based development of modern infrastructure and common facilities to encourage a group of entrepreneurs to set up food processing units.
7. PM Formalisation of Micro Food Processing Enterprises (PMFME): It is implemented by the Ministry of Food Processing Industry (MoFPI). It aims at providing financial, technical, and business support for the upgradation of existing micro food processing enterprises.

8. Common Facility Centres (CFCs) under MSE-CDP- Export Promotion Facilities for FPO such as for processing, storage (cold chains), Pack Houses, testing, and packaging.
9. Mission for Integrated Development of Horticulture (MIDH): Under this, apart from other things, financial assistance is provided for setting up of Pre-cooling Unit, Cold Room, Pack Houses, Integrated Pack House, Preservation unit, Reefer Transport, Ripening Chamber, etc.

Way Forward

- Adequate food storage facilities at affordable costs is the need of the hours not only to reduce food wastage but also to help small and marginal farmers to escape from distress sales.

(5) Making India the Food Basket of the World

- Out of 8 billion people on this planet, 828 million are going hungry every day.
- Currently, India is the second-biggest producer of wheat and rice, the two staples.
- It has cultivable land, all the seasons for production of all varieties of fruits & vegetables, and an agribusiness system that works.
- India exports wheat to about 70 countries and rice to about 150.

Some of the strengths outlined below underline India's intent to be the world's food supplier: Millets

- India could help mitigate the world food crisis by offering millets.
- India is the largest producer of millets in the world.
- India's two varieties of millets, namely pearl millet (bajra) and sorghum (jowar), will together contribute approximately 19 percent in world production in 2020.
- The major millet producing states in India are Rajasthan, Karnataka, Maharashtra, Uttar Pradesh, Haryana, Gujarat, Madhya Pradesh, Tamil Nadu, Andhra Pradesh, and Uttarakhand.
- Terming millets as part of India's 'Super Food Bucket', we have given it (millets) the identity of Shree Anna.
- India spearheaded the United Nations General Assembly (UNGA) resolution for declaring the year 2023 as the International Year of Millets.
- High-yielding varieties, including bio-fortified millets, have been introduced to increase production, and the Government has recognised the health benefits of millets by including them in the POSHAN Mission and designating them as nutri-cereals.

Food Processing Industry

- It has an important role to play while India seeks to create a food basket for the world by linking the farmers to the final consumers in domestic as well as international markets.

- In the next ten years, food production is expected to double.
- These products, if processed and marketed smartly, can make India a leading food supplier in the world.
- The sector's size is estimated to be around US $ 322 billion, and it is expected to reach US $ 543 billion by 2025, growing at a CAGR of 14.6%.

Food Supply Chain

- India is one of the country to become the food and grocery market in the world, a large consumer of food products, and has a huge opportunity to become a leading global food supplier through the right marketing strategies and an agile, adaptive, and efficient supply chain.
- The food supply chain is complex, with perishable goods and numerous small stakeholders.
- Data integration, financial flow management, supply-demand matching, collaborative forecasting, information sharing, and goods movement synchronization through efficient transport scheduling, are very well practiced in high technology industries with immense benefits.

Food Packaging

- Packaging is also emerging as a key ingredient as the country marches towards creating a food basket for the world.
- Packages have become the competitive tool to reach the consumer, and the task assumes increasing responsibility with more and more competitive and substitute products being introduced.

Standards

- It is a powerful tool for improving supply chain efficiency.
- There are two kinds of standards in the food supply chain. The first one is the food standard, which concerns itself with the content, the manufacturing process, the packaging, etc.
- The second standard concerns logistics and IT systems like standardization of cartons, pallets, and IT software so that seamless transfer of goods and information is possible.
- The increase in world food trade and the advent of the Sanitary and Phytosanitary (SPS) Agreement under the World Trade Organization (WTO) have led to increasing recognition and adoption of food safety measures.

Conclusion

- India can become the largest food supplier in the world. It has cultivable land, all the seasons for production of all varieties of fruits and vegetables, and an agribusiness system. Investments in cold chain infrastructure, applied research in post-harvest technologies, the installation of food processing plants in various sectors, and the development of the food retailing sector are mandatory for achieving gains in this sector.

(6) ODOP Providing Framework for Value chain Development

- 'One District One Product'(ODOP) initiative has been taken by Government of India to foster the inclusive development, to harness the export potential of each districts and helping in integrated development of local economy.
- It is an initiative under 'Pradhan Mantri Formalisation of Micro Food Processing Enterprises (PMFME) Scheme.
- **The major objectives of the PMFME scheme through ODOP are:**
  a. improved access to financial assistance to micro food processing entrepreneurs for technological upgradation;
  b. capacity building through skill training, enhanced technical knowledge, and hand holding & anchoring services;
  c. support to Farmer Producer Organizations (FPOs), Self-Help Groups (SHGs) and Cooperatives;
  d. enabling the existing informal entities into formal registration as 'agri-based business enterprises.
- Under this ODOP scheme, the Government of India approved 137 unique products in 713 districts of 35 States and UTs.
- Under the branding and marketing component, the FPOs, SHGs, Cooperatives as 'Special Purpose Vehicles (SPV)" of ODOP-based micro food processing enterprises have been getting support for market study and product standardization, packaging material, quality control and food safety compliance for consumer retail sales, warehousing and storage rentals, and marketing of agri-products.
- The ODOP intervention has enabled and of onboarding of sellers of identified products on e-commerce platforms, which in turn, enhance visibility for the small businesses and farmers from rural areas.
- Under PMFME Scheme, the top 5 performing states are Maharashtra, Bihar, Tamil Nadu, Uttar Pradesh, and Telangana.
- Within the scheme, individual micro-enterprises will get the assistance in the form of capital subsidy with credit-linkage at 35% of the eligible project cost, up to a maximum of Rs.10 lakhs per unit.
- Additionally, clusters and groups like FPOs, SHGs, Producers Cooperative, will receive credit-linked grant at 35% for capital investment.
- The ODOP has facilitated in attaining balanced regional development across all the districts and will enable socio-economic development across India.

Value Chain Development, Infrastructure and Marketing Support-

- Common Infrastructure- It has provisions for usage of common infrastructure facilities at rural area for all the FPOs, SHGs, Cooperatives, while the private enterprises use the facilities on hiring basis, thus making the best use of existing capacity.
- Development of Clusters: There can be more than one cluster for one product in one district or it can be extended beyond two or more districts, particularly for value chain development and alignment of relevant support infrastructure, depending upon the nature of products and perishable goods. The scheme also supports strengthening of forward and backward linkages to provide common facilities, skilling/training, incubation centres, research and development, marketing, and branding.
- Value Addition: The cluster-based approach adopted by various States/UTs in India have played an enabling role regarding storage for agri-based products, preventing the wastages, facilitating processing and most importantly ensuring effective marketing ecosystem for the various products under ODOP.
- Branding and Marketing: Through this scheme a common brand, common packaging and common standard is highly critical.
- Institutional Architecture- With committees at district, state, and national level, the project envisages proper planning, effective execution, and close monitoring through robust institutional architecture.

ODOP Prospects and Benefits

- **The ODOP scheme has variety of benefits such as -**
  a. Local and community development like in-situ employment, empowering rural women and youth.
  b. Promoting and preserving the local best practices/ micro-enterprises.
  c. Skilling, upskilling. reskilling and training of local talent.
  d. Local to global approach.

Way Forward

- The success of 'Democracy and Swaraj' depends upon 'how we plan for the unplanned and how we reach the unreached, how we get the best out of everyone, every district and every sector'.
- The ODOP intervention has received a lot of accolades and awards for its 'bottom-up approach' andits significant contribution to integrated development of India.
- In summary, India will emerge as a stronger economy with well-founded public policy support, enhanced awareness and infrastructure, improved institutional architecture along with cluster development, value addition, systematic marketing and branding for identified products, etc., through effective implementation of ODOP and its measurable outcomes, thereby achieving the goal of 'Atamanirbhar Bharat'.

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