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SEPTEMBER 2026

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MAINS **UPSC CSE** **2027**
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PREFACE

Dear Students,

Understanding and organizing Civil Services Exam relevant Current affairs in a crisp and concise manner is essential for success in the Civil Services exam. Our exclusive CSE Mains current affairs magazine will fulfil that need in your preparation.

Features

- Crisp, Clear and insightful analysis on key Current Affairs issues.
- Important issues segregated according to CSE Main Exam syllabus.
- Content written in question and answer format for clarity, easy recollection and coherence while writing the main examination.
- Exam relevant topics curated from The Hindu and Indian Express.

All the best

R.C.Reddy IAS Study Circle

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GS I - INDIAN HERITAGE AND CULTURE, HISTORY AND GEOGRAPHY OF THE WORLD AND SOCIETY

A. INDIAN CULTURE

I. Art Forms, Literature and Architecture

1. RAJGHAT EXCAVATIONS AND URBAN HISTORY OF VARANASI

Recent excavations at Rajghat have highlighted **Varanasi's ancient settlement, urbanisation and cultural development dating back to around 800 BCE.**

About Rajghat

- Rajghat lies in northern Varanasi, close to the **confluence of the Ganga and Varuna rivers.**
- Its archaeological mounds represent an important settlement associated with **ancient Kashi/Varanasi.**
- Kashi later emerged as one of the **16 Mahajanapadas**, reflecting the growth of territorial States and urban centres in the middle Gangetic plain.
- While **Sarnath** developed into an important Buddhist centre, the Varanasi region became a major centre of settlement, crafts, trade and religion.

Discovery and Excavation

- Archaeologist **Krishna Deva**, working for the Archaeological Survey of India (ASI), carried out excavations at Rajghat in **1940** and helped establish its archaeological identity.
- Later investigations were undertaken by scholars associated with **Banaras Hindu University (BHU).**
- Evidence from Rajghat initially placed early habitation at around **800 BCE.** Subsequent excavation at nearby **Aktha** suggested settlement in the wider Varanasi region could go back several centuries further.

Major Archaeological Findings

- Early levels yielded pottery associated with the period preceding or leading into the **Northern Black Polished Ware (NBPW)** cultural phase.
- Archaeologists discovered **terracotta human and animal figurines, pottery, metal objects and brick structures.**
- Numerous **seals and sealings** provide information about administration, economic activity and literacy.
- A significant Gupta-period sealing referring to the **city administration of Varanasi** helped confirm the site's identification with ancient Varanasi.

Historical Significance

- **Rajghat helps explain the rise of towns** in the Gangetic plains during the **first millennium BCE.**
- **Iron tools** supported agriculture, crafts and expansion of settlements.
- **The site provides archaeological context** for the rise of **Kashi from a Janapada to a major political centre.**
- **Material remains** from different periods demonstrate Varanasi's long history of occupation and transformation.
- Excavations at **Aktha and Ramnagar** indicate that ancient Varanasi developed through interconnected settlements rather than a single isolated urban core.

Conclusion:

Rajghat transforms Varanasi's antiquity from literary tradition into archaeological evidence, revealing the long evolution of Kashi into one of India's enduring urban centres.

B. INDIAN SOCIETY**I. Social Empowerment, Communalism, Regionalism & Secularism.****1. CHANGING FACE OF YOUTH PROTEST AND DISCONTENT IN INDIA****Why in News?**

- Recent youth mobilisations over **NEET-UG, recruitment examinations and institutional accountability** have highlighted the emergence of digitally connected, issue-based and decentralised protests in India.

How are Youth Protests Changing?

- Network-based:** Many contemporary movements emerge through informal student networks rather than established political organisations.
- Digital mobilisation:** Social media enables grievances to spread rapidly across universities, cities and States.
- Issue-centric:** Employment, examination integrity, education costs, transparency and institutional accountability increasingly drive mobilisation.
- Decentralised leadership:** Hashtags, online groups and local collectives can coordinate action without a single recognised leader.
- New political language:** Memes, satire, videos and digital symbols have become tools of political communication.

Why is Youth Discontent Growing?

- Examination failures:** Paper leaks, delayed results and cancelled recruitment processes can impose financial and psychological costs on aspirants. The government acknowledged reported irregularities in **NEET-UG 2024** and referred the matter to the CBI.
- Employment concerns:** PLFS 2025 reported an all-India unemployment rate of **9.9% among persons aged 15-29 years** under usual status, considerably above the rate for the overall working-age population.
- Rising aspirations:** Expansion of higher education has increased expectations for secure, merit-based employment and upward mobility.

Democratic Significance

- Accountability:** Peaceful mobilisation can draw attention to administrative failures overlooked by formal institutions.
- Participation:** It expands civic engagement beyond elections and political parties.
- Inclusiveness:** Digital platforms can connect students across geographical and socio-economic boundaries.
- Early warning:** Youth protests can signal deeper problems concerning employment, education and governance.
- Constitutionally, peaceful dissent is protected through **Articles 19(1)(a) and 19(1)(b)**, subject to reasonable restrictions such as public order. The Supreme Court has recognised peaceful protest as an important democratic freedom.

Challenges

- Leaderless structure:** Absence of recognised representatives can complicate negotiations and accountability.

- **Risk of violence:** Fringe actors may divert peaceful mobilisation towards confrontation.
- **Disproportionate restrictions:** Excessive policing can deepen alienation and weaken democratic trust.
- **Policy disruption:** Blanket cancellation of examinations may penalise genuine candidates along with wrongdoers.

Way Forward

- The **Public Examinations (Prevention of Unfair Means) Act, 2024** created a national framework against paper leaks and organised examination fraud.
- The **2026 Amendment Bill** proposed stronger penalties, fast-tracked investigations and Special Fast Track Courts.
- Establish time-bound and independent **student grievance-redress mechanisms**.
- Improve cybersecurity and transparency across examination processes.

Conclusion:

Youth protest should be treated as democratic feedback-responsive institutions, credible opportunities and peaceful dialogue can transform discontent into constructive participation.

C. GEOGRAPHY

I. Salient features of World's Physical Geography.

1. FROM MERCATOR TO EQUAL EARTH AND RETHINKING THE WORLD MAP

Why in News?

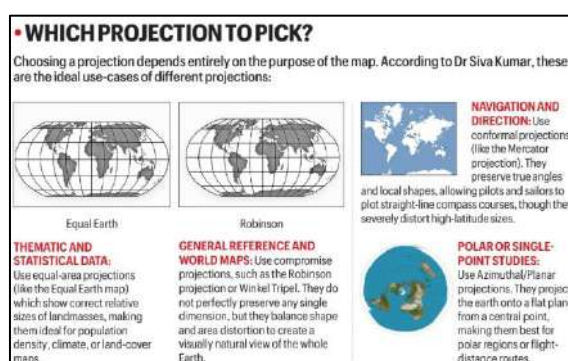
- The **UN General Assembly has backed the use of more accurate world-map projections**, highlighting how the Mercator map significantly understates Africa's relative size.

Why Can't Earth be Perfectly Represented on a Map?

- Earth is an **oblate spheroid**, while a map is a two-dimensional flat surface.
- Converting Earth's curved surface into a flat map is called **map projection**.
- Every projection produces some distortion in **area, shape, distance or direction**.
- Therefore, there is **no single 'perfect' map projection**; the appropriate projection depends on its purpose.

Mercator Projection

- Developed by Flemish cartographer **Gerardus Mercator in 1569**, primarily to assist maritime navigation.
- It is a **cylindrical conformal projection**, meaning it preserves local angles and shapes reasonably well.
- Its major navigational advantage is that **rhumb lines (constant compass bearings) appear as straight lines**.
- However, the spacing between latitudes increases towards the poles, greatly enlarging high-latitude regions.



Problems with the Mercator Map

- It seriously distorts **relative geographical area** at the global scale.
- For example, **Greenland appears comparable to Africa**, even though Africa is roughly **14 times larger**.
- Regions closer to the Equator, including **Africa, South Asia and South America**, consequently appear smaller relative to northern regions.
- Hence, Mercator remains useful for certain navigational purposes but is unsuitable when the objective is to compare the **actual areas of countries or continents**.

Evolution of Alternative Projections

- **Gall-Peters:** Preserves relative area but considerably stretches and distorts continental shapes.
- **Robinson:** A compromise projection that attempts to make overall distortion less visually severe; it does not preserve area exactly.
- **Winkel Tripel:** Designed to minimise combined distortions of **area, direction and distance** and became widely used for general world maps.
- **Equal Earth:** Combines an **equal-area property** with relatively recognisable continental shapes.

What is the Equal Earth Projection?

- Developed in **2018** by cartographers **Bojan Savric, Tom Patterson and Bernhard Jenny**.
- It is an **equal-area, pseudocylindrical projection** designed specifically for world maps.
- Countries and continents retain their **correct relative areas**; a region twice as large geographically is represented with twice the map area.
- Its curved outer meridians also give the map a more globe-like appearance.
- However, Equal Earth is **not distortion-free**: shapes, distances, angles and directions are altered to preserve area.

Why Does the UN Move Matter?

- The UN General Assembly adopted the **“Correct the Map” resolution on September 4, 2026**, led by Togo and the African Union.
- It encourages governments, educational institutions and technology companies to use projections that represent continental areas more accurately.
- It is particularly relevant for **education, climate maps, land-use representation and thematic mapping**, where accurate comparison of area is important.
- Importantly, the issue is not that Mercator is universally “wrong”; rather, **different projections should be selected according to their intended purpose**.

Conclusion:

The shift towards Equal Earth shows that good cartography is not about eliminating distortion, but choosing the projection that represents the geographical reality relevant to its purpose.

II. Key Natural Resources

1. CHINA'S YARLUNG ZANGBO MEGA-DAM AND IMPLICATIONS FOR INDIA AND THE BRAHMAPUTRA BASIN

Why in News?

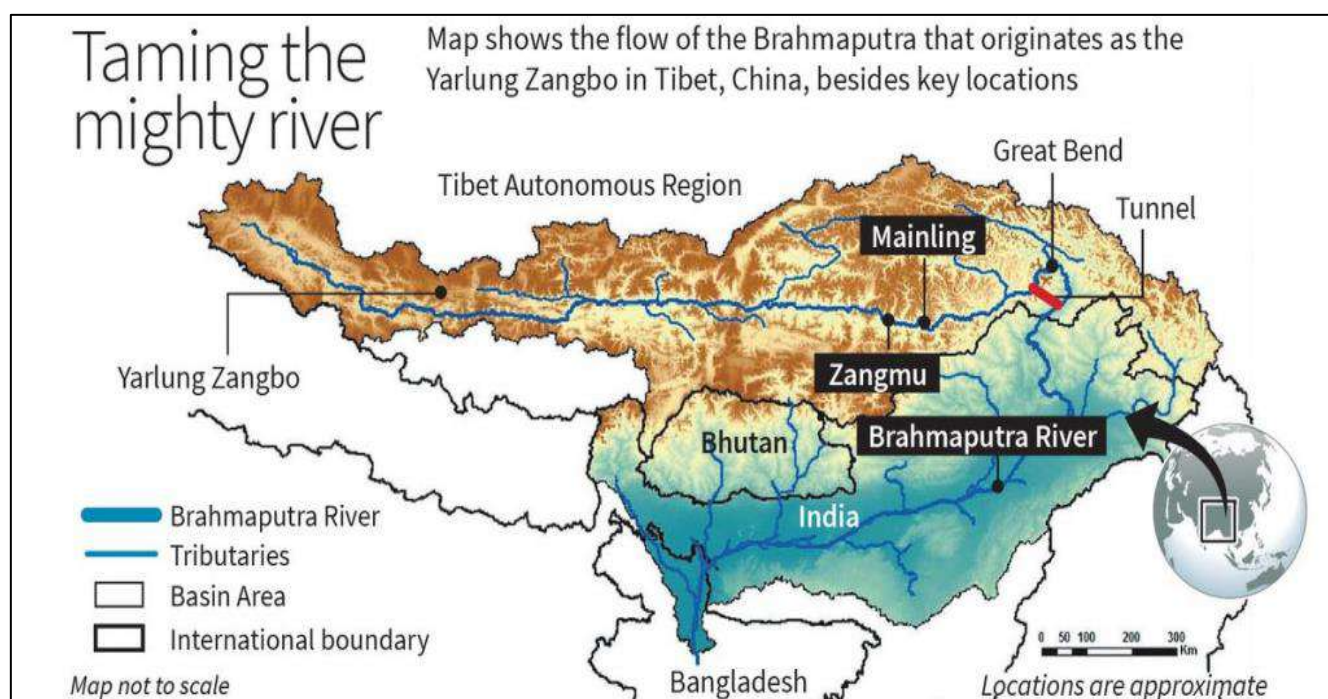
- Recent Himalayan flash floods have renewed concerns over **China's mega-hydropower project on the Yarlung Zangbo**, particularly its ecological, disaster and downstream implications for India and Bangladesh.

About the Yarlung Zangbo Project

- China has begun developing a massive hydropower project on the **lower reaches of the Yarlung Zangbo in Tibet**, near the river's dramatic bend before it enters India.
- The project comprises **five cascade hydropower stations** and is expected to generate about **300 billion kWh annually**, more than three times the annual generation of China's Three Gorges Dam.
- The region has exceptional hydropower potential because the river drops about **2,000 metres within roughly 50 km**.

Yarlung Zangbo-Brahmaputra River

- The river originates in the **Tibetan Himalayas**, where it is called Yarlung Zangbo/Tsangpo.
- It enters Arunachal Pradesh as the **Siang/Dihang** and becomes the Brahmaputra after receiving major tributaries such as the **Dibang and Lohit**.
- It subsequently enters Bangladesh before ultimately draining into the **Bay of Bengal**.
- The Brahmaputra basin covers about **5.8 lakh sq. km** across China, India, Bhutan and Bangladesh; around one-third lies in India.



Why is the Project Important for China?

- **Clean energy:** It supports China's renewable-energy and carbon-neutrality objectives.
- **Energy security:** Tibet's large hydropower potential can support electricity supply to other regions.
- **Economic benefits:** Such infrastructure can stimulate construction, investment and employment.
- **Strategic significance:** Development of infrastructure in Tibet also increases China's economic and administrative presence in a sensitive Himalayan region.

Major Concerns for India

- **Downstream flows:** Regulation of an upstream transboundary river creates concerns over the timing and quantity of water reaching Arunachal Pradesh and Assam.
- **Disaster vulnerability:** The eastern Himalayas are exposed to **earthquakes, landslides, extreme rainfall and glacial hazards**; a large project can increase the consequences of cascading disasters.

- **Sediment and ecology:** Altered sediment movement could affect river morphology, agriculture, wetlands and biodiversity downstream.
- **Sudden releases:** Dam operations during extreme events make reliable advance information crucial for flood preparedness.

Existing India-China Cooperation

- An **Expert Level Mechanism (ELM)** on trans-border rivers was established in **2006** to discuss hydrological information, emergency management and related issues.
- Under the **2013 MoU**, China agreed to extend the period for providing Brahmaputra flood-season hydrological information from **May 15 to October 15**.
- Such data are valuable for **flood forecasting and disaster mitigation** in downstream India.

Way Forward

- Seek **real-time and year-round hydrological information**, particularly during emergencies.
- Push for prior notification and greater transparency regarding major upstream infrastructure.
- Strengthen **satellite monitoring, flood forecasting and early-warning systems** in Arunachal Pradesh and Assam.
- Build climate-resilient infrastructure and community-based disaster preparedness across the Northeast.

Conclusion:

The Brahmaputra must be approached as a shared transboundary ecosystem where energy development, ecological security and downstream rights require transparency and sustained regional cooperation.

III. Important Geophysical Phenomena

1. INDIA'S EMERGING DROUGHT STRESS AND AGRICULTURAL RISKS

Why in News?

- Uneven southwest monsoon rainfall and persistent soil-moisture deficits in 2026 have increased **drought stress across India**, threatening kharif crops, rabi sowing and water availability.

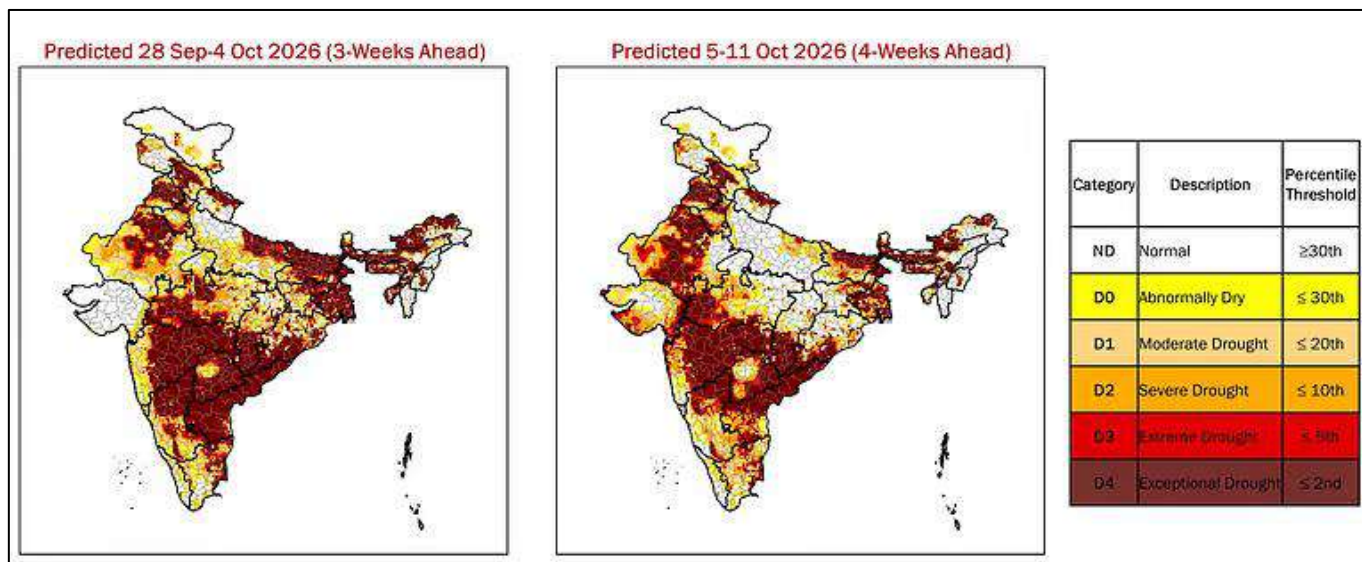
What is Drought?

- Drought is a prolonged period of **below-normal water availability** that adversely affects agriculture, ecosystems and human activities.
- It is broader than simply receiving less rainfall; its severity depends on **duration, timing, soil moisture and available water reserves**.
- Major forms include:
 - **Meteorological drought:** prolonged rainfall deficiency.
 - **Agricultural drought:** inadequate soil moisture for crops.
 - **Hydrological drought:** reduced reservoirs, rivers and groundwater.
 - **Socio-economic drought:** water shortage begins affecting livelihoods and economic activity.

Why is Drought Stress Increasing?

- **Uneven monsoon:** Rainfall may be near normal over a season but concentrated into short, intense spells separated by long dry periods.
- **Soil-moisture stress:** Heavy rainfall can generate runoff rather than adequately replenish soil moisture.

- **El Niño:** Warming of the central/eastern equatorial Pacific can influence atmospheric circulation and is often associated with weaker Indian monsoon conditions, though the relationship is not one-to-one.
- **Climate change:** Higher temperatures increase evaporation and crop-water requirements, worsening the impact of rainfall deficits.
- **Regional variation:** Western and peninsular India are particularly vulnerable because of high rainfall variability and large dryland farming areas. ICAR's vulnerability assessment has identified several districts in Rajasthan, Maharashtra, Karnataka and other States as highly vulnerable to climate risks.



Why is India Vulnerable?

- A large part of Indian agriculture continues to depend on **monsoon rainfall**, making farm output sensitive to rainfall timing.
- Small and marginal farmers have relatively limited capacity to absorb crop losses.
- Excessive groundwater extraction reduces the buffer available during rainfall-deficient years.
- Crops such as **paddy, sugarcane and cotton** can create additional pressure where they are grown in water-stressed regions.

Major Impacts

- **Agriculture:** Lower soil moisture can reduce kharif productivity and delay rabi sowing.
- **Food security:** Reduced production can raise prices of cereals, pulses and vegetables.
- **Rural economy:** Crop losses affect farm income, agricultural labour and livestock availability.
- **Water security:** Poor rainfall reduces reservoir storage and groundwater recharge.
- **Energy:** Lower reservoir levels can affect hydropower generation while irrigation increases electricity demand.
- **Environment:** Drought increases risks of land degradation, forest fires and ecosystem stress.

Government Initiatives

- **ICAR-CRIDA** has developed around **650 District Agricultural Contingency Plans** for drought, delayed monsoon and other weather extremes.
- **NICRA (National Innovations in Climate Resilient Agriculture)** promotes climate-resilient crops, technologies and farming practices.
- In 2026, ICAR institutions have specifically initiated **El Niño-based contingency planning** in vulnerable areas.

Way Forward

- Shift from rainfall-only assessment towards **impact-based drought monitoring** combining soil moisture, vegetation, reservoirs and groundwater.
- Promote **millets, pulses and drought-tolerant crop varieties**.
- Expand **drip and sprinkler irrigation, farm ponds, watershed development and rainwater harvesting**.
- Encourage **crop diversification according to local agro-climatic conditions**, reducing dependence on water-intensive crops.

Conclusion:

India must move from drought relief to drought resilience by integrating climate-smart agriculture, efficient water management and local-level early warning systems.



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GS 2 - GOVERNANCE, CONSTITUTION, POLITY, SOCIAL JUSTICE AND INTERNATIONAL RELATIONS

A. POLITY

I. Federal structure of the Constitution

1. Gram Sabha Consent and Tribal Land Rights

Why in News?

- A proposal to allow majorities of affected gram sabhas to approve projects has raised concerns over tribal land rights, Forest Rights Act protections and democratic consent in Scheduled Areas.

Gram Sabha and Tribal Land Rights

- **Role of gram sabhas:** Gram sabhas in tribal areas serve as democratic institutions for protecting community rights over land, forests, livelihoods, culture and customary ownership.
- **Consent and tribal autonomy:** Requiring the participation and consent of affected gram sabhas helps ensure that communities directly facing displacement or land diversion retain meaningful control over decisions affecting their lives.
- **Forest Rights Act framework:** The Forest Rights Act, 2006 (FRA) was enacted to address historical injustices against forest-dependent communities by recognising individual and community forest rights.
- **Proposed majority-based consent:** The Committee on Public Undertakings' suggestion that consent from about 70%-75% of affected gram sabhas could suffice has raised concerns that directly affected villages could potentially be bypassed.
- **Impact on democratic institutions:** Treating gram sabhas primarily as stakeholders rather than rights-bearing democratic institutions could weaken their role in protecting the constitutional and statutory rights of their inhabitants.
- **Risk of indirect displacement:** A project developer could potentially secure approvals from less affected villages while proceeding with a project that directly affects another village, thereby weakening community-level protection.

Legal and Institutional Concerns

- **Absence of explicit universal consent clause:** The FRA does not expressly contain a provision requiring a no-objection certificate from every gram sabha affected by a project, but this does not automatically establish that gram sabha decisions can simply be bypassed.
- **Regulatory overlap:** The debate involves the relationship between the FRA administered by the Tribal Affairs Ministry and environmental and forest-diversion rules administered by the Environment Ministry.
- **Regulatory vacuum:** The refusal of the Tribal Affairs Ministry to assume jurisdiction over the issue has raised concerns about the absence of a clear institutional framework governing gram sabha consent.
- **Need for legislative clarity:** Any substantial change to the consent framework should be made transparently through appropriate amendments to legislation or rules rather than through administrative interpretation.

Tribal Communities and Development

- **Infrastructure expansion:** India's efforts to expand energy infrastructure, including projects such as Teesta-IV, create a need to balance development objectives with the statutory rights of forest-dependent communities.

- **Historical injustice:** The FRA was designed to address historical exclusion and dispossession of forest-dependent communities and to recognise their relationship with forests and customary resources.
- **Land as the foundation of identity:** For many Scheduled Tribe communities, land supports livelihoods while also underpinning cultural identity, social organisation and political autonomy.
- **Collective ownership:** Recognition of customary collective rights can provide communities with greater protection against displacement and dispossession arising from land diversion and development projects.

Constitutional and Legal Safeguards

- **Panchayats Extension to Scheduled Areas Act:** The Panchayats (Extension to Scheduled Areas) Act, 1996 (PESA) provides a framework for strengthening self-governance and the role of gram sabhas in Scheduled Areas.
- **Land acquisition safeguards:** The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 provides safeguards relating to land acquisition, rehabilitation and resettlement that are relevant to affected communities.
- **Democratic decentralisation:** Strengthening gram sabhas can deepen participatory governance by ensuring that communities directly affected by development projects have a meaningful institutional role in decision-making.

Way Forward

- **Strengthen gram sabha powers:** The Centre and States should strengthen statutory powers of gram sabhas under the FRA, PESA and land acquisition legislation, particularly in Scheduled Areas.
- **Protect directly affected communities:** Decision-making frameworks should ensure that communities facing direct displacement or substantial loss of land and livelihood cannot be effectively overridden merely through approvals from less affected areas.
- **Transparent rule-making:** Any change to consent requirements should undergo open legislative and democratic scrutiny, with clear responsibilities assigned among the concerned ministries and governments.
- **Balance development and rights:** Infrastructure expansion should proceed alongside safeguards for tribal land, customary ownership, livelihoods, cultural identity and participatory decision-making, ensuring that development does not weaken legally recognised community rights.

II. The Judiciary

1. Culture of Secrecy in Judicial Appointments

Why in News?

- Greater transparency in judicial appointments has revived debate over collegium accountability, merit, constitutional equality and public confidence in judicial institutions.

Evolution of the Collegium System

- **Judicially created mechanism:** The collegium system is not expressly provided in the Constitution; it evolved through Supreme Court judgments concerning the respective roles of the executive and judiciary in appointments.
- **First Judges Case (1981):** The Supreme Court initially gave primacy to the executive in judicial appointments, reflecting the constitutional framework then understood to govern the process.
- **Second Judges Case (1993):** The Court shifted primacy to the collective opinion of the Chief Justice of India and senior judges, establishing the foundation of the collegium system.
- **Third Judges Case (1998):** The collegium was further institutionalised and expanded into the present five-member body for appointments to the Supreme Court.

Right to Information and Judicial Accountability

- **Judicial office and transparency:** In *CPIO v. Subhash Chandra Agarwal* (2019), the Supreme Court held that the office of the Chief Justice of India falls within the ambit of the Right to Information Act, 2005.
- **Accountability dilemma:** The recognition of transparency in the functioning of the Chief Justice of India's office raises broader questions about whether the institutional process through which judges are selected should also provide adequate public accountability.
- **Confidentiality versus transparency:** Confidential inputs concerning integrity or personal information may legitimately require protection, but confidentiality need not extend to basic eligibility criteria, selection methodology and reasons for recommendations.

Comparative Constitutional Practices

- **United Kingdom:** The Judicial Appointments Commission publicly advertises judicial vacancies and follows structured selection procedures, demonstrating that judicial independence can coexist with institutional transparency.
- **South Africa:** The Judicial Service Commission invites public nominations and conducts publicly accessible interviews, providing greater visibility into the assessment of candidates for judicial office.
- **Lessons for India:** These models differ institutionally from India, but demonstrate that transparency need not necessarily imply executive control or compromise judicial independence.

Judicial Independence and Democratic Legitimacy

- **Independence with accountability:** Judicial independence is essential for constitutional governance, but institutional autonomy does not imply complete exemption from principles of transparency, fairness and accountability.
- **Public justification:** Democratic institutions derive legitimacy not merely from constitutional authority but also from public confidence that their decisions are based on fair and intelligible processes.
- **Changing information environment:** Social media and rapid digital communication have increased public scrutiny of constitutional institutions, making institutional opacity increasingly difficult to sustain.

Need for Reform

- **Advance disclosure of vacancies:** Anticipated judicial vacancies could be published in advance to create greater predictability and transparency in the appointment process.
- **Defined eligibility criteria:** The collegium could establish publicly available criteria relating to professional competence, integrity, experience, diversity and suitability while retaining flexibility for qualitative assessment.
- **Reasoned recommendations:** Recommendations could explain the broad considerations behind selection without disclosing sensitive personal or confidential information.
- **Conflict-of-interest safeguards:** Where candidates have familial or professional links with serving or retired judges, enhanced scrutiny and disclosure safeguards could help address perceptions of favouritism.
- **Independent scrutiny mechanisms:** A transparent record of the selection process, without transferring decision-making power to political authorities, could strengthen accountability while preserving judicial independence.

2. Appointment of Judges to Supreme Court

Why in News?

- Continued non-use of Article 124(3)(c), which permits appointment of a “distinguished jurist” as a Supreme Court judge, despite its inclusion since 1950.

Constitutional Provision

- **Article 124(3):** The Constitution provides three eligibility routes for appointment as a Supreme Court judge-five years as a High Court judge, 10 years as a High Court advocate, or being a “distinguished jurist” in the President’s opinion.
- **Distinguished jurist:** The Constitution neither defines the expression nor prescribes a minimum experience requirement, leaving scope for eminent legal scholars and academics to qualify through this route.
- **Alternative pathway:** The provision indicates that Supreme Court appointments were constitutionally envisaged beyond conventional judicial and practising-Bar backgrounds.

Constituent Assembly Perspective

- **Wider field of choice:** H.V. Kamath supported the category to widen the field of choice for Supreme Court appointments and recognised that outstanding legal learning could exist outside the judiciary and practising Bar.
- **International example:** The Constituent Assembly referred to the appointment of Felix Frankfurter, a Harvard Law professor, to the United States Supreme Court as an example of bringing academic legal expertise to the Bench.
- **Professional diversity:** The debates reflected an intention to recognise juristic scholarship as a distinct source of judicial expertise rather than restricting eligibility to judges and advocates.

Position in High Courts

- **Original proposal:** The Constituent Assembly also considered extending the distinguished-jurist route to High Court appointments, but the proposal was not accepted.
- **42nd Amendment:** The Constitution (Forty-second Amendment) Act, 1976 subsequently inserted a similar distinguished-jurist qualification into Article 217 during the Emergency.
- **44th Amendment:** The Constitution (Forty-fourth Amendment) Act, 1978 removed this qualification from Article 217, making the Supreme Court provision the continuing constitutional route for distinguished jurists.

Why the Provision Remains Unused

- **Collegium process:** Although Article 124(3)(c) refers to the President’s opinion, Supreme Court appointments operate within the judicial appointments framework in which the Supreme Court Collegium plays a central role.
- **Professional experience:** A potential concern is that legal academics may have limited courtroom and procedural experience compared with judges and practising advocates.
- **Academic-practice divide:** Full-time law teachers generally cannot simultaneously practise as advocates because Rule 49 of the Bar Council of India Rules requires an advocate taking full-time salaried employment to cease practising.

Need for Greater Diversity

- **Academic expertise:** Distinguished jurists could contribute specialised knowledge in constitutional law, international law, comparative law, legal theory and emerging areas of jurisprudence.
- **Broader perspectives:** Their inclusion could expand the professional diversity of the Supreme Court Bench and bring perspectives developed through legal scholarship and teaching.
- **Law in books and action:** Greater interaction between academia and courtroom practice could help bridge the gap between theoretical legal scholarship and practical application.

Way Forward

- **Clear criteria:** Objective and transparent criteria could be developed for identifying a distinguished jurist while preserving constitutional flexibility.

- **Academic-practice interface:** Greater opportunities for law teachers to engage with courts, research institutions and legal practice could reduce the divide between legal scholarship and litigation.
- **Institutional consultation:** Any consideration of this route should involve the constitutional authorities and judicial appointments institutions to ensure transparency and institutional legitimacy.

III. Representation of People's Act

1. Youth Vote and its Electoral Impact

Why in News?

- Recent electoral trends and youth-led political mobilisation have renewed debate over Gen Z's electoral participation, party preferences and potential influence on forthcoming Assembly elections.

Youth Electoral Participation

- **Variation in turnout:** Lokniti-CSDS survey data indicates that youth participation varies substantially across States, with young voters sometimes recording turnout below the State average and elsewhere significantly exceeding it.
- **Age-based differences:** Within the youth category, 18-21-year-olds and 22-25-year-olds can display different levels of electoral participation, indicating that youth cannot be treated as a homogeneous electoral group.
- **State-specific context:** In Bihar and Uttar Pradesh, turnout among 18-21-year-olds was substantially below overall turnout, while Madhya Pradesh, Punjab, Gujarat, West Bengal and Tamil Nadu recorded comparatively high youth participation.

Implications for Indian Democracy

- **Youth as a dynamic electorate:** Young voters can influence electoral outcomes when high participation combines with a relatively concentrated shift towards a particular political formation.
- **Context-driven voting:** Employment, education, governance, identity, welfare, local issues and perceptions of political alternatives can shape youth preferences differently across States and elections.
- **Inter-generational differences:** Youth voting patterns may diverge from those of older voters, making age-wise analysis important for understanding changing electoral behaviour.

Challenges in interpreting the Youth Vote

- **Avoiding overgeneralisation:** Treating Gen Z as a unified political constituency can obscure substantial differences based on State, age, socio-economic background and political context.
- **Turnout versus preference:** A large youth population does not automatically translate into electoral influence; participation levels and the concentration of preferences also determine its political significance.
- **Survey limitations:** Survey-based estimates should be interpreted cautiously because reported voting behaviour can vary according to sampling, response patterns, election context and methodology.

Way Forward

- **Evidence-based electoral analysis:** Political parties, researchers and institutions should examine youth participation through disaggregated data rather than relying on the assumption of a uniform youth vote.
- **Strengthening youth participation:** Greater civic and electoral awareness, accessible registration mechanisms and meaningful political engagement can facilitate informed participation among young citizens.
- **Recognising electoral fluidity:** The emerging pattern suggests that the youth electorate is better understood as a dynamic component of Indian democracy whose preferences can change across elections rather than as a permanent political bloc.

2. Introduction of Totaliser in EVM

Why in the news?

- The Supreme Court has asked the Centre to examine introducing totalisers for EVM vote counting to protect voter secrecy and prevent booth-level identification and victimisation.

Totaliser and Electoral Secrecy

- **Meaning of totaliser:** A totaliser is a proposed interface that combines votes from about 14 polling booths, preventing disclosure of individual booth-wise voting patterns.
- **Working mechanism:** It connects to the control units of a cluster of 14 Electronic Voting Machines (EVMs) and displays consolidated candidate-wise results instead of booth-wise results.
- **Purpose of the mechanism:** By aggregating votes across multiple booths, totalisers make it difficult to determine how voters belonging to a particular locality or social group voted.
- **Need for voter protection:** Booths are generally geographically organised, allowing voting patterns to be correlated with communities or localities and potentially exposing voters to intimidation or victimisation.
- **Background of the Supreme Court case:** The issue originated in a 2014 Public Interest Litigation seeking aggregation of votes across polling stations to protect voters in areas perceived to have opposed particular candidates.
- **Arguments on voter intimidation:** The petitioners argued that knowledge of booth-wise voting patterns could enable candidates or political actors to identify communities that did not support them and potentially retaliate against them.

Centre's Position

- **Opposition to totalisers:** The Centre has consistently opposed totalisers, arguing that disclosure of booth-wise results does not necessarily lead to voter intimidation and provides useful electoral information.
- **Utility of booth-wise results:** According to the Centre, candidates can identify areas with relatively lower support and undertake greater political outreach there, potentially improving their electoral performance.
- **Data breach concern:** In 2018, the Centre raised concerns that introducing totalisers could create possibilities of data breaches even before the commencement of vote counting.
- **Recent government position:** A Law Ministry affidavit referred to the view of a Group of Ministers that voter intimidation or victimisation may not occur on a large scale in an environment of extensive media scrutiny.

Election Commission's Position

- **Support for totalisers:** The Election Commission of India (ECI) has consistently supported the introduction of totalisers and first recommended the system to the Union government in 2008.
- **Protection of voter anonymity:** The ECI has supported aggregation of votes as a means of protecting the anonymity of voters and reducing the possibility of identifying voting patterns at individual booths.
- **Implementation concerns:** While supporting the objective, the ECI has highlighted practical and legal issues concerning booth-wise verification, counting procedures and the use of Voter Verifiable Paper Audit Trail (VVPAT) systems.

Key Constitutional and Democratic Issues

- **Secrecy of voting:** Aggregated counting seeks to strengthen the principle that an elector's choice should remain confidential and should not be traceable through booth-level voting patterns.
- **Transparency in elections:** Booth-wise counting provides granular electoral information and facilitates verification, while totalisation prioritises confidentiality by reducing the visibility of individual polling-station trends.

- **Balance between competing objectives:** The debate involves balancing transparency and verifiability in vote counting with protection against identification, intimidation or victimisation of voters.

Way Forward

- **Evidence-based assessment:** Any decision on totalisers should consider empirical evidence regarding voter intimidation, technological safeguards, counting transparency and the practical feasibility of aggregated counting.
- **Safeguards and verification:** If introduced, clear protocols for Electronic Voting Machine and Voter Verifiable Paper Audit Trail verification can help reconcile voter secrecy with the need for transparent electoral processes.
- **Institutional consultation:** A considered framework involving the Election Commission, government, political parties and other stakeholders can address legal, technological and administrative concerns before implementation.

3. Regulation of Registered Unrecognised Political Parties (RUPP)

Why in News?

- Six Gujarat-based Registered Unrecognised Political Parties reportedly received about ₹1,700 crore in donations in 2023-24, raising concerns over transparency and misuse of political funding exemptions.

Registered Unrecognised Political Parties

- **Meaning of RUPPs:** Registered Unrecognised Political Parties (RUPPs) are political parties registered with the Election Commission under Section 29A of the Representation of the People Act, 1951, but not recognised as State or national parties.
- **Registration process:** Citizens can form political parties, which may seek registration by submitting prescribed documents to the Election Commission for scrutiny under the Representation of the People Act.
- **Benefits available to RUPPs:** Registered parties receive tax-related benefits, access to common symbols subject to applicable conditions and permission to nominate up to 20 star campaigners during elections.
- **Donation reporting requirement:** RUPPs must maintain details of individual donors contributing more than ₹20,000 in a financial year and submit the prescribed information to the Election Commission.
- **Mode of receiving donations:** Under the Income Tax Act, 2025, donations exceeding ₹2,000 are required to be received through banking channels such as cheques or bank transfers.

Concerns Regarding RUPPs

- **Large number of registered parties:** India had more than 2,800 RUPPs as of July, while only around 750 contested the 2024 Lok Sabha elections, leading to the description of many others as “letter pad parties”.
- **Limited power of the Election Commission:** The Representation of the People Act does not explicitly empower the Election Commission to de-register parties merely for not contesting elections, failing to conduct internal elections or not filing prescribed returns.
- **Supreme Court position:** In *Indian National Congress v. Institute of Social Welfare* (2002), the Supreme Court held that the Election Commission does not possess general powers of de-registration under the Representation of the People Act.
- **Exceptional grounds for de-registration:** The Election Commission may de-register a party in exceptional circumstances such as registration obtained through fraud, cessation of allegiance to the Constitution or declaration of the party as unlawful.
- **Poor compliance and transparency:** According to an Association for Democratic Reforms analysis cited in the article, annual reports of only about 26% of RUPPs for 2022-23 were available in the public domain, raising concerns about financial transparency.

- **Risk of financial misuse:** Weak compliance and limited regulatory powers can create opportunities for some non-serious parties to misuse tax exemptions or serve as opaque channels for unlawful financial transactions.

Need for Electoral Reforms

- **Law Commission recommendation:** The Law Commission's 255th Report recommended allowing de-registration where a political party fails to contest elections for ten consecutive years.
- **Election Commission proposal:** In its 2016 electoral reforms memorandum, the Election Commission recommended amending the Representation of the People Act to provide it with explicit powers to de-register political parties.
- **Strengthening financial monitoring:** The Income Tax Department and other enforcement agencies can use digital financial records to monitor transactions and investigate suspected violations involving political parties.
- **Eligibility for tax exemptions:** The Election Commission has suggested restricting tax exemptions to parties that win seats, but a more inclusive approach could involve prescribing a legally defined vote-share threshold for RUPPs to retain such benefits.

Way Forward

- **Empower the Election Commission:** Parliament may consider appropriate amendments to establish clear and constitutionally consistent grounds and procedures for de-registration of inactive or non-compliant political parties.
- **Strengthen disclosure mechanisms:** Timely publication and verification of annual financial reports and donor information should be strengthened to improve transparency in political funding.
- **Targeted enforcement:** Suspected tax evasion, money laundering or other financial violations should be addressed through evidence-based investigation by the competent statutory authorities.
- **Protect political competition:** Reforms should improve financial accountability without unnecessarily restricting legitimate smaller parties that participate consistently in the electoral process.

IV. Constitutional and Non Constitutional Bodies , Statutory, regulatory and quasi-judicial bodies

1. Bar Council of India

Why in News?

- The Supreme Court held that the Bar Council of India and State Bar Councils lack statutory authority to discipline law students, protecting their institutional autonomy and constitutional freedom to dissent.

Role of Bar Councils

- **Legal education:** The BCI has statutory responsibilities relating to standards of legal education and the legal profession under the Advocates Act, 1961.
- **Professional regulation:** Its disciplinary jurisdiction is primarily connected with advocates enrolled under the statutory framework and cannot automatically be extended to students.
- **Limits of delegated authority:** A statutory regulator must exercise powers within the authority conferred by legislation and cannot assume disciplinary jurisdiction merely because students are pursuing legal education.

University Autonomy

- **Institutional jurisdiction:** Universities and competent authorities under applicable laws and regulations remain responsible for maintaining academic discipline and addressing misconduct by their students.

- **Academic freedom:** Universities require sufficient institutional space for students to engage in debate, disagreement and peaceful expression without regulatory overreach.

Constitutional Significance

- **Rule of law:** The ruling reinforces that public and statutory authorities must act within the jurisdiction specifically conferred upon them by law.
- **Separation of institutional roles:** It distinguishes the regulation of legal education and the legal profession from the disciplinary control of students.
- **Protection of dissent:** The judgment strengthens the principle that legitimate dissent within educational institutions cannot be subjected to coercive action by an authority lacking statutory jurisdiction.

Freedom of Dissent

- **Article 19(1)(a):** Students, like other citizens, enjoy the constitutional protection of freedom of speech and expression, subject to the reasonable restrictions permitted under Article 19(2).
- **Right to protest:** Peaceful expression of disagreement with institutional decisions can form part of democratic participation, provided it remains within applicable legal limits.
- **Chilling effect:** Threats of disciplinary consequences by an authority lacking jurisdiction may discourage legitimate expression and create a chilling effect on free speech and association.

Way Forward

- **Clear regulatory boundaries:** Statutory regulators should issue directions only within their legally defined powers, particularly where fundamental freedoms are involved.
- **Grievance mechanisms:** Universities should maintain transparent mechanisms for addressing student protests, disciplinary issues and institutional disagreements.
- **Constitutional literacy:** Law students should be encouraged to understand both their fundamental rights and the lawful restrictions governing protest and expression.

2. Chief Election Commissioner

Why in News?

- The Opposition parties has indicated plans to move motions seeking the removal of Chief Election Commissioner, renewing debate on constitutional safeguards governing Election Commission independence.

Introduction

- **Election Commission of India:** The Election Commission of India (ECI), established under Article 324, is a constitutional authority entrusted with the superintendence, direction and control of elections to Parliament, State legislatures and the offices of President and Vice-President.
- **Institutional Independence:** Since electoral legitimacy depends upon impartial administration, the Constitution creates a deliberately stringent mechanism for removing the Chief Election Commissioner (CEC), broadly aligning it with the removal process applicable to Supreme Court judges.

Appointment of Election Commissioners

- **Constitutional Framework:** Article 324 provides for the appointment of the CEC and other Election Commissioners by the President, subject to the constitutional and statutory framework governing the appointment process.
- **2023 Legislation:** The Chief Election Commissioner and Other Election Commissioners (Appointment, Conditions of Service and Term of Office) Act, 2023 provides for a selection committee comprising the **Prime**

Minister, the Leader of the Opposition in the Lok Sabha and a Union Cabinet Minister nominated by the Prime Minister.

- **Eligibility and Tenure:** The law provides for appointment of persons with relevant senior administrative experience and knowledge of election management, with a tenure of six years or until attaining 65 years of age, whichever is earlier.

Constitutional Protection of the CEC

- **Article 324(5):** The CEC can be removed only in the same manner and on the same grounds as a Supreme Court judge, thereby creating a high constitutional threshold against arbitrary executive or political action.
- **Grounds for Removal:** Under Article 124(4), removal of a Supreme Court judge requires proved misbehaviour or incapacity. The same substantive threshold applies to removal of the CEC.
- **Protection of Election Commissioners:** Other Election Commissioners and Regional Election Commissioners cannot be removed except on the recommendation of the CEC, creating an additional institutional safeguard.

Parliamentary Removal Process

- **Initiation of Motion:** Members of either House can initiate the process through a notice alleging misbehaviour or incapacity. The motion requires signatures of at least 100 Lok Sabha members or 50 Rajya Sabha members for admission.
- **Preliminary Scrutiny:** The Speaker of the Lok Sabha or Chairman of the Rajya Sabha examines the notice and may admit or reject it according to the applicable parliamentary procedure.
- **Investigation:** If admitted, an inquiry is conducted by a committee to examine the allegations and determine whether the constitutional grounds for removal are established.
- **Parliamentary Approval:** Removal requires a majority of the total membership of each House and a two-thirds majority of members present and voting in both Houses.
- **Final Removal:** Once Parliament passes the motion in accordance with the constitutional requirements, the President issues the order removing the CEC.

Challenges

- **Perception of Partisanship:** Even without established misconduct, persistent allegations of political bias can weaken public confidence in electoral institutions.
- **Appointment Concerns:** The composition of the statutory selection committee has generated debate over the relative role of the executive and Opposition in appointments to an institution expected to function independently.
- **Transparency:** Greater disclosure regarding institutional decision-making, dissenting views and reasons for major procedural decisions could strengthen public accountability while protecting legitimate confidentiality.
- **Parliamentary Polarisation:** Removal proceedings involving constitutional authorities can become politically contentious, making adherence to evidence, procedure and constitutional standards particularly important.

Way Forward

- **Strengthen Institutional Independence:** Appointment, tenure and service conditions should provide sufficient insulation from executive or political pressures while preserving constitutional accountability.
- **Transparent Decision-Making:** Where legally and institutionally appropriate, the ECI should provide reasoned explanations for major electoral decisions and clearly communicate the basis of institutional processes.
- **Internal Deliberative Mechanisms:** A multi-member Commission should maintain robust procedures for recording differing views, resolving disagreements and ensuring collective decision-making.
- **Evidence-Based Accountability:** Allegations against Election Commissioners should be examined through constitutionally prescribed procedures rather than being determined solely through political claims or public controversy.

- **Parliamentary Responsibility:** Presiding officers dealing with removal motions should follow established constitutional and parliamentary procedures consistently, thereby reinforcing institutional legitimacy.

B. GOVERNANCE

I. Government policies and Interventions

1. Untouchability and the Idea of 'Purity'

Why in News?

- A purification ritual at Haldwani has raised questions about whether caste-based notions of purity and pollution can constitute untouchability under Article 17.

Constitutional Framework

- **Article 17:** Article 17 abolishes untouchability, prohibits its practice in any form and makes enforcement of disabilities arising from it punishable by law.
- **Non-State actors:** The Supreme Court has held that Article 17 can operate against private individuals and social practices, not merely State action.

Legal Framework

- **Protection of Civil Rights Act:** The Protection of Civil Rights Act, 1955 criminalises preaching, practising and enforcing disabilities arising from untouchability.
- **Beyond physical exclusion:** Section 7(1)(d) also addresses insults or attempts to insult a Scheduled Caste person on the ground of untouchability.

Purity and Pollution

- **Supreme Court interpretation:** In *Sukanya Shantha v. Union of India* (2024), the Supreme Court linked untouchability with caste-based notions of purity and pollution that reinforce social hierarchy.
- **Human dignity:** The Court emphasised that no stigma can be attached to the existence, touch or presence of any person.

Protection of Civil Rights and Atrocities Laws

- **Different legal provisions:** Article 17 and the Protection of Civil Rights Act address untouchability, while the Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, 1989 creates separate offences with specific legal requirements.
- **Public-view requirement:** In relevant cases under the 1989 Act, courts examine whether statutory ingredients such as intentional humiliation and public view are satisfied.

Way Forward

- **Evidence-based enforcement:** Authorities should determine allegations through objective investigation rather than treating every purification ritual as automatically constituting untouchability.
- **Constitutional morality:** Social practices must be evaluated against equality, dignity and fraternity, particularly where caste-based notions of purity and pollution are involved.
- **Social transformation:** Legal enforcement should be complemented by education and social reform to eliminate practices that perpetuate caste-based stigma.
- **Substantive equality:** Article 17 is not limited to physical exclusion; it addresses caste-based practices that attach stigma or disability to a person because of their identity or presence.

2. POSH Complaints in Corporate Sector

Why in News?

- Nifty 50 companies reported 1,327 complaints under the Prevention of Sexual Harassment Act in FY26, with experts linking the rise partly to greater awareness and confidence in redressal mechanisms.

Reported Trend

- **Rising Complaints:** Nifty 50 companies recorded 1,327 complaints in FY26 compared with 1,269 in FY25, a 4.6 per cent increase.
- **Interpretation:** Higher reporting does not necessarily establish an increase in harassment; it may also indicate greater awareness, improved reporting systems and increased confidence in institutional redressal.

Constitutional Foundations

- **Article 14:** The guarantee of equality before law and equal protection of laws requires institutions to prevent discriminatory workplace practices and ensure fair treatment of complainants.
- **Article 15:** The constitutional prohibition of discrimination on grounds including sex provides the broader equality framework for addressing gender-based discrimination and harassment.
- **Article 19(1)(g):** The freedom to practise any profession or carry on any occupation is strengthened when workplaces provide conditions that do not create discriminatory barriers to women's participation.
- **Article 21:** The right to life and personal liberty has been judicially interpreted to include dignity and protection against conditions that undermine an individual's bodily and personal autonomy.
- **Directive Principles:** Article 39(a) promotes adequate means of livelihood for all citizens, while Article 39(d) emphasises equal pay for equal work, supporting the broader objective of gender-equitable participation in employment.
- **Fundamental Duties:** Article 51A(e) calls upon citizens to renounce practices derogatory to the dignity of women, providing a constitutional ethical foundation for preventing gender-based humiliation and discrimination.

Judicial Foundation

- **Vishaka Guidelines:** In Vishaka v. State of Rajasthan (1997), the Supreme Court recognised workplace sexual harassment as a violation of fundamental rights and laid down guidelines in the absence of specific legislation.
- **Legislative Response:** The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013, subsequently provided a statutory framework for prevention, prohibition and redressal.

POSH Framework

- **Internal Complaints Committee:** The law provides for Internal Complaints Committees at workplaces to receive and inquire into complaints of sexual harassment.
- **Local Complaints Committee:** Local Complaints Committees provide a mechanism for women who work in establishments where an Internal Complaints Committee is unavailable, including aspects relevant to the informal sector.

Changing Nature of Harassment

- **Digital Harassment:** Messaging platforms, email and social media have created new forms of workplace misconduct, particularly with the expansion of remote and hybrid working.
- **Peer-Level Conduct:** Complaints involving colleagues at similar organisational levels highlight the need to address workplace behaviour beyond traditional superior-subordinate relationships.

Way Forward

- **Constitutional Governance:** Organisations should treat POSH compliance as an extension of constitutional values rather than merely a statutory obligation.
- **Institutional Capacity:** Internal and Local Complaints Committees should be properly constituted, trained and equipped to ensure accessible, impartial and timely redressal.
- **Informal Sector:** Authorities should strengthen Local Complaints Committees, improve district-level accessibility and expand awareness of legal remedies among informal-sector workers.
- **Preventive Approach:** Continuous sensitisation, leadership accountability, anti-retaliation safeguards and clear digital-workplace policies should complement formal complaint mechanisms.

C. SOCIAL JUSTICE

I. Welfare Schemes for Vulnerable Sections

1. OBC Creamy Layer and the Income Test

Why in the News?

- The Supreme Court will consider setting up a Bench to hear the Centre's application seeking clarification on its judgment on the income test used to identify the creamy layer among the Other Backward Classes (OBC).

The creamy layer doctrine

- Introduced in the landmark **Indra Sawhney v. Union of India (1992)** judgment-mandates the exclusion of socially and economically advanced members among OBCs so that reservation benefits reach the genuinely backward sections.

Creamy layer status is determined through two distinct mechanisms:

- **Status-Based Test (Categories I-V):** Applied to children of constitutional authorities, Group A/Class I and Group B/Class II officers, armed forces personnel, and PSU executives.
- **Income/Wealth Test (Category VI):** Serves as a residual filter for individuals engaged in trade, business, or unclassified sectors whose gross family income exceeds the prescribed threshold (₹1 lakh in 1993, revised periodically to ₹8 lakh per annum since 2017) for three consecutive years.
 - Crucially, the 1993 OM specified that income from salaries and agricultural land must be excluded when calculating the income/wealth test limit.

Supreme Court Ruling

- **Rohith Nathan judgment:** The Supreme Court held that salaries should not be included in the income test for certain Other Backward Classes candidates where equivalence of parents' posts with government services has not been established.
- **Hostile discrimination:** Treating salaries of parents in public sector undertakings or private employment differently from government employees was held to create unequal treatment among similarly placed candidates.
- **Supernumerary posts:** The Court directed creation of additional posts for affected candidates and allocation of services according to their respective Civil Services Examination ranks.

OBC Creamy Layer Framework

- **Indra Sawhney judgment:** The creamy layer concept emerged from the 1992 judgment to exclude relatively advanced sections among Other Backward Classes from reservation benefits.

- **1993 Office Memorandum:** The Department of Personnel and Training prescribed exclusion criteria covering constitutional authorities, senior officials and an income/wealth test.
- **Income threshold:** The income ceiling, initially ₹1 lakh, was revised periodically and currently stands at ₹8 lakh, with the latest revision in 2017.

Income Test Controversy

- **1993 framework:** The Office Memorandum excluded salary and agricultural income while calculating income under the relevant income/wealth test.
- **2004 clarification:** A Department of Personnel and Training letter created ambiguity by appearing to include salary income for certain parents employed in public sector undertakings and other organisations.
- **Discrimination issue:** The differing treatment resulted in candidates being excluded based on parental salary without considering the nature or status of their parents' posts.

Centre's Implementation Concerns

- **Retrospective impact:** The Centre argues that applying the ruling retrospectively could disturb settled service allocations and create cascading effects across multiple categories.
- **Seniority and adjustment:** Creation of supernumerary posts could generate claims relating to seniority, service allocation and adjustments involving candidates already appointed.
- **Wider implications:** The Centre has cautioned that retrospective changes could affect Other Backward Classes candidates as well as candidates belonging to other categories, including the Unreserved category.

Centre's Additional Argument

- **Salary as a differentiator:** The Centre has argued that salary could, in certain circumstances, provide an intelligible basis for distinguishing between Other Backward Classes candidates from otherwise similar social backgrounds.
- **Affluence concern:** It has also argued that excluding salary completely could potentially allow candidates from families with very high incomes to qualify as non-creamy layer.

Way Forward

- **Clear guidelines:** The government should establish precise, uniform and legally consistent criteria for applying the creamy layer income test.
- **Avoid retrospective disruption:** Implementation should protect legitimate expectations while ensuring that candidates affected by discriminatory application receive appropriate remedies.
- **Institutional coordination:** The Department of Personnel and Training and Ministry of Social Justice and Empowerment should develop coordinated implementation guidelines.
- **Periodic review:** The creamy layer framework should be periodically reviewed using objective socioeconomic indicators to ensure that reservation benefits reach genuinely disadvantaged sections.

2. Child Sexual Abuse Material Online

Why in the news?

- The National Human Rights Commission has sought reports over Instagram advertisements allegedly directing users to child sexual abuse material, raising questions about platform accountability and intermediary protections.

Protection under POCSO

- **Mandatory Reporting:** Section 19 of the Protection of Children from Sexual Offences Act requires a person having knowledge or reasonable apprehension of an offence under the Act to report it to the appropriate police authority.
- **Platform Responsibility:** Internal moderation, grievance redressal or communication with regulators cannot automatically substitute statutory reporting obligations where the law requires reporting of suspected offences.
- **POCSO Special Courts:** Offences involving online child sexual abuse material can be tried before Special Courts designated under the Protection of Children from Sexual Offences Act.
- **Information Technology Act:** Section 67B of the Information Technology Act, 2000 specifically addresses publication, transmission and related activities involving sexually explicit material depicting children.
- **Specialised Jurisdiction:** Section 28(3) of the POCSO Act provides POCSO Special Courts jurisdiction over specified offences under Section 67B of the Information Technology Act.

Key Regulatory Gaps

- **Intermediary Liability:** Existing legal categories may not adequately capture platforms whose algorithms actively recommend, amplify, monetise or transform content.
- **AI Accountability:** Responsibility becomes difficult to determine when harmful outcomes emerge from automated systems involving algorithms, platform design and human oversight.
- **Reporting Compliance:** Stronger mechanisms are required to ensure that statutory reporting obligations are not diluted by internal platform procedures.
- **Cross-Border Cooperation:** Effective investigation requires timely access to digital evidence held by foreign technology companies and cooperation across jurisdictions.

Way Forward

- **Risk-Based Platform Regulation:** Platforms should face proportionate obligations based on the degree to which their systems generate, curate, recommend, amplify or monetise content.
- **Mandatory Reporting Architecture:** Technology companies should have clearly designated statutory compliance officers and automated escalation mechanisms for suspected child sexual exploitation.
- **AI Safety by Design:** Platforms should incorporate child-safety safeguards into recommendation, advertising and monetisation systems rather than relying exclusively on post-publication moderation.
- **Stronger Digital Forensics:** Police forces require specialised cyber investigators, forensic laboratories, training and interoperable databases for processing large volumes of digital evidence.
- **Standardised Reporting:** A common reporting architecture should enable technology companies and Indian authorities to share relevant metadata rapidly while protecting legitimate privacy interests.
- **Victim-Centric Justice:** Investigation and prosecution should minimise secondary trauma, protect the identity of child victims and ensure speedy proceedings through specialised courts.
- **International Cooperation:** India should strengthen mechanisms for cross-border preservation and lawful access to digital evidence, given the global nature of online platforms.

II. Issues Relating to Development and Management of Social Sector/Services relating to Health, Education, Human Resources

1. The High Cost of India's Private Health-Care Boom

Why in News?

- A Parliamentary committee's recommendations on hospital costs, private healthcare regulation and foreign investment have renewed debate over affordability, competition and patient protection.

Rising Cost of Healthcare

- **Private-public cost gap:** The Parliamentary Standing Committee on Health and Family Welfare reported that average hospitalisation costs ₹50,508 in private facilities compared with ₹6,631 in government facilities.
- **Childbirth expenditure:** Average out-of-pocket expenditure for childbirth was reported at ₹37,630 in private facilities, compared with ₹2,299 in public facilities.
- **Financial vulnerability:** High hospitalisation costs can push households towards debt, asset depletion and financial insecurity, particularly when treatment is prolonged or requires specialised care.

Key Recommendations of the Parliamentary Committee

- **Standardised package rates:** The committee recommended standardised treatment package rates and mandatory pre-treatment cost estimates to improve price transparency and reduce unexpected medical bills.
- **Hospital room tariffs:** It proposed examining limits on basic room tariffs in metropolitan private hospitals by linking them to average tariffs of nearby three-star hotels.
- **Cross-subsidisation:** Large corporate hospitals serving medical tourists and high-income patients have been encouraged to cross-subsidise poorer patients and reserve beds for Ayushman Bharat-Pradhan Mantri Jan Arogya Yojana beneficiaries at regulated rates.

Need for Private Healthcare Investment

- **Infrastructure requirements:** Hospitals require substantial investment in land, medical equipment, intensive care units, laboratories, digital systems and skilled healthcare professionals.
- **Capacity expansion:** Private hospitals supplement public facilities, particularly in secondary and tertiary healthcare where government capacity remains insufficient to meet total demand.
- **Role of foreign investment:** Foreign Direct Investment can bring capital, technology, managerial expertise and opportunities for expanding hospital networks, particularly in underserved regions.
- **Medical manufacturing ecosystem:** Investment in pharmaceuticals, medical devices and healthcare infrastructure can strengthen domestic healthcare capacity and reduce dependence on imported medical technologies.

Strengthening Public Healthcare

- **Public hospitals as credible alternatives:** India cannot rely exclusively on regulation of private hospitals; government facilities must provide accessible, affordable and quality secondary and tertiary care.
- **Primary healthcare:** Strong primary healthcare can prevent disease, facilitate early diagnosis and reduce avoidable dependence on expensive tertiary treatment.
- **Insurance reform:** Public insurance schemes such as Ayushman Bharat-Pradhan Mantri Jan Arogya Yojana should incentivise appropriate and evidence-based care rather than simply increasing procedure volumes.
- **Clinical accountability:** Treatment protocols, clinical audits, transparent billing and grievance-redress mechanisms can protect patients while providing greater clarity for healthcare professionals.

Way Forward

- **Balanced investment framework:** India should continue attracting private and foreign capital while ensuring that investments expand healthcare capacity, improve quality and serve underserved regions.
- **Competition-based regulation:** Foreign Direct Investment and hospital acquisitions should be assessed for their impact on competition, market concentration, affordability and creation of additional capacity.
- **Transparent healthcare pricing:** Mandatory cost estimates, standardised packages and comprehensive billing disclosures can reduce information asymmetry and unexpected financial burdens.

- **Patient-centric healthcare:** The ultimate objective should be a healthcare system where clinical decisions are guided by medical need, while public and private investment jointly improve accessibility, affordability and quality.

D. INTERNATIONAL RELATIONS

I. India and its Neighborhood- Relations

1. India-China Border Delimitation

Why in News?

- India and China reached an eight-point consensus during the 25th round of Special Representatives' talks, focusing on border peace, communication mechanisms and boundary negotiations.

Eight-Point Consensus and Border Management

- **Peace and tranquillity:** India and China reaffirmed the importance of maintaining peace and tranquillity in border areas while advancing negotiations on the boundary question based on existing agreements.
- **Boundary negotiations:** The two sides agreed to advance discussions through Expert and Working Groups, including exploration of an "early harvest" of boundary delimitation in appropriate sectors.
- **Military communication mechanisms:** India and China agreed to implement the earlier understanding on additional General-Level Mechanisms or Senior Highest Military Commander meetings in the Eastern and Middle Sectors.
- **Sectoral hotlines:** Two additional hotline channels were agreed upon for the Eastern and Middle Sectors to facilitate direct military communication and help prevent local tensions from escalating.

Evolution of Confidence-Building Measures

- **Joint Working Group:** In 1992, the Joint Working Group on the Boundary Question discussed confidence-building measures such as Border Personnel Meetings alongside progress in border trade.
- **1993 Border Peace and Tranquillity Agreement:** Following the agreement, an Expert Group comprising diplomatic and military officials was established to support the management of boundary-related issues.
- **Working Mechanism for Consultation and Coordination:** The Working Mechanism for Consultation and Coordination on India-China Border Affairs was established in 2012 as an institutional mechanism for consultations and coordination on border affairs.
- **Border Personnel Meetings:** Regular meetings between border personnel have provided institutionalised channels for direct interaction between the two militaries and helped manage local tensions.

Way Forward

- **Institutionalised communication:** India and China should operationalise the additional military meetings and hotlines quickly to strengthen crisis-management mechanisms along the Line of Actual Control.
- **Incremental boundary negotiations:** Sector-specific progress should be pursued without losing sight of the objective of a broader and mutually acceptable boundary settlement.
- **Respect for existing agreements:** Sustained adherence to previous bilateral agreements and protocols remains essential for preserving peace and preventing unilateral changes to the status quo.
- **Political guidance and diplomacy:** Continued engagement between political leadership and Special Representatives can provide strategic direction while allowing technical and military mechanisms to address operational concerns.

- **From crisis management to cooperation:** Sustained peace along the border can create conditions for expanding cooperation in trade, connectivity, cultural exchanges and other areas of mutual interest.

II. India & World

1. India and Central Asia

Why in News?

- Prime Minister Narendra Modi's visit to Uzbekistan and participation in the Shanghai Cooperation Organisation summit highlighted India's growing engagement with Central Asia.

Central Asia and India's Strategic Neighbourhood

- **Geostrategic significance:** Central Asia comprises Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan and occupies a strategically important position between Russia, China, Afghanistan, Iran and the Caspian region.
- **Post-Soviet transformation:** Since the dissolution of the Soviet Union in 1991, Central Asian states have pursued independent foreign policies while managing ethnic, territorial, economic and security challenges.
- **Resource potential:** The region possesses significant reserves of hydrocarbons, uranium, minerals and other natural resources, creating opportunities for trade, energy cooperation and investment.
- **Security environment:** Terrorism, radicalisation, instability in Afghanistan and unresolved border issues remain major regional security concerns.

India-Central Asia Relations

- **Civilisational linkages:** India shares longstanding cultural, linguistic, religious, architectural and commercial connections with Central Asia, making the region important beyond its immediate geopolitical significance.
- **Act East of Central Asia:** India's engagement reflects an effort to expand its strategic presence beyond its immediate neighbourhood and strengthen relations with countries located at the heart of Eurasia.
- **Central Asia Dialogue:** The India-Central Asia Dialogue has emerged as an important institutional mechanism for cooperation in areas including trade, connectivity, security, culture and development.
- **Diplomatic outreach:** India invited the leaders of all five Central Asian republics as chief guests for Republic Day celebrations in 2022, signalling the growing importance attached to the region.

Connectivity and Economic Challenges

- **Geographical constraint:** India lacks direct overland access to Central Asia, with Pakistan's geography and political relations limiting conventional land connectivity.
- **International North-South Transport Corridor:** The International North-South Transport Corridor can provide India with an alternative multimodal route towards Central Asia and Eurasia through Iran.
- **Chabahar connectivity:** India's engagement with the Chabahar Port in Iran provides an important potential gateway for accessing Afghanistan and Central Asian markets while bypassing Pakistan.
- **Trade potential:** Improved connectivity can facilitate Indian exports, investment and access to Central Asian energy and mineral resources.

Way Forward

- **Connectivity first:** India should accelerate multimodal connectivity through Chabahar and the International North-South Transport Corridor while exploring additional routes through Iran and Afghanistan.
- **Economic engagement:** Greater cooperation in pharmaceuticals, information technology, healthcare, agriculture, energy, mining and education can expand India's economic footprint.

- **Security cooperation:** Counter-terrorism, intelligence sharing, border security and Afghanistan-related consultations should remain important pillars of bilateral engagement.
- **People-to-people ties:** Educational exchanges, tourism, cultural cooperation and restoration of historical linkages can strengthen societal connections between India and Central Asia.
- **Strategic institutional engagement:** Sustained participation in the Shanghai Cooperation Organisation and the India-Central Asia Dialogue can help India pursue its continental interests while maintaining strategic autonomy.
- **Integrated neighbourhood policy:** Greater engagement with Central Asia, alongside India's relations with the Indian Ocean Region, South Asia and West Asia, can strengthen India's position across its wider maritime and continental neighbourhood.

2. India-Uzbekistan Relations

Why in News?

- India and Uzbekistan have elevated bilateral ties to a comprehensive strategic partnership, targeting \$5 billion trade by 2030 and expanding cooperation across critical minerals, defence, nuclear energy and digital payments.

Comprehensive Strategic Partnership

- **Elevation of ties:** India and Uzbekistan decided to elevate their existing strategic partnership to a comprehensive strategic partnership, marking a broader framework for bilateral cooperation.
- **Institutional mechanism:** The existing Joint Commission will be elevated from the secretary level to the ministerial level, while a Coordination Council of Foreign Ministers will provide strategic direction to bilateral cooperation.
- **Trade target:** The two countries have set an ambitious target of \$5 billion in annual bilateral trade by 2030, compared with the current trade volume of over \$1 billion.
- **Mineral cooperation:** India and Uzbekistan agreed to undertake joint projects covering geological exploration, mining, mineral processing and development of integrated critical-mineral value chains.
- **Uranium supply:** The two sides agreed to establish a framework for the long-term supply of uranium from Uzbekistan to India in line with cooperation in civil nuclear energy.
- **Defence industrial cooperation:** India and Uzbekistan will encourage their defence industries to pursue direct linkages, co-development and co-production of military equipment.
- **Counter-terrorism:** Both countries reaffirmed a zero-tolerance approach towards terrorism, extremism and separatism, reflecting shared concerns about regional security.
- **UPI integration:** National Payments Corporation of India International Payments Limited and Uzbekistan's National Interbank Processing Centre agreed to facilitate the use of India's Unified Payments Interface applications for merchant payments through Uzbekistan's national QR system.
- **Buddhist heritage:** India and Uzbekistan agreed on restoration and conservation of the Buddhist sites of Fayaz Tepa and Kara Tepa.
- **Aral Sea restoration:** India announced a \$1 million grant for afforestation activities in the Aral Sea region, contributing to environmental cooperation.

Strategic Significance for India

- **Central Asian gateway:** Uzbekistan's geographical position at the centre of Central Asia makes it an important partner for India's wider engagement with the region.
- **Connectivity:** Stronger relations with Uzbekistan can support India's efforts to improve connectivity with Central Asia through alternative multimodal routes.
- **Regional stability:** Enhanced cooperation in defence, counter-terrorism and economic development can contribute to stability in Central Asia, particularly amid continuing geopolitical uncertainties.

- **Strategic autonomy:** Diversified partnerships with Central Asian countries strengthen India's ability to pursue its economic and security interests while maintaining strategic autonomy.

3. India-Vietnam Relations

Why in News?

- India and Vietnam agreed to deepen defence and security cooperation, including co-production of Indian defence equipment, amid growing strategic competition and evolving security dynamics in the Indo-Pacific.



Strategic Significance

- **Act East Policy:** Vietnam is a key pillar of India's Act East Policy and an important partner in strengthening India's strategic and economic engagement with Southeast Asia.
- **Indo-Pacific Vision Vision MAHASAGAR:** Vietnam is an important partner in India's Vision MAHASAGAR (Mutual and Holistic Advancement for Security and Growth Across Regions) and its broader Indo-Pacific outlook.
- **ASEAN Engagement Regional Partnership:** Vietnam's position within the Association of Southeast Asian Nations (ASEAN) makes it important for India's engagement with ASEAN and regional multilateral mechanisms.
- **Defence and Security Cooperation Military Engagement:** Defence and security constitute central pillars of bilateral relations, encompassing military dialogue, training, capacity building and cooperation among all branches of the armed forces.
- **Economic Cooperation Trade and Investment:** Both countries agreed to expand trade, investment and mutually beneficial supply chains while improving market access for Indian marine products, agricultural products and pharmaceuticals.
- **Development Partnership Lines of Credit:** India has extended Lines of Credit to Vietnam, including USD 120 million and USD 180 million agreements signed in 2024, supporting bilateral development cooperation.

- **Maritime Cooperation Indo-Pacific Oceans Initiative:** Vietnam's engagement with India's Indo-Pacific Oceans Initiative provides opportunities for cooperation in maritime security, sustainable development and rules-based management of maritime spaces.
- **Connectivity Ports and Aviation:** Enhanced financial, port and air connectivity can facilitate trade, investment and movement of people while strengthening India's economic integration with Southeast Asia.
- **Emerging Sectors Space and Nuclear Energy:** India and Vietnam identified opportunities for cooperation in space and nuclear energy, demonstrating the diversification of bilateral relations into strategic and technology-intensive sectors.
- **Regional Security Strategic Convergence:** Shared interests in maritime security, regional stability and adherence to international law provide a basis for closer coordination between India and Vietnam in the Indo-Pacific.
- **Cultural Relations Civilisational Linkages:** Historical and civilisational connections provide a foundation for people-to-people relations, while the growing popularity of Yoga in Vietnam strengthens India's cultural diplomacy.
- **People-to-People Relations Year of India-Vietnam Friendship:** Both countries agreed to observe the Year of India-Vietnam Friendship to commemorate 55 years of diplomatic relations and deepen societal linkages.
- **Multilateral Cooperation Regional Coordination:** India and Vietnam reaffirmed their commitment to closer cooperation and coordination in regional and multilateral forums on issues of mutual interest.

4. Impact of U.S.'s Sanctioning on India

Why in News?

- The United States Congress passed the Lindsey O. Graham Sanctioning Russia and Iran Bill, raising concerns over India's Russian oil imports, strategic autonomy and broader India-US relations.

Graham Bill

- **Key Provision:** The Bill empowers the White House to impose tariffs of up to 100 per cent on countries importing Russian oil, particularly targeting major buyers such as India and China.
- **Strategic Implication:** The measure could turn economic interdependence into an instrument of geopolitical pressure and constrain the policy choices of countries maintaining relations with Russia.

India's Energy Security

- **Import Dependence:** India's large energy requirements make access to affordable crude oil important for economic growth, inflation management, transportation and industrial activity.
- **Russian Oil:** Russian crude has become an important component of India's oil procurement, reflecting the role of commercial considerations alongside geopolitical relationships.
- **Inflationary Impact:** Restrictions on Russian oil could raise procurement costs and transmit higher energy prices into transportation, manufacturing and consumer markets.

Strategic Autonomy

- **Independent Decision-Making:** India's strategic autonomy involves preserving the ability to pursue national interests independently while maintaining partnerships with multiple major powers.
- **Balancing Partnerships:** India's simultaneous engagement with Russia, the United States, Europe and other partners requires calibrated diplomacy rather than alignment with any single geopolitical bloc.

Geopolitical Context

- **Ukraine Conflict:** The Ukraine conflict has disrupted supply chains and energy markets, generating economic consequences beyond the countries directly involved.

- **West Asia Crisis:** Instability in West Asia has further complicated global energy markets and increased uncertainty surrounding international trade and supply chains.

Uneven Application

- **European Energy Relations:** Continued European energy linkages with Russia demonstrate the practical difficulties of applying uniform sanctions within a highly interconnected global energy system.
- **Global Realpolitik:** Divergence between strategic objectives and their practical implementation reflects the constraints created by economic interdependence among major powers.

Impact on India-US Relations

- **Trust and Predictability:** Excessive use of secondary sanctions and tariff threats could create concerns regarding predictability in India-US economic relations.
- **Broader Partnership:** India-US cooperation extends across defence, technology, trade, critical minerals and the Indo-Pacific, making stable economic relations important for the wider strategic partnership.

Way Forward

- **Diplomatic Engagement:** India should pursue sustained negotiations with the United States for exemptions or transitional arrangements while highlighting the developmental consequences of sudden restrictions.
- **Domestic Resilience:** Greater investment in renewable energy, domestic production, strategic reserves and energy efficiency can reduce exposure to external supply disruptions over the long term.
- **Strategic Autonomy:** India should preserve independent decision-making by maintaining diversified defence, technology, economic and diplomatic partnerships.
- **Multilateral Approach:** Greater engagement through the G20, BRICS and other multilateral platforms can promote predictable rules and discourage excessive weaponisation of economic interdependence.

III. Bilateral, Regional and Global Groupings and Agreements

1. WTO Plurilateral Agreements

Why in News?

- The 2026 BRICS Summit declaration called for pathways for plurilateral initiatives within the World Trade Organisation framework, indicating a potentially nuanced evolution in India's negotiating position.

Introduction

- **Plurilateral Trade Agreements:** These are agreements negotiated among a group of World Trade Organisation (WTO) members rather than universally, allowing participating countries to create rules in specific areas of trade.
- **Core Issue:** The debate involves balancing the WTO's principle of inclusive multilateralism with the need for faster rule-making in emerging areas where consensus among all members is difficult.

Background

- **India's Traditional Position:** India has generally favoured multilateral negotiations involving all WTO members, as universal participation provides greater scope to protect developing-country interests.
- **Investment Facilitation for Development:** India opposed incorporating the Investment Facilitation for Development (IFD) agreement into the WTO rulebook, citing systemic concerns and arguing that investment is not a core trade issue.

India's Shift

- **From Opposition to Conditional Engagement:** The BRICS declaration does not amount to unconditional acceptance of plurilaterals; it indicates greater willingness to identify legally appropriate pathways for selected initiatives within the WTO framework.
- **Strategic Pragmatism:** India may be moving from categorical resistance towards issue-based engagement, enabling it to participate in shaping emerging trade rules rather than remaining outside negotiations.
- **Negotiating Leverage:** Participation in selected plurilaterals could allow India to negotiate safeguards, influence rule-making and protect developmental interests from within the negotiating process.
- **China Factor:** The shift is significant because China supports several plurilateral initiatives, including the IFD, suggesting greater willingness by India to engage with diverse approaches to WTO reform.

Analytical Dimensions

- **Developmental Dimension:** India remains concerned that plurilateral agreements on food security or agricultural subsidies may have limited value if major developed economies responsible for significant subsidies do not participate.
- **Legal Dimension:** Incorporating plurilateral agreements into the WTO framework raises questions regarding consensus, Annex 4 agreements, institutional authority and compatibility with existing WTO rules.
- **Strategic Dimension:** Greater participation could help India shape rules on digital trade, investment facilitation, environmental sustainability and other emerging areas rather than allowing rules to evolve without Indian participation.
- **Institutional Dimension:** Excessive proliferation of plurilaterals could create fragmented obligations and weaken the WTO's role as the central institution governing global trade.

India's Continuing Reservations

- **Electronic Commerce:** India has questioned the legal basis of interim arrangements for the WTO Agreement on Electronic Commerce, demonstrating that its evolving approach does not imply acceptance of every plurilateral arrangement.
- **Guardrails:** India has emphasised the need for legal safeguards and appropriate guardrails before integrating plurilateral outcomes into the WTO rulebook.

Arguments in Favour

- **Rule-Shaping Opportunity:** Selective participation can provide India with greater influence over emerging international trade rules and allow it to negotiate provisions compatible with developmental priorities.
- **Negotiating Flexibility:** Plurilaterals can enable willing members to advance cooperation in areas where consensus among the entire WTO membership remains difficult.

Arguments Against

- **Fragmentation Risk:** Multiple plurilateral agreements could produce differentiated obligations, complicate the WTO system and weaken the principle of common rules.
- **Developing-Country Concerns:** Agreements without meaningful participation of developing countries or major developed economies may create rules that inadequately address developmental concerns.

Way Forward

- **Issue-Based Engagement:** India should assess each plurilateral proposal independently based on participation, developmental impact, legal compatibility, transparency and national interests.
- **Strong Safeguards:** India should seek binding safeguards for developing countries, meaningful participation and protection of policy space before accepting incorporation of plurilateral agreements.

- **WTO-Centric Approach:** Plurilateral initiatives should remain compatible with strengthening WTO institutions, restoring dispute settlement and preserving the organisation's central role in global trade governance.

IV. Important International Institutions, agencies and fora

1. 26th Shanghai Cooperation Organisation (SCO) Summit

Why in News?

- The Shanghai Cooperation Organisation's Bishkek Summit highlighted counter-terrorism, regional connectivity and India's strategic autonomy amid growing geopolitical fragmentation and instability.

Bishkek Summit and India

- **Bishkek Declaration:** The 2026 summit adopted the Bishkek Declaration and several other documents covering security, energy, nuclear safety and regional cooperation.
- **Counter-terrorism:** India reiterated opposition to terrorism and cross-border terrorism and stressed resolving conflicts through dialogue and diplomacy.

India's Objectives in SCO

- **Central Asian engagement:** India seeks stronger political, economic and strategic engagement with Central Asia, its extended neighbourhood, leveraging historical and civilisational links.
- **Energy security:** Central Asia's reserves of hydrocarbons, uranium and critical minerals provide opportunities for India's long-term energy and resource security.
- **Security cooperation:** The SCO provides a platform to address terrorism, extremism, drug trafficking and regional instability through multilateral cooperation.

Connectivity and Economic Interests

- **Chabahar and INSTC:** India promotes Chabahar Port and the International North-South Transport Corridor to improve access to Central Asia while avoiding geographical constraints created by Pakistan.
- **Economic integration:** Limited connectivity, low trade volumes and inadequate transport infrastructure remain major constraints on India-Central Asia economic relations.

Strategic Autonomy

- **Multi-alignment:** SCO enables India to engage simultaneously with Russia, China, Iran and Central Asian states while maintaining independent foreign-policy choices.
- **Bridge-building role:** Participation in diverse multilateral platforms allows India to engage different geopolitical blocs and preserve strategic flexibility.

Way Forward

- **Connectivity projects:** Accelerate Chabahar Port, International North-South Transport Corridor and other multimodal connectivity initiatives.
- **Economic engagement:** Expand cooperation in critical minerals, energy, pharmaceuticals, digital technology, agriculture and education.
- **Central Asian partnerships:** Strengthen bilateral and regional mechanisms with Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.
- **Strategic autonomy:** Maintain issue-based cooperation with SCO members while preserving independent decision-making and adherence to international law.

2. BRICS Summit

Why in News?

- The 18th BRICS Summit, hosted by India on September 12-13, 2026, adopted the New Delhi Declaration amid geopolitical differences and focused on trade, technology and institutional continuity.

Key Outcomes of the BRICS Summit

- **New Delhi Declaration:** The 140-point declaration demonstrated BRICS' ability to accommodate divergent positions through carefully calibrated language on conflicts while maintaining a common framework.
- **Condemnation of Pahalgam terror attack:** The declaration explicitly condemned the April 22, 2025 terrorist attack in Jammu and Kashmir, which killed 26 people and injured many others.
- **West Asia conflict:** The declaration expressed concern over escalating tensions in West Asia, reaffirmed the United Nations Charter and called for maximum restraint without naming specific parties.
- **China's 2027 chairmanship:** The summit endorsed China as the next BRICS chair, marking the continuation of the expanded grouping's institutional cycle.
- **India-China bilateral engagement:** Prime Minister Narendra Modi and Chinese President Xi Jinping discussed trade, business, supply chains and people-to-people exchanges while stressing the importance of peace and tranquillity along the border.
- **BRICS Continuity and Implementation Mechanism:** India proposed a mechanism under which the outgoing, current and incoming chairs would track implementation and follow up on decisions across successive presidencies.
- **Economic Partnership 2030:** India promoted BRICS Economic Partnership 2030 alongside initiatives concerning development finance, infrastructure, investment and greater business engagement.

India's 2026 Presidency Compared with 2021

- **Expanded membership:** In 2021, BRICS consisted of five original members, whereas in 2026 it comprised 11 members and 10 partner countries, increasing its economic weight and diversity.
- **Different geopolitical context:** The 2021 summit was held virtually during the COVID-19 pandemic and amid the India-China border standoff, while India hosted more than 350 meetings across 30 cities in 2026.
- **Shift in thematic priorities:** India's 2021 presidency focused heavily on global health challenges, vaccine production and distribution, while the 2026 presidency emphasised science and technology, agroecology, fintech and economic cooperation.
- **Multilateral reform:** India continued its emphasis on reforming the United Nations and multilateral institutions by seeking greater representation, responsiveness and participation in global rulemaking.
- **Growing intra-BRICS trade:** India's trade with BRICS members increased from \$203 billion in 2020-21 to \$417 billion in 2025-26, highlighting the growing economic significance of the grouping.
- **Trade facilitation:** BRICS placed emphasis on customs cooperation, trade finance, supply chains and digital payments while also recognising persistent trade asymmetries among members.

Cross-Border Payments

- **BRICS Payment Task Force:** The task force will continue exploring practical solutions for efficient cross-border payments and greater interoperability of payment and financial messaging systems.
- **Interoperable payment systems:** India advocated linking fast-payment systems of BRICS countries and examining interoperability between central bank digital currencies to make transactions faster and more reliable.
- **Implementation challenges:** Differences in exchange-rate regimes, capital controls, sanctions exposure, banking regulations and payment standards complicate the creation of interoperable cross-border payment systems.

- **Trade asymmetry:** China accounts for a substantial share of intra-BRICS trade, while several members have significant trade deficits with China, creating additional challenges for balanced payment arrangements.
- **No common BRICS currency:** BRICS members have not agreed to establish a common currency, common technical architecture or shared settlement mechanism for intra-group trade.
- **BRICS Pay:** Despite discussions on digital payments, a BRICS Pay platform for comprehensive settlement of trade in national currencies has not yet been operationalised.

Significance for India

- **Development-oriented cooperation:** India sought to keep BRICS focused on development, trade, technology and practical economic cooperation despite differences in the geopolitical positions of members.
- **Technology and financial integration:** Greater interoperability of payment systems could potentially reduce transaction costs and improve the efficiency of cross-border trade among participating economies.
- **Institutional continuity:** The proposed continuity mechanism seeks to prevent initiatives from losing momentum when the BRICS chairmanship passes from one member to another.
- **Balancing geopolitical diversity:** The New Delhi Declaration demonstrated the challenge of maintaining common positions within an expanded grouping containing countries with differing strategic interests.

Way Forward

- **Implementation of commitments:** The effectiveness of India's initiatives will depend on converting declarations into operational mechanisms, particularly in payments interoperability, investment and development finance.
- **Strengthening private-sector participation:** Greater involvement of businesses and Micro, Small and Medium Enterprises (MSMEs) could help translate BRICS economic initiatives into increased trade and investment.
- **Continuity across presidencies:** The success of the Continuity and Implementation Mechanism will depend on whether future chairs maintain systematic monitoring of commitments and follow-up on earlier initiatives.
- **Pragmatic multilateralism:** BRICS can retain its relevance by concentrating on areas of convergent interests such as development, trade, technology, financial cooperation and institutional reform while managing geopolitical differences through consensus-based diplomacy.

3. Demand for Expansion of Security Council

Why in News?

- United Nations Secretary-General Antonio Guterres backed the Global South's demand for United Nations Security Council reform at the BRICS Summit, highlighting changing geopolitical and economic realities.

Need for Global Governance Reform

- **Changing global realities:** Contemporary economic, demographic and geopolitical realities differ substantially from those of 1945, requiring institutional structures to reflect present-day conditions.
- **Rise of multipolarity:** The emergence of multiple centres of economic and political influence is creating a more multipolar international system, increasing demands for representative and inclusive multilateral institutions.
- **Global South representation:** Developing countries increasingly seek greater participation in global decision-making, particularly in institutions whose decisions have significant economic, security and developmental consequences for them.
- **From rule-takers to rule-shapers:** India has advocated transforming the Global South from passive recipients of international rules into active participants in shaping global norms and institutions.

United Nations Security Council Reform

- **Existing composition:** The United Nations Security Council has five permanent members - China, France, Russia, the United Kingdom and the United States - with veto powers that have remained unchanged since 1945.
- **Representation deficit:** The present structure does not fully reflect the demographic, economic and geopolitical importance of contemporary developing countries, particularly from Africa, Asia and Latin America.
- **BRICS position:** The New Delhi Declaration called for comprehensive United Nations reform, including a more democratic, representative, effective and efficient Security Council with greater representation of developing countries.
- **Support for India and Brazil:** China and Russia reiterated their support for India and Brazil to play a greater role in the United Nations, including the Security Council.

India's Position

- **Greater role for developing countries:** India has consistently advocated greater representation of developing countries in global institutions, arguing that decision-making structures should reflect contemporary economic and geopolitical realities.
- **Time-bound reform process:** India has called for text-based negotiations on Security Council reform to be linked with definite timelines and clear outcomes.
- **Reforming international financial institutions:** India has also advocated greater representation for emerging economies in institutions such as the International Monetary Fund and World Bank.
- **Global South leadership:** India seeks to strengthen the collective voice of developing countries in international rule-making, particularly on emerging areas such as Artificial Intelligence, biotechnology, cyberspace and critical technologies.

Reform of Bretton Woods Institutions

- **Need for institutional restructuring:** Reforms of the Bretton Woods system, particularly to ensure that international financial institutions better correspond to current global economic realities.
- **Multilateral Development Banks:** Multilateral Development Banks to become larger, more effective and more capable of mobilising private investment and expanding concessional finance for developing countries.
- **Development finance gap:** Greater access to affordable development finance can support infrastructure, climate action, social development and economic resilience in developing countries.

Artificial Intelligence and Global Inequality

- **Concentration of Artificial Intelligence:** Artificial Intelligence capabilities remain concentrated among a limited number of companies and countries, creating the possibility of widening existing global inequalities.
- **Artificial Intelligence divide:** Unequal access to Artificial Intelligence could deepen disparities in income, opportunities, security and technological sovereignty between developed and developing economies.
- **Inclusive technology governance:** Developing countries need greater participation in establishing global norms governing Artificial Intelligence, data, cyberspace and other emerging technologies.

Climate Justice and Development

- **Climate finance commitment:** Need for developed countries to honour their climate-finance commitments, including the goal of mobilising \$300 billion annually.
- **Critical minerals:** Developing countries possessing critical minerals should be able to derive greater value, employment and developmental benefits from their natural resources.
- **Sustainable development:** Global governance reform must integrate economic development with climate resilience, sustainable resource management and equitable access to technology and finance.

Challenges to Reform

- **Veto power:** Any restructuring of the Security Council must address the complex question of existing permanent members' veto powers and their interests in preserving the present arrangement.
- **Divergent national interests:** Countries within the Global South and BRICS themselves have different geopolitical priorities, making consensus on the precise structure of reform difficult.
- **Institutional resistance:** Reform of major international institutions requires agreement among existing powers as well as broad participation from developing countries.
- **Balancing representation and effectiveness:** Expansion must seek greater geographical and political representation while ensuring that the Security Council remains capable of taking timely and effective decisions.

Way Forward

- **Inclusive Security Council reform:** Reform negotiations should provide greater representation to Africa, Asia and Latin America while addressing the aspirations of major developing countries.
- **Strengthen development finance:** International financial institutions should expand concessional financing and mobilise private capital for sustainable development in developing economies.
- **Democratise technology governance:** Developing countries should have meaningful participation in framing international rules for Artificial Intelligence, biotechnology, cyberspace and other critical technologies.
- **Strengthen multilateralism:** A reformed multilateral system should combine broader representation with effective decision-making, ensuring that global institutions remain responsive to contemporary economic, demographic and geopolitical realities.



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GENERAL STUDIES - 3

A. INDIAN ECONOMY

I. Indian economy issues relating to planning, mobilization of resources

1. 10 YEARS OF INDIA'S INFLATION TARGETING FRAMEWORK

Why in news?

- Recently, India completed a decade of its Flexible Inflation Targeting framework.

India's Shift Towards Inflation Targeting

- India formally introduced **Flexible Inflation Targeting (FIT)** in **2016**, following the recommendations of the **Urjit Patel Committee**.
- The framework was institutionalised through amendments to the **RBI Act, 1934**, giving price stability a central role in monetary policy while recognising growth concerns.
- Under **Section 45ZA**, the Central Government, in consultation with the RBI, specifies the inflation target for a five-year period.
- Consumer Price Index (CPI) inflation** is used as the principal measure for the target.
- The **Monetary Policy Committee (MPC)** is responsible for using monetary policy instruments to keep inflation aligned with the prescribed target.
- The framework currently operates around a **4% CPI inflation target with a tolerance band of 2-6%**.

How Inflation Targeting Works

Demand Channel

- When inflationary pressures arise from excessive demand, the RBI can increase the **repo rate**.
- Higher borrowing costs can reduce credit demand, consumption and investment, thereby moderating aggregate demand and price pressures.

Expectations Channel

- Monetary policy also seeks to influence the inflation expectations of households, firms and financial markets.
- A credible inflation target can prevent temporary price increases from becoming persistent through higher wage demands and repeated price revisions.

Phillips Curve Link

- The framework is partly informed by the **New Keynesian Phillips Curve (NKPC)**.
- It suggests that inflation is influenced by **economic activity, production costs and expected future inflation**.
- Stronger demand can increase employment and input costs, which may eventually translate into higher consumer prices.

Challenges

- Flat Phillips Curve:** India's Phillips Curve appears relatively flat, weakening the link between output, employment and inflation **in India**.
- Weak Wage-Price Transmission:** Informal employment and weak wage bargaining reduce the transmission from higher output to wages and consumer prices.

- **Elevated Inflation Expectations:** Household inflation expectations often exceed RBI projections, making sustained price stability more difficult to achieve.
- **Supply-Side Inflation:** Food shocks, weather events, supply disruptions and crude prices often drive inflation beyond monetary policy's direct control.

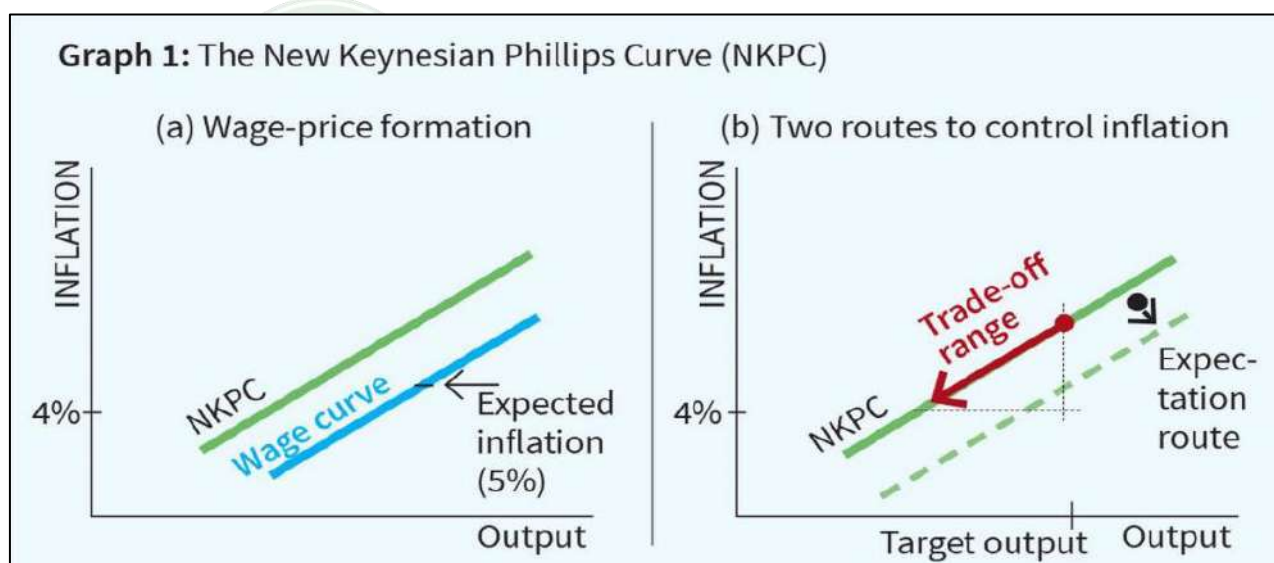
What Has the Framework Achieved?

- Inflation targeting has provided a **clear numerical benchmark** for monetary policy and strengthened communication between the RBI and markets.
- RBI assessments noted that average CPI inflation during **October 2016-February 2020** was about **3.8%**, compared with **7.3% during January 2012-September 2016**, before the pandemic period.
- The framework has also allowed monetary policy to respond flexibly to exceptional shocks, including the COVID-19 period.
- The **Economic Survey 2025-26** notes a substantial easing of inflation, with headline CPI inflation at **1.7% during April-December FY26**, largely reflecting lower food prices and favourable supply conditions.

NEW KEYNESIAN PHILLIPS CURVE (NKPC)

- The NKPC describes how inflation is connected with **inflation expectations and economic activity**.
- It suggests that **expected future inflation** can influence the rate of inflation observed today.
- When **aggregate demand and output rise**, firms may face higher production and labour costs.
- These increased costs can be reflected in **higher prices**, causing inflationary pressure to increase.

Graph 1: The New Keynesian Phillips Curve (NKPC)



Conclusion

India's next phase of inflation management requires credible monetary policy combined with stronger supply-side capacity, climate resilience and effective economic coordination.

2. INDIA'S NEW NATIONAL ACCOUNTS METHODOLOGY AND IMPROVING GDP MEASUREMENT

Why in news?

- **MoSPI has introduced the new National Accounts Series with 2022-23 as the base year**, replacing the earlier 2011-12 series.

What are National Accounts?

- National Accounts provide a systematic picture of an economy's **production, income, consumption, investment and trade**.
- GDP can be measured through three approaches:
 - **Production:** GVA + taxes – subsidies on products.
 - **Expenditure:** Consumption + investment + exports – imports.
 - **Income:** Compensation + operating surplus/mixed income + taxes – subsidies.
- The estimates follow the broad framework of the **UN System of National Accounts**.

Why Change the Base Year?

- The new base year **2022-23** replaces **2011-12**.
- Base-year revision helps:
 - Capture structural changes in the economy.
 - Incorporate newer data sources.
 - Improve sectoral coverage.
 - Use more appropriate prices and weights.
- FY 2022-23 was selected as a relatively recent year with comprehensive data availability after the COVID-19 disruption.

Major Methodological Change: Double Deflation

- Earlier, manufacturing GVA was largely converted into real terms using a **single broad deflator**.
- The new methodology separately adjusts:
 - **Output prices**, and
 - **Prices of intermediate inputs**.
- This provides a more detailed picture of how changes in both selling prices and input costs affect real value addition.
- MoSPI has adopted double deflation for various manufacturing industries, while using volume or single extrapolation where sufficient price data are unavailable.

Other Important Improvements

- Greater use of **GST and administrative data** for quarterly estimates.
- Better coverage of the **unincorporated sector** through annual survey information.
- **Supply and Use Tables (SUTs)** have been integrated to reduce inconsistencies between production and expenditure estimates.
- The revised series also improves measurement of private consumption and quarterly GDP benchmarking.

Significance for India

- **Better GDP accuracy:** More detailed data can improve measurement of real economic activity.
- **Better policymaking:** Reliable sectoral estimates help governments design fiscal, industrial and monetary policies.
- **Improved international comparability:** Methodological improvements bring estimates closer to evolving international practices.
- **Better state-level estimates:** States are also being guided to adopt the **2022-23 base year** for GSDP calculations.

challenges

- **Domestic price** indices may not accurately represent the prices of imported intermediate goods.
- **Suitable producer-price** indices are not available for several services.

- **Changes in methodology** can alter historical growth estimates, requiring careful comparison between old and new series.
- **Greater dependence on administrative** datasets requires continuous improvement in coverage and consistency.

Way Forward

- Develop a comprehensive and regularly updated **Producer Price Index (PPI)**.
- Improve item-level price data and mapping of **domestic and imported inputs**.
- **Strengthen ASI, GST** and administrative databases.
- **Ensure transparent documentation** and periodic validation of deflators.
- Improve coordination between **MoSPI, RBI, ministries and States** for consistent economic statistics.

Conclusion:

A modern national-accounts system is essential for a modern economy, and India must continuously improve its **data quality, price statistics and estimation methods** to make GDP measurement more credible.

II. Growth and Development, employment

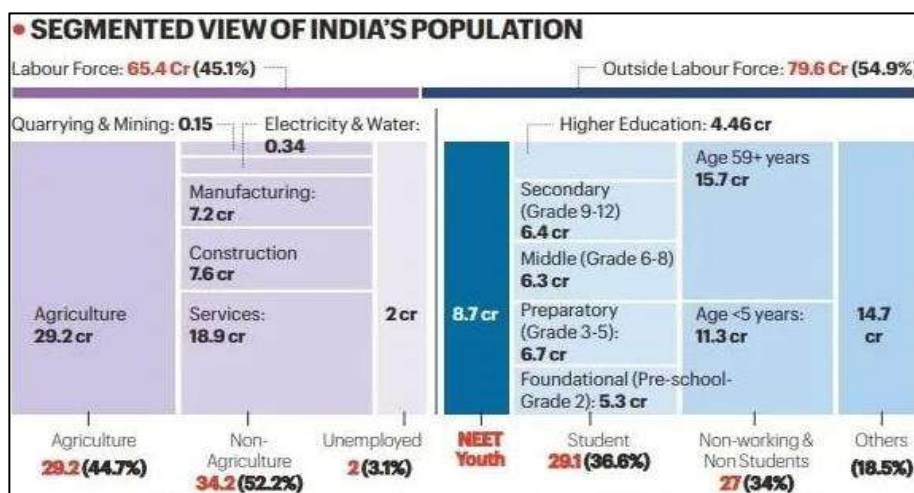
1. REIMAGINING SKILLING FOR VIKSIT BHARAT

Why in News?

- Recently, NITI Aayog's report "**Reimagining Skilling for Viksit Bharat@2047**" highlighted India's growing challenge of **educated unemployment and skill-job mismatch**.

Key Findings of the Report

- **Skill-Job Mismatch:** Only around **8.25% of graduates** are employed in jobs matching their educational qualifications.
- **High Educated Unemployment:** Unemployment is around **13% among graduates** and **20.4% among graduate women**, compared with a national unemployment rate of about **3.2%**.
- **Overdependence on Generic Degrees:** More than **2 crore of India's 3.4 crore undergraduate students** are enrolled in B.A., B.Sc. and B.Com. programmes.
- **NEET Youth:** A significant share of young people are **Not in Education, Employment or Training (NEET)**.
- **Returns from Skilling:** A generic graduate with additional skills earns an average starting salary of around **₹29,000 per month**, compared with **₹22,000** for graduates without additional skilling.



Challenges

- **Information gaps:** Students often lack reliable information about suitable courses, apprenticeships, scholarships and career opportunities.
- **Gender barriers:** Women face constraints related to mobility, safety, family responsibilities and social norms.
- **Supply-driven skilling:** Training programmes often focus on available courses rather than actual local and sectoral labour demand.
- **Weak industry participation:** Limited employer involvement reduces workplace exposure and employment relevance.

Way Forward

- Convert conventional B.A., B.Sc. and B.Com. programmes into **applied, industry-linked specialisations**.
- Expand **Apprenticeship Embedded Degree Programmes** and work-integrated learning.
- Develop skills for emerging sectors such as **green industries, renewable energy and electric vehicles**.
- Provide greater autonomy to **ITIs and skill-development institutions** and strengthen public-private partnerships.
- Integrate **digital literacy, financial literacy and workplace skills** into formal education.

NITI AAYOG

NITI Aayog, established on **1 January 2015**, replaced the Planning Commission. It is a **non-constitutional, non-statutory executive body** and India's premier public policy think tank.

- **Chairperson:** Prime Minister
- **Vice-Chairperson:** Appointed by the Prime Minister
- **Governing Council:** Chief Ministers of States and representatives of Union Territories
- Promotes **cooperative and competitive federalism**, bottom-up planning, innovation and evidence-based policymaking.

Conclusion

For **Viksit Bharat**, India must move from a degree-oriented system towards **demand-driven, industry-linked and outcome-based skilling** that converts its demographic potential into productive employment.

2. BUILDING A SELF-RELIANT INDIA'S MEDTECH ECOSYSTEM

Why in news?

- Recently, India's medical devices sector has gained momentum with rising domestic manufacturing, exports and government support for reducing import dependence.

India's Medical Devices Industry

- The medical devices sector covers a wide range of products, including **diagnostic equipment, implants, surgical instruments, in-vitro diagnostics, patient-monitoring systems and medical consumables**.
- These technologies support diagnosis, treatment, disease monitoring, emergency care and home-based healthcare.
- The **National Medical Devices Policy, 2023** aims to create a patient-centric ecosystem and make India a global hub for manufacturing and innovation.

Present Status

- India's medical devices industry is recognised as a **high-potential sunrise sector** with significant scope for domestic and global expansion.

- The National Medical Devices Policy has set an ambition of expanding the sector from around **US\$11 billion to US\$50 billion by 2030**.
- India's medical-device exports have increased substantially, rising from **US\$2.5 billion in FY2020-21 to US\$4.1 billion in FY2024-25**.
- Indian manufacturers are increasingly producing sophisticated products such as **MRI and CT scanners, linear accelerators, cardiac stents and ventilators**, indicating movement towards higher-value manufacturing.

Factors Driving India's MedTech Growth

- **Growth of hospitals**, diagnostic centres, speciality healthcare and digital health services is increasing demand for advanced medical equipment.
- Urbanisation, increasing health awareness, ageing population and the growing burden of **non-communicable diseases** are creating sustained demand for diagnostic and therapeutic devices.
- **India possesses a large skilled workforce** and relatively competitive manufacturing costs, creating opportunities for cost-effective medical technologies.
- **Startups and MSMEs are developing** products such as **portable diagnostic devices, wearable technologies, point-of-care testing systems and AI-enabled healthcare solutions**.

Significance

- Affordable portable devices such as **handheld ultrasound systems, portable ECG machines and point-of-care diagnostic kits** can improve healthcare delivery in rural and underserved regions.
- Greater domestic production of high-end devices can reduce dependence on overseas suppliers and strengthen the resilience of critical healthcare supply chains.
- Expansion of the sector can generate investment, skilled employment, technological capabilities and export opportunities while strengthening India's manufacturing base.
- Integration of **AI, robotics, 3D printing, IoT and advanced materials** can promote next-generation medical technologies and improve clinical outcomes.

Challenges

- **Import Dependence:** Despite progress, India remains dependent on imports for several sophisticated components, raw materials and advanced medical equipment.
- **High R&D Costs:** Medical-device innovation requires substantial investment in research, clinical validation, testing and certification, creating difficulties particularly for startups and MSMEs.
- **Regulatory Challenges:** Medical devices require stringent standards to ensure patient safety and product quality.
- **Skill Gaps:** The sector requires specialised professionals in **biomedical engineering, medical-device design, clinical research, regulatory affairs and advanced manufacturing**.

Government initiatives

- **PLI Scheme for Medical Devices:** The scheme has an outlay of **₹3,420 crore** and supports domestic manufacturing in areas such as radiotherapy, imaging, anaesthesia, critical care and implants.
- **Medical Device Parks:** Three parks are under implementation at **Greater Noida, Ujjain and Kanchipuram**, providing common testing, sterilisation, warehousing, prototyping and other infrastructure.
- **Strengthening Medical Device Industry Scheme:** The **₹500-crore scheme**, launched in 2024, supports common facilities, reducing import dependence, skill development, clinical studies and industry promotion.
- **Research and Innovation:** The **PRIP Scheme** supports research infrastructure, Centres of Excellence and R&D projects in the pharma and medical-device sectors.

Way Ahead

- **Strengthen component manufacturing:** Develop domestic capabilities in sensors, chips, imaging components, precision instruments and specialised materials.
- **Promote R&D:** Increase collaboration among **industry, hospitals, universities, startups and research institutions.**
- **Simplify regulation:** Create predictable, transparent and risk-based approval mechanisms while maintaining patient safety.
- **Expand testing infrastructure:** Develop internationally accredited testing, certification and clinical-validation facilities.

Conclusion

India must move from import-dependent consumption towards indigenous innovation, affordable manufacturing and globally competitive medical-device capabilities.

3. CREATIVE ECONOMY AND INDIA'S EMERGING GROWTH FRONTIER

Why in news?

- India's growing **creative economy**, driven by AVGC-XR, gaming, digital content and media, is emerging as a new source of **employment, innovation and exports.**

What is Creative Economy?

- It comprises industries where economic value is created mainly through **creativity, culture, technology and intellectual property (IP).**
- It includes:
 - **Media and entertainment**
 - **Animation, VFX and gaming**
 - **Comics and digital content**
 - **Design, advertising and publishing**
 - **Music, films and live events**
- Unlike traditional cultural activities, these sectors increasingly use **AI, cloud computing, digital platforms and immersive technologies.**

India's Emerging Position

- India's media and entertainment sector grew about **9% in 2025 to ₹2.78 lakh crore** and is projected to reach **₹3.3 lakh crore by 2028.**
- The **AVGC-XR sector** combines artistic skills with technologies such as 3D modelling, animation, virtual production and extended reality.
- India has a large talent base in **film production, animation, gaming and digital storytelling.**
- The global creative economy contributes around **3.1% of global GDP**, according to UNESCO.

Why is it Important for India?

- **Employment:** Creates opportunities for designers, animators, musicians, developers, writers and content creators.
- **Youth opportunities:** Creative industries can provide new avenues for India's large young workforce.
- **Exports:** Films, music, gaming and digital content can be sold globally without large physical infrastructure.
- **Soft power:** Indian cinema, music, crafts and storytelling can strengthen India's cultural influence abroad.

Challenges

- **Weak IP protection**, copyright violations and unauthorised use of creative content can reduce creator earnings.
- **Skill gap** in AI, VFX, gaming and virtual production require continuous reskilling.
- **Access to finance** often possess intangible assets, making conventional lending difficult.
- **Advanced studios and specialised training** remain concentrated in major cities.

Way Forward

- Build **regional creative clusters and digital infrastructure** beyond major metropolitan centres.
- Strengthen **copyright enforcement and transparent rules for AI-generated content and IP ownership**.
- Link schools, universities, startups and industry to provide **industry-oriented creative and technology skills**.
- Promote Indian-language content and global partnerships to expand **creative exports and cultural diplomacy**.

GOVERNMENT INITIATIVES

- **Indian Institute of Creative Technologies (IICT)**: Established as a National Centre of Excellence for the AVGC-XR ecosystem and capacity building.
- **AVGC Content Creator Labs**: Proposed in **15,000 schools and 500 colleges** to create an early talent pipeline.
- **National AI Skilling Initiative**: Government, Google and YouTube are training **15,000 creators and media professionals** in AI-related skills.
- **MyWAVES**: Enables citizens to create and share content through the WAVES OTT ecosystem.
- **WAVES**: Provides a platform connecting creators, investors, startups and global media industries.

Conclusion:

India can convert its rich cultural heritage and young talent into a globally competitive creative economy by combining **creativity, technology, skills and intellectual property**.

III. Inclusive growth and issues

1. FEMINISATION OF AGRICULTURE AND EMPOWERMENT

Why in news?

- Recently the growing presence of women across farming, livestock, fisheries, processing and allied activities has brought renewed attention to the **feminisation of agriculture** and the need to give women greater access to land, credit, technology and markets.

What is Feminisation of Agriculture?

- Feminisation of agriculture refers to the **increasing participation, responsibility and decision-making role of women in farming and allied activities**.
- It is partly associated with **male migration from rural areas to non-farm employment**, leaving women to manage agricultural operations.
- However, greater participation does not automatically mean greater ownership or control over agricultural resources.
- Government data notes that **80% of rural women are engaged in agriculture and allied sectors**, with 33% working as agricultural labourers and 48% as self-employed farmers.

Major Reasons

- **Male Migration**: Migration of men to cities for construction, manufacturing, services and other non-farm employment increases women's responsibility for farms.

- **Rural Economic Pressures:** Small and fragmented holdings, uncertain farm incomes and rising household expenses encourage women to participate in both family farming and wage employment.
- **Expansion of Allied Activities:** Women's participation extends beyond crop cultivation to **dairy, poultry, fisheries, horticulture, beekeeping, agro-processing and forest-based livelihoods.**
- **Growth of Women's Collectives:** Self-Help Groups and Farmer Producer Organisations are creating opportunities for women to access credit, technology, training and markets.

Significance

- **Economic Empowerment:** Greater participation in agriculture can strengthen women's income-earning capacity and their role in household economic decisions.
- **Food and Nutrition Security:** Women play important roles in food production, livestock management, processing and household nutrition.
- **Sustainable Agriculture:** Women's traditional knowledge can support **crop diversity, seed conservation, livestock management and resource-efficient farming practices.**
- As of March 2026, **1,175 FPOs with 100% women membership** had been registered under the government's 10,000 FPO initiative, with **23.55 lakh women farmers** registered across the scheme.

Major Challenges

- **Limited land ownership:** Women may cultivate land without holding formal titles, restricting their access to institutional credit and government benefits.
- **Credit constraints:** Lack of collateral and formal ownership documents can make agricultural finance difficult.
- **Technology gap:** Access to machinery, digital services and modern agricultural technology remains uneven.
- **Wage disparity:** Women agricultural labourers may receive lower wages than men in some occupations.

Way Forward

- Promote **joint land ownership and stronger recognition of women as farmers.**
- Expand **collateral-free and accessible agricultural credit.**
- Develop women-friendly farm machinery to reduce physical drudgery.
- Strengthen women's **FPOs and SHGs** for aggregation, processing and marketing.
- Provide gender-sensitive agricultural extension and digital advisory services.

GOVERNMENT INITIATIVES

- **Namo Drone Didi:** Provides drones and financial assistance to women SHGs for agricultural services, precision farming and rural employment.
- **DAY-NRLM:** Strengthens women's SHGs through credit, skills, entrepreneurship and diversified livelihood opportunities in rural areas.
- **Agricultural Technology Management Agency:** Provides women farmers training in improved agricultural practices, technologies, productivity enhancement and modern farming techniques.
- **Farmer Producer Organisations:** Help women farmers collectively access inputs, technology, processing, storage and markets, improving bargaining power and incomes.

Conclusion

Feminisation of agriculture should move beyond increasing women's participation towards recognising women as farmers, owners, entrepreneurs and decision-makers, thereby converting a structural change in rural employment into an opportunity for inclusive and sustainable agricultural development.

IV. Agriculture and allied

1. STRENGTHENING INDIA'S SEED REGULATION AND NEW SEED ACT

Why in news?

- The Union Agriculture Ministry is consulting farmer organisations on a **proposed new Seed Act** aimed at replacing the Seeds Act, 1966.

Need for a New Seed Law

- India's seed sector has changed significantly since the existing law was enacted nearly six decades ago.
- The growth of private seed companies, technological developments and emergence of new varieties have created regulatory challenges.
- According to the Agriculture Minister, nearly **70% of seeds currently remain outside the effective ambit of the existing regulatory framework**.
- This can make it difficult to ensure quality and fix responsibility when farmers suffer losses due to defective or counterfeit seeds.
- Poor-quality seeds can result in **crop failure, loss of farm income and indebtedness**, making seed quality an important component of agricultural and livelihood security.

Key Features of the Proposed Act

- **National Seed Register:** All seeds and planting materials would require registration before being legally sold in India.
- **QR-Based Traceability:** QR codes would provide information on producers, laboratory clearance and seed movement across the supply chain.
- **Protection of Farmer Rights:** Farmers would retain rights to use, exchange and sell traditional and farmers' varieties.
- **Voluntary Registration:** Registration of traditional varieties would remain voluntary, protecting community seed systems and traditional agricultural knowledge.
- **Graded Penalties:** Violations would attract penalties based on severity, with counterfeit seeds and deliberate fraud facing stringent punishment.
- **Role of States:** States would approve and release varieties according to agro-climatic needs while complying with national standards.
- **Centre-State Coordination:** A unified online register would improve coordination and information sharing between central and state authorities.
- **Seed Security Fund:** States would establish funds using penalties and recoveries to support farmers affected by seed failures.
- **Time-Bound Compensation:** Verified crop losses caused by seed failure would be assessed, with compensation proposed within **15 days**.
- **Consumer Protection Remedy:** Farmers would continue to have access to remedies available under the Consumer Protection Act.

Significance

- **Farmer protection:** Better regulation can reduce losses caused by counterfeit and substandard seeds.
- **Supply-chain transparency:** Digital traceability can help identify the source of defective seeds and improve accountability.
- **Quality improvement:** Stronger testing and registration can encourage producers to maintain consistent standards.

- **Agricultural productivity:** Access to reliable, quality seed is essential for improving yields and supporting climate-resilient agriculture.

Challenges

- **Compliance burden:** Extensive registration and digital requirements may increase costs for small seed producers and local enterprises.
- **Digital accessibility:** QR-based systems must remain usable for farmers with limited connectivity or digital literacy.
- **Centre-State balance:** National standards need flexibility to accommodate diverse agro-climatic conditions across States.
- **Implementation capacity:** Effective regulation requires adequate seed laboratories, trained inspectors, testing facilities and timely grievance redressal.

Way Forward

- **Farmer-centric regulation:** Keep compliance simple while maintaining strict quality standards for commercial seed producers.
- **Stronger infrastructure:** Expand accredited laboratories, testing facilities and inspection capacity across States.
- **Inclusive digitalisation:** Make QR-based traceability simple, multilingual and accessible through offline mechanisms where required.
- **Effective compensation:** Establish transparent verification procedures and ensure genuinely time-bound compensation for verified crop losses.

Conclusion

A modern seed law can strengthen **farmer protection, seed quality and supply-chain accountability**. However, its success will depend on balancing effective regulation with **farmers' traditional seed rights, small-producer interests and India's diverse agricultural conditions**.

V. Effects of liberalization on the economy

1. INDIA FROM LIBERALISATION TO GLOBAL INNOVATION

Why in news?

- Recent data shows that **corporate R&D spending in India is rising**, but its share in company revenues remains modest compared with major innovation-driven economies.

India's Corporate R&D Landscape

- The number of listed companies reporting R&D expenditure increased from about **150 in FY1999 to 471 in FY2026**.
- Their combined R&D spending rose from **₹957.8 crore to about ₹63,529 crore** during this period.
- R&D expenditure grew at around **16.8% CAGR**, faster than the 12.9% growth in net sales.
- However, R&D intensity was only **0.91% of combined sales in FY2026**, below its peak of 1.15% in FY2017.

From 1991 Reforms to Technology Creation

- The **1991 economic reforms** exposed Indian firms to greater global competition and encouraged efficiency, exports and technology adoption.
- Initially, many companies concentrated on **importing and adapting foreign technologies** rather than developing original technologies.

- Over time, sectors such as **pharmaceuticals, automobiles and engineering** developed stronger in-house R&D capabilities.
- The next stage requires movement from **technology absorption to technology creation and commercialisation**.

Why Corporate R&D Matters

- **Productivity:** New technologies can improve production efficiency and reduce costs.
- **Global competitiveness:** Innovation allows Indian firms to compete through technology rather than only lower costs.
- **Strategic autonomy:** Domestic R&D can reduce dependence on imported critical technologies.
- **High-value exports:** Patented products and proprietary technologies can generate greater export value.
- **Quality employment:** R&D creates demand for scientists, engineers and specialised technical professionals.

challenges

- India's business sector contributes only about **41% of national R&D expenditure**, compared with much higher shares in countries such as China, the US and South Korea.
- **Corporate R&D** remains concentrated in areas such as pharmaceuticals and automobiles.
- Firms may prefer projects with quicker commercial returns over long-term basic or high-risk research.
- Good research does **not always translate into patents**, products and successful businesses.

Way Forward

- Increase **private R&D intensity**, especially in AI, semiconductors, electronics, biotechnology and advanced manufacturing.
- Create stronger **university-industry research partnerships** with joint laboratories, patents and technology-transfer mechanisms.
- Strengthen India's **IP and patent capabilities** and simplify technology commercialisation.
- Link R&D with **manufacturing, exports and strategic technologies** so that research creates economic value.

Conclusion

India's next technological leap depends on turning rising R&D expenditure into **globally competitive intellectual property, technologies, products and enterprises**.

VI. Industry and Industrial Policies

1. INDIA'S MANUFACTURING CHALLENGE AND THE LIMITS OF ECONOMIC DIPLOMACY

Why in news?

- India's trade experiences with **Russia and China** highlight a key challenge: diplomatic goodwill can create economic opportunities, but weak domestic manufacturing may prevent India from fully utilising them.

India-Russia Trade Imbalance

- India's exports to Russia remain below **US\$5 billion**, while imports from Russia reached about **US\$63.8 billion in 2024-25**.
- Imports are dominated by **crude oil and other commodities**, while India has limited penetration into Russia's large market for manufactured goods.

- Russia offers opportunities for Indian automobiles, machinery, electronics and industrial equipment, but inadequate production capacity limits India's export potential.

Dependence on China

- India's trade with China reflects another dimension of the manufacturing problem.
- Bilateral trade reached around **US\$151 billion in 2025-26**, while India's trade deficit was approximately **US\$112 billion**.
- Indian industries depend on Chinese electronics, machinery, chemicals, pharmaceutical inputs, auto components and other intermediate goods.
- China's advantage comes from **large-scale production, integrated supply chains and extensive supplier networks**, enabling competitive prices and faster delivery.

Why Manufacturing Matters for Economic Diplomacy?

- **Converts diplomatic opportunities into exports:** Foreign markets become meaningful only when domestic firms can supply globally competitive products.
- **Improves strategic autonomy:** Strong domestic production reduces dependence on external sources for critical goods and technologies.
- **Raises domestic value addition:** Deeper supply chains allow Indian firms to capture a larger share of value from exports.
- **Diversifies exports:** Competitive manufacturing can expand India's export basket beyond traditional sectors such as textiles, pharmaceuticals and petroleum products.



Challenges in Indian Manufacturing

- **Regulatory complexity**, compliance burdens, logistics expenses and approval delays can reduce competitiveness.
- **Smaller industrial operations** can make it difficult for Indian firms to match the cost advantages of large global manufacturers.
- **Advanced manufacturing requires modern machinery**, digital systems, innovation capabilities and specialised skills.
- **Weak industry academia linkages** and research institutions restricts commercialisation of domestic technologies.
- **Fragmented supply chains**, logistics, specialised services and supporting industries reduce overall manufacturing efficiency.

Way Forward

- Fiscal support should catalyse investment while firms progressively become competitive without permanent subsidies.

- Strengthen capabilities in components, machinery, raw materials, logistics and specialised industrial services.
- Identify sectors with sustainable comparative advantages and integrate Indian firms more deeply into global value chains.
- Expand industry academia partnerships, applied research, technical training and adoption of advanced manufacturing technologies.

GOVERNMENT INITIATIVES

National Mission on Manufacturing

- Announced in **Budget 2025-26**, it seeks to raise manufacturing's share in GDP to **25% by 2035**.
- It also targets merchandise exports of **US\$1.2 trillion**, supported by deeper integration with global value chains.

Production Linked Incentive Scheme

- The PLI scheme provides incentives linked to incremental sales to strengthen domestic production.
- It has expanded across **14 sectors**, including electronics, automobiles, textiles and food processing.

Infrastructure and Logistics

- **National Logistics Policy** seeks to reduce India's relatively high logistics costs and improve supply-chain efficiency.
- **PM Gati Shakti** promotes integrated infrastructure planning and multimodal connectivity across transport networks.

Innovation and Entrepreneurship

- **Startup India** promotes entrepreneurship, innovation and technology-based enterprises.
- The **Research, Development and Innovation Fund** has an outlay of **₹1 lakh crore over six years**, aimed at encouraging private-sector investment in advanced R&D.

Conclusion

Economic diplomacy can open international markets, but a competitive manufacturing base determines India's ability to convert those opportunities into exports, resilience and strategic autonomy.

2. 12 YEARS OF MAKE IN INDIA AND MANUFACTURING COMPETITIVENESS

Why in news?

- **Make in India completed 12** highlighting the expansion of India's manufacturing capacity **and stronger global value-chain integration**.

Make in India: Core Objective

- Launched on **25 September 2014** to make India a global centre for **manufacturing, design and innovation**.
- Focused on:
 - Improving ease of doing business.
 - Attracting domestic and foreign investment.
 - Building industrial infrastructure.
 - Promoting innovation and entrepreneurship.
- **Make in India 2.0** now covers **27 sectors**, including 15 manufacturing and 12 services sectors.

Major Achievements

- **Manufacturing GVA:** Grew at a **10.88% CAGR during 2022-23 to 2025-26** at constant prices.
- **Electronics:** Production increased nearly **7 times**, from ₹1.9 lakh crore in 2014-15 to ₹13.11 lakh crore in 2025-26.

- **Mobile phones:** Production rose around **33 times** during the same period, supporting India's position as the world's second-largest mobile-phone manufacturer by volume.
- **Electronics exports:** Increased from about ₹38,000 crore to **₹4.24 lakh crore**.
- **Defence:** Indigenous defence production reached a record **₹1.78 lakh crore in 2025-26**.
- **Capital goods:** Growth in machinery and heavy engineering indicates increasing domestic industrial capability.



Policy Ecosystem

- **PLI Scheme:** Covers 14 sectors and links incentives with incremental production and sales. By December 2025, it had attracted over **₹2.16 lakh crore investment**, generated over ₹20.41 lakh crore production/sales and supported more than 14.39 lakh jobs.
- **PM GatiShakti:** Promotes integrated planning of transport and logistics infrastructure.
- **National Single Window System:** Simplifies approvals required for businesses.
- **India Industrial Land Bank:** Helps investors identify industrial locations.
- **Semiconductor and electronics policies:** Aim to develop capabilities beyond final assembly towards components, chips and manufacturing equipment.

Why Manufacturing Matters

- **Employment:** Labour-intensive manufacturing can absorb workers shifting from agriculture.
- **Technology:** Domestic production creates opportunities for technology learning and innovation.
- **Supply-chain resilience:** Local capabilities reduce vulnerability to global disruptions.
- **Regional development:** Industrial clusters can stimulate MSMEs, logistics and urban infrastructure.

Key Concerns

- High production does not always mean that a large share of the product's value is created domestically; electronics is an example where domestic value addition remains relatively limited.
- Smaller firms face difficulties in finance, technology, quality standards and integration with large manufacturers.
- Critical minerals, components, machinery and advanced technologies remain areas of dependence.
- Capital-intensive sectors may increase output without generating proportionate mass employment.

Way Forward

- Shift from **assembly to complete value-chain development**, including components, machinery, materials and R&D.
- Integrate **MSMEs into global value chains** through technology, finance and quality support.
- Link incentives increasingly with **productivity, exports, domestic value addition and innovation**.
- Build resilient domestic supply chains for **semiconductors, critical minerals and strategic components**.

Conclusion

The next phase of Make in India must transform “**Made in India**” from **higher production into deeper value creation, technological capability and globally competitive manufacturing**.

VII. Services sector

1. INDIA'S SOFTWARE SERVICES EXPORTS AND STRENGTHENING THE SERVICES-LED GROWTH MODEL

Why in news?

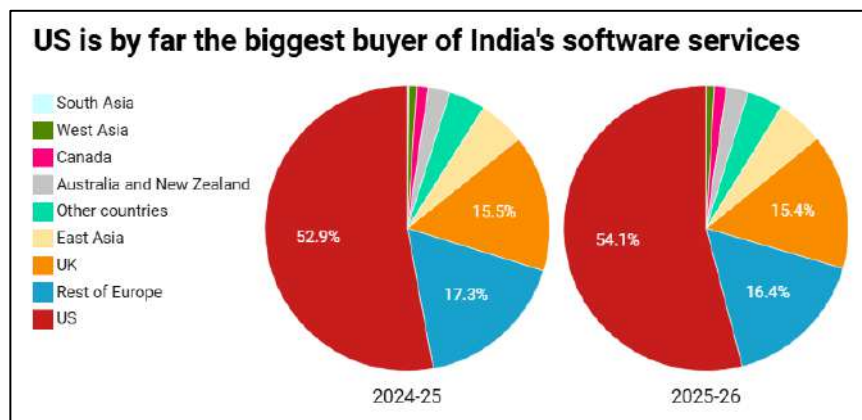
- Recently India's software services exports reached **\$221.4 billion in 2025-26**, highlighting the growing role of digital services in India's external sector.

India's Services Sector role

- Services include **IT, finance, transport, communication, tourism, healthcare, education and professional services**.
- Services exports have become an important source of **foreign exchange and trade-surplus earnings**.
- In FY25, India's services exports reached a record **\$387.5 billion**, while the services trade surplus was **\$188.8 billion**.

Software Services: Current Picture

- **Software exports:** Increased **8.2% year-on-year to \$221.4 billion** in 2025-26.
- Including overseas commercial presence, exports increased **9.5% to \$239.3 billion**.
- Software services formed around **53% of total services exports**.
- Major segments include:
 - **IT services** - software development, consulting and technology solutions.
 - **BPO/ITES** - customer support, back-office and business-process services.
 - **Software products and digital solutions** - AI, cloud and cybersecurity applications.
- RBI data shows computer services have consistently remained the largest component of software-service exports.



Major Export Markets

- **United States:** Remains the largest destination, accounting for **54.1%** of software exports in 2025-26.
- **Europe:** Provides an important second market, creating opportunities for diversification.
- **UK:** Continues to be a significant destination for Indian technology companies.
- This geographical concentration provides strong demand but also exposes India to changes in **US trade, immigration and technology policies.**

Changing Mode of Delivery

- About **91.7%** of software services are delivered through **off-site/remote operations.**
- Declining on-site exports indicate the growing importance of **digital delivery and distributed global teams.**
- Indian companies are also expanding through **Global Capability Centres (GCCs) and foreign affiliates,** strengthening their international presence.
- GCCs in India grew at about **7% CAGR during FY20-FY25,** supported by skilled talent and digital infrastructure.

Challenges

- Heavy dependence on the US increases vulnerability to external policy changes.
- Tariffs and localisation requirements can affect cross-border service delivery.
- Tighter mobility rules may affect traditional on-site business models.
- Greater dependence on service outsourcing can limit value capture compared with globally owned technology products.

Way Forward

- Expand services exports towards Europe, Asia-Pacific, Africa and emerging economies.
- Increase focus on **AI, semiconductors, cybersecurity, cloud, software products and R&D.**
- Promote continuous reskilling in AI, advanced computing, data science and emerging technologies.
- Use overseas subsidiaries and GCCs to serve local markets while reducing mobility-related risks.

Conclusion:

India must evolve from a major **IT service provider into a global technology and innovation hub,** combining talent, digital infrastructure, intellectual property and high-value services.

VIII. Infrastructure

1. WESTERN DEDICATED FREIGHT CORRIDOR (WDFC)

Why in news?

Recently The **Western Dedicated Freight Corridor (WDFC)** has been dedicated to the nation, marking a major step in strengthening India's freight transportation and logistics infrastructure. **What is a Dedicated Freight Corridor?**

- A Dedicated Freight Corridor is a **railway route exclusively designed for freight trains,** separating cargo movement from passenger traffic on conventional railway lines.
- India's DFC programme was conceived in **2005,** while the **Eastern and Western DFCs were approved in 2008.** Together, these two corridors cover around **2,843 km.**
- **Eastern DFC:** About 1,337 km from **New Sahnewal in Punjab to New Sonnagar in Bihar.**
- **Western DFC:** About 1,506 km from **New Dadri in Uttar Pradesh to New JNPT in Maharashtra,** passing through Haryana, Rajasthan and Gujarat.



Key Features of WDFC

- Designed primarily for **high-volume freight movement**.
- Supports **double-stack container trains**, enabling more cargo to be transported in a single train.
- Freight trains can operate at speeds of up to **100 kmph**.
- Connects major **industrial clusters, logistics centres and ports**.
- Helps create dedicated capacity for freight without competing with passenger trains on conventional routes.

Significance for India

- The WDFC can substantially **reduce transit time**. Freight trains can cover 100 km in around **2.5 hours**, compared with nearly six hours on conventional mixed-use routes.
- **Lower logistics costs** and better asset utilisation can reduce transportation costs. Container cargo could potentially see **cost savings of around 25%**.
- Shifting freight traffic to dedicated corridors **releases capacity on conventional railway lines**, allowing more passenger and other services to operate.
- **The corridor links industrial regions** with major logistics hubs and the **Jawaharlal Nehru Port area**, facilitating smoother movement of exports and imports.
- **Reliable and faster freight connectivity** can improve inventory management, reduce transit uncertainty and strengthen the integration of national markets.

Challenges

- The effectiveness of DFCs depends not only on rail infrastructure but also on **last-mile connectivity, efficient terminals and integration with other modes of transport**.
- High capital costs, timely maintenance, land and environmental concerns, and coordination among multiple agencies can affect project efficiency.
- Ensuring sufficient freight volumes and efficient utilisation of the created capacity is also important.

Way Forward

- India should focus on integrating DFCs with **multimodal logistics parks, ports, industrial corridors and dedicated road connectivity**.
- **Greater use of digital freight tracking**, efficient terminals and unified logistics planning can improve utilisation.

- **Expansion of the DFC network** should be accompanied by **strong last-mile connectivity and seamless rail-port integration**.
- **A third DFC has also been proposed**, connecting **Dankuni in West Bengal with Surat in Gujarat**, which would further expand India's dedicated freight network.

Conclusion

By integrating DFCs with ports, industrial clusters and multimodal transport systems, **India can strengthen its supply chains**, reduce logistics costs and enhance the **competitiveness of its economy**.

2. DECONGESTING INDIAN RAILWAYS FOR EFFICIENT FREIGHT MOVEMENT

Why in news?

- Indian Railways is focusing on **multitracking High-Density Networks and expanding Dedicated Freight Corridors** to increase freight capacity.

Dedicated Freight Corridors (DFCs)

- **Dedicated Freight Corridors are special railway routes built mainly for carrying freight trains**, rather than sharing the tracks heavily with passenger trains.
- Freight trains get dedicated routes, reducing conflict with passenger trains.
- Trains can travel with fewer stops and delays, and DFCs can carry heavier and longer freight trains.
- Faster rail movement reduces transportation and inventory costs.

Importance of Rail Freight

- **Freight is central to railway finances:** Freight earnings contribute over **65% of Indian Railways' total earnings**, supporting passenger services.
- **Major freight carrier:** Railways handled around **1,670 million tonnes in 2025-26**, accounting for nearly **27% of India's freight movement**.
- **Cost advantage:** Rail transport is generally cheaper and more energy-efficient than road transport for long-distance bulk movement.
- **Economic significance:** Faster freight movement can reduce inventory costs, improve supply-chain reliability and strengthen manufacturing competitiveness.

High-Density Networks (HDNs)

- HDNs are railway routes carrying **very high volumes of passenger and freight traffic**, often close to their operating limits.
- The **11,051-km HDN network** forms only about **16% of the railway network but handles over 40% of railway traffic**.
- Ideally, utilisation should remain around **70-80%** for operational flexibility. Excessive utilisation causes delays and restricts additional freight trains.
- The move aims to **reduce rail congestion, lower logistics costs and support the target of 3,000 MT freight loading by 2030**.

Increasing Existing Capacity

- **Multitracking** means constructing additional railway lines along heavily used routes.
- Railways plans to progressively **four-line the seven major HDNs**.
- It can:
 - Separate passenger and freight movements.

- Reduce waiting and crossing delays.
- Increase train frequency and operational flexibility.
- Improve reliability of time-sensitive cargo.

Challenges

- **Last-mile gaps:** Rail lines may not directly connect ports, mines, factories and logistics parks.
- **Terminal congestion:** Limited loading, unloading and storage capacity can reduce the benefits of faster mainline trains.
- **Freight concentration:** Heavy dependence on commodities such as coal limits diversification into automobiles, containers and agricultural products.
- **Road competition:** Flexible door-to-door delivery gives road transport an advantage for many short and medium-distance consignments.

Way Forward

- Develop **multimodal logistics parks, port-rail links and first/last-mile connectivity**.
- Modernise terminals through mechanised handling and digital freight-management systems.
- Promote containerised rail freight and specialised services for **automobiles, agriculture and e-commerce**.
- Integrate rail infrastructure with the **PM GatiShakti** and **National Logistics Policy** framework.

Conclusion

A decongested, well-connected rail network can make freight movement faster, cheaper and cleaner while strengthening India's overall logistics competitiveness.

IX. Trade and External sector

1. BRICS NATIONS AND TRADE IN LOCAL CURRENCIES

Why in News?

- In recent **BRICS summit** members are exploring ways to reduce excessive dependence on dollar-based payment systems and strengthen **Local-Currency Trade**.

Local-Currency Trade and De-dollarisation

- **Local-currency trade** involves settling international transactions directly in the currencies of participating countries instead of using a vehicle currency such as the US dollar.
- **De-dollarisation** refers to reducing excessive dependence on the dollar for international trade, payments, reserves and financial transactions.
- BRICS' objective is not necessarily to replace the dollar immediately, but to create **greater currency diversification and payment-system autonomy**.

Why Local-Currency Trade Matters?

- **Lower Transaction Costs:** Direct settlement can reduce repeated currency conversions and intermediary banking charges.
- **Greater Financial Resilience:** Alternative payment channels can provide additional options during geopolitical tensions or disruptions in international financial networks.
- **Boost to Intra-BRICS Trade:** Efficient settlement mechanisms can help convert the complementary strengths of member economies into greater commercial exchange.

- **Digital Payment Integration:** Linking systems such as **India's UPI** can enable faster, cheaper and more inclusive cross-border payments.

Key Proposals from India

- **Link payment systems** and expand settlement of trade in local currencies.
- Use **UPI**, which is accepted in **11 countries**, to facilitate wider digital transactions.
- Reduce **non-tariff measures (NTMs)** that increase the cost of international trade.
- Strengthen cooperation in **agriculture, pharmaceuticals, engineering, electronics, automobiles, auto components and services**.
- Increase participation of **women-led enterprises** in BRICS trade exhibitions and business platforms.

Challenges

- **Exchange-rate volatility** can increase financial risks for exporters and importers.
- Several emerging-market currencies have **Limited convertibility** than major global currencies.
- **Trade imbalances** may result in the accumulation of partner currencies, creating settlement difficulties.
- **Payment-system differences**, technical standards and data frameworks can complicate interoperability.
- **Dollar-based financial markets** continue to offer considerable liquidity and global acceptability.

Way Forward

- **Build interoperable payment systems** and secure platforms for seamless cross-border transactions.
- **Expand currency-swap arrangements** with greater central-bank cooperation can provide liquidity and reduce risks arising from currency volatility.
- **Strengthen financial safeguards** while improving cybersecurity, data protection and mechanisms for managing financial risks.
- **Promote trade facilitation** through reducing non-tariff barriers, and improve mutual recognition of standards.

Significance for India

- Expands opportunities for **Indian exports and services**.
- Supports wider internationalisation of **Indian digital payment technologies**.
- Creates opportunities for Indian firms in **pharmaceuticals, engineering, automobiles, electronics and agriculture**.
- Strengthens India's role in shaping discussions on **global financial and economic governance**.

BRICS

- **2001:** Economist **Jim O'Neill** coined the term BRIC for Brazil, Russia, India and China.
- **2009:** The first BRIC Summit was held at **Yekaterinburg, Russia**.
- **2010:** South Africa joined, transforming BRIC into BRICS.
- **2024:** Egypt, Ethiopia, Iran, Saudi Arabia and UAE became full members.
- **2025:** Indonesia joined as a full member, further expanding the grouping's representation.
- BRICS has also developed a **Partner Country** framework, widening engagement with the Global South.
- **2026:** India holds the BRICS chairship and hosts the **18th Summit in New Delhi**.

Conclusion

BRICS can strengthen economic resilience by combining **interoperable payment systems, local-currency settlements, open markets and resilient supply chains**. For India, the priority should be to use such cooperation to expand exports, strengthen domestic capabilities and promote a more diversified international financial system.

B. ENVIRONMENT

I. Biodiversity and conservation

1. CORAL BLEACHING EVENTS BECOMING MORE FREQUENT

Why in news?

- Recently, the global coral-reef assessment highlighted increasingly frequent heat-stress events, leaving reefs with shorter periods to recover from bleaching.

Coral Reef Ecosystems

- The **Global Coral Reef Monitoring Network (GCRMN)** has highlighted growing pressure on coral-reef ecosystems from repeated marine heat stress.
- Since around 2010, severe disturbances in several reef regions have occurred approximately every **four to six years**, compared with roughly once a decade earlier.
- Global hard-coral cover has fallen significantly compared with the long-term reference period.
- A substantial proportion of the world's reefs experienced temperatures capable of causing bleaching and coral mortality during 2024.

What are Corals?

- Corals are **marine invertebrates** belonging to the phylum **Cnidaria**.
- Individual coral organisms, called **polyps**, live together in colonies and secrete calcium-carbonate structures that form reefs.
- Their characteristic colours are associated with microscopic symbiotic algae called **zooxanthellae**, which provide corals with energy through photosynthesis.
- Coral reefs are among the most biologically diverse marine ecosystems and provide habitat, feeding grounds and nursery areas for numerous species.

Types of Coral Reefs

- Fringing reefs:** Develop close to coastlines and islands.
- Barrier reefs:** Run parallel to coastlines but are separated from land by deeper lagoons.
- Atolls:** Ring-shaped reefs surrounding a lagoon, generally associated with submerged volcanic islands.

Coral Reefs in India

- Major coral-reef ecosystems occur in the **Gulf of Kachchh, Gulf of Mannar, Lakshadweep and Andaman & Nicobar Islands**.
- Malvan in Maharashtra** also contains offshore coral reefs.
- These ecosystems are important for fisheries, tourism, coastal protection and marine biodiversity.

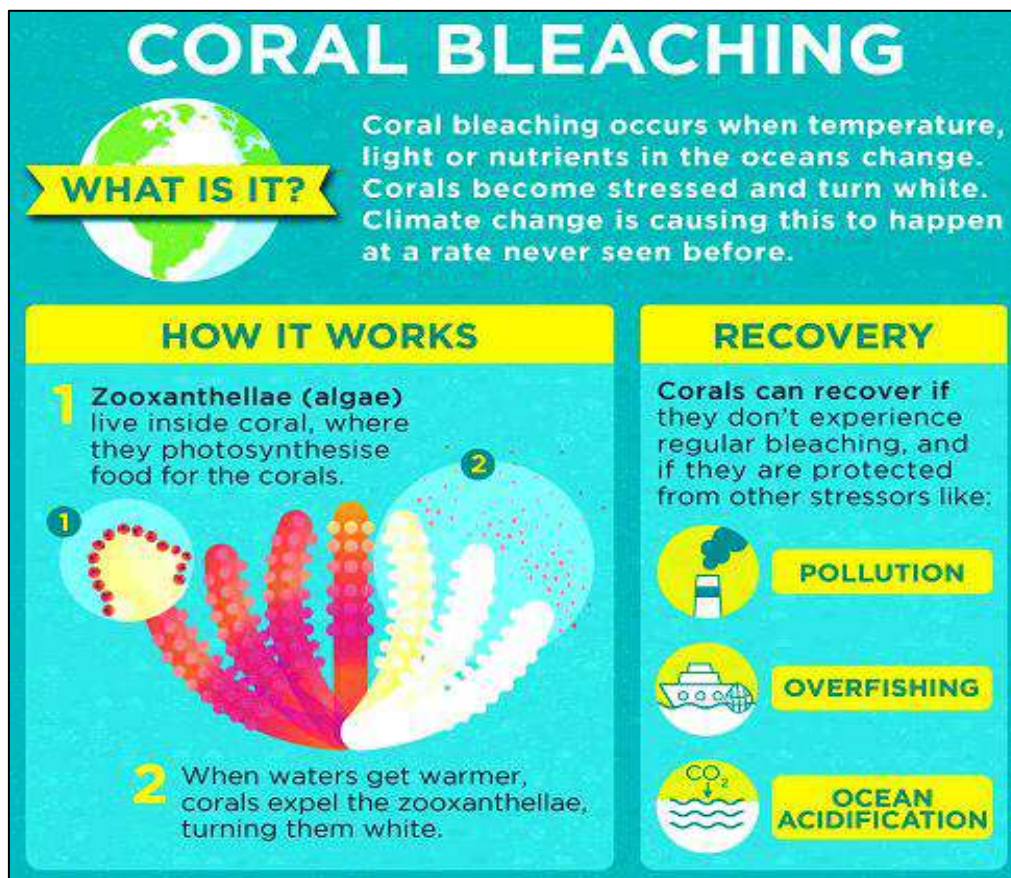
Significance of Coral Reefs

- Biodiversity:** Coral reefs provide shelter, feeding grounds and breeding habitats for a large variety of marine organisms.
- Food security:** Reef-associated fisheries contribute to the food and nutritional security of coastal populations.
- Coastal protection:** Reef structures reduce wave energy and help protect shorelines from erosion and storm impacts.
- Livelihoods:** Fisheries, tourism and other reef-based activities support millions of coastal communities globally.

- **Climate resilience:** Healthy reefs strengthen the ecological resilience of tropical and island coastal systems.

What is Coral Bleaching?

- Coral bleaching occurs when environmental stress, particularly **abnormally high sea temperatures**, causes corals to lose or expel their symbiotic algae.
- As the algae disappear, corals lose much of their characteristic colour and an important source of energy.
- **Bleaching does not necessarily mean immediate death.** If favourable conditions return quickly, the algae can recolonise the coral and the colony may recover.
- However, prolonged or repeated bleaching can result in **starvation, disease and eventual coral mortality**.



Reasons for Coral Bleaching

- **Marine Heatwaves:** Higher sea-surface temperatures disrupt the relationship between corals and their symbiotic algae, triggering mass bleaching.
- **Ocean Acidification:** Oceans absorb atmospheric carbon dioxide, increasing acidity and reducing the availability of carbonate ions required for coral skeleton formation.
- **Marine and Coastal Pollution:** Agricultural runoff containing fertilisers and pesticides, untreated sewage, plastics and other pollutants can reduce water quality and increase stress on coral ecosystems.
- **Physical Damage:** Coastal construction, dredging, sedimentation, destructive fishing practices, anchoring and unregulated tourism can directly damage coral colonies.

Can Corals Recover from Bleaching?

- **Yes, recovery is possible** when temperature and other environmental conditions return to suitable levels.
- Symbiotic algae can return to surviving coral tissues, allowing colonies to gradually regain colour and functionality.

- However, recovery depends on the **severity and duration of heat stress, coral species, water quality and the frequency of repeated bleaching events**.
- Therefore, reducing local pressures can improve reef resilience, but long-term protection ultimately requires limiting global warming.

India's Conservation Efforts

- India has identified the **Gulf of Mannar, Gulf of Kachchh, Lakshadweep and Andaman & Nicobar Islands** as major coral-reef areas requiring conservation and management.
- Conservation efforts include **monitoring, surveillance, research, awareness programmes and protection of reef ecosystems**.
- The **National Centre for Sustainable Coastal Management** and other institutions contribute to research, monitoring and coastal ecosystem management.
- Island climate plans also recognise the close link between **coral reefs, fisheries, coastal livelihoods and climate resilience**.

Way Ahead

- **Reduce greenhouse-gas emissions:** Limiting global warming remains the most important long-term measure for preventing repeated marine heat stress.
- **Strengthen reef monitoring:** Expand satellite observations, underwater surveys and early-warning systems for marine heatwaves and bleaching.
- **Reduce local stressors:** Control sewage, plastic pollution, sedimentation, destructive fishing and unregulated coastal development.
- **Promote sustainable fisheries:** Protect herbivorous fish and strengthen community-based fisheries management.

Conclusion

Healthy coral reefs require urgent climate action, reduced local pressures and ecosystem-based conservation to protect biodiversity, livelihoods and resilient coastal communities.

II. Environmental pollution

1. SUSTAINABLE COOLING OF DATA CENTRES IN INDIA

Why in news?

Recently Google has announced that its proposed **1-GW data centre in Visakhapatnam** will use **air-cooling technology**, following concerns over the water requirements of large computing facilities. **Growing Data-Centre Footprint**

- India's data-centre capacity has increased from about **520 MW in 2020 to nearly 1.5 GW**, and it is projected to reach around **6.5 GW by 2030**.
- Electricity consumption by these facilities could rise from nearly **13 TWh in 2024 to about 57 TWh by 2030**.
- The rapid growth of **Artificial Intelligence (AI)** is likely to further increase demand for high-performance computing and associated cooling infrastructure.

Why Cooling Matters?

- Data centres operate continuously and generate substantial heat. Cooling systems can account for nearly **30-40% of their energy consumption**.
- Major cooling approaches include:
 - **Air cooling:** Uses fans and air-handling systems to remove heat.

- **Direct liquid cooling:** Circulates coolant close to heat-generating components.
- **Immersion cooling:** Submerges components in a non-conductive liquid to absorb heat.
- **Evaporative cooling:** Uses water evaporation to dissipate heat.



Challenges

- **Water-intensive cooling** can place additional pressure on already stressed urban water systems. Large facilities may consume millions of litres of water every day.
- **Reducing on-site water use** through air cooling does not eliminate the problem. Electricity generation, particularly from thermal power plants, can also involve significant water consumption.
- **Rapid growth in data-centre** and AI demand requires reliable, round-the-clock electricity. Weak transmission infrastructure can limit the ability to integrate additional renewable power.
- **Where renewable electricity is insufficient**, additional demand may increase dependence on fossil-fuel-based generation, potentially raising emissions.
- **Large cooling and ventilation systems** can contribute to **noise pollution and local heat effects**, particularly when facilities are concentrated in urban areas.

Way Forward

- Make **water-use and energy-use disclosure** mandatory for large data centres.
- Promote **treated wastewater and recycled water** instead of freshwater for cooling wherever technically feasible.
- Adopt **water-stress-based site selection** for new facilities.
- Encourage efficient technologies such as **direct liquid and immersion cooling** for high-density computing.

Conclusion

India's digital and AI ambitions require massive computing infrastructure, but data-centre expansion must follow a **resource-efficient pathway**. Renewable energy integration and stronger grid planning can help India achieve digital growth without aggravating its existing environmental stresses.

III. Land Degradation

1. INDIA CALLS FOR COMMUNITY-LED RESTORATION OF RANGELANDS AT UNCCD COP17

Why in news?

- Recently, India called for a **community-led approach to restoring rangelands** at the 17th Conference of Parties (COP17) of the **United Nations Convention to Combat Desertification (UNCCD)**.

Rangelands and Economic Significance

- Rangelands include **grasslands, savannas, shrublands and open woodlands**. They are critical for livelihoods, biodiversity and ecosystem stability.
- Rangelands cover around **54% of the Earth's land surface** and support nearly **500 million pastoralists**.
- They contain around **one-third of the world's important biodiversity areas**.
- They provide livestock fodder, food, water regulation, carbon storage and other ecosystem services.
- Their estimated annual economic and ecological benefits range between **\$21 trillion and \$47 trillion**.
- Restoration can generate around **\$4-6 for every dollar invested**, rising significantly when wider benefits such as improved water availability are considered.

Rethinking Pastoralism

- Pastoralism is not inherently degrading:** Traditional grazing systems are often blamed for overgrazing, but many rangelands have naturally evolved alongside livestock grazing.
- Ecological role of managed grazing:** Properly managed pastoralism can support **biodiversity, nutrient cycling, soil health and ecosystem resilience**.
- Multiple drivers of degradation:** Rangeland degradation is increasingly linked to:
 - Drought and climate variability**
 - Conversion of rangelands into cropland and settlements
 - Urbanisation and infrastructure expansion
 - Fragmentation of traditional livestock migration routes
 - Unsustainable land and water management
- Role of pastoral communities:** Local pastoralists possess valuable **traditional ecological knowledge** regarding grazing patterns, water availability and seasonal migration.
- Policy implication:** Restoration strategies should involve pastoral communities in **decision-making, implementation and monitoring**, rather than treating livestock grazing as the sole cause of degradation.

Land Degradation and Financing Gap

- Global scale:** Land degradation affects up to **40% of the world's land surface**, threatening food security, water resources, biodiversity and rural livelihoods.
- Underinvestment:** Rangeland restoration receives **far less climate and development finance** than several other environmental priorities, particularly forests.
- Need for sustained finance:** Restoration requires **long-term, predictable and locally accessible funding**, especially for vulnerable pastoral communities.
- Economic rationale:** Investment in restoration can generate significant returns through improved **livelihoods, water security, biodiversity and ecosystem services**.

Land Degradation Neutrality (LDN)

- **Meaning:** LDN aims to ensure that the **quantity and quality of land resources are maintained or improved** to sustain ecosystem functions and food security.
- **Three-pronged approach:**
 - **Avoid:** Prevent new land degradation.
 - **Reduce:** Minimise ongoing degradation.
 - **Restore:** Recover the productivity and ecological functions of already degraded land.
- **Key principle:** **Prevention should receive greater priority than restoration**, as avoiding degradation is generally more cost-effective than restoring severely degraded ecosystems.

Challenges

- **Financing gap:** Investment remains inadequate compared with the magnitude of land degradation.
- **Policy gap:** Rangelands often receive less attention than forests in climate and restoration policies.
- **Knowledge gap:** Indigenous and traditional ecological knowledge is insufficiently integrated into restoration planning.
- **Institutional fragmentation:** Agriculture, livestock, water, environment and disaster-management policies often function separately.

Way Forward

- Mobilise **public, private and blended finance**, including green bonds, for restoration and drought resilience.
- Strengthen **drought early-warning systems**, forecasting and anticipatory action.
- Integrate rangelands and pastoralist systems into **Nationally Determined Contributions (NDCs)** and land-restoration targets.
- Give local communities a central role in planning, implementation and monitoring.

UNCCD

- The **UNCCD**, established in **1994 following the 1992 Rio Earth Summit**, is the only legally binding international framework specifically addressing desertification, land degradation and drought.
- It is one of the **three Rio Conventions**, alongside the **UNFCCC and CBD**, and has **197 Parties**, including the European Union. Its **2018-2030 Strategic Framework** provides a major global framework for achieving Land Degradation Neutrality.

Conclusion

A community-led approach can make rangeland restoration more **ecologically effective, socially inclusive and economically sustainable**, supporting both resilient livelihoods and the global goal of Land Degradation Neutrality.

2. PERSISTENT GROUNDWATER DECLINE IN INDIA

Why in news?

- The **WMO's State of Global Water Resources 2025** highlights continuing changes in global freshwater storage and groundwater conditions.

Groundwater Depletion

- Groundwater depletion occurs when **withdrawal remains higher than natural recharge** over a sustained period.
- Recharge mainly occurs through **rainfall infiltration, seepage from surface water and other natural processes**.
- A temporary fall in the water table differs from long-term depletion, which can permanently reduce aquifer capacity.

- India's groundwater situation is assessed annually by the **Central Ground Water Board (CGWB)** along with State agencies.

India's Groundwater Status

- According to CGWB's **2024 assessment**, India extracted **245.64 billion cubic metres (BCM)** of groundwater.
- Agriculture accounted for 87%** of total extraction, followed by domestic use at 11% and industry at 2%.
- The national stage of groundwater extraction was **60.47%**.
- Out of **6,746 assessment units**:
 - 751** were over-exploited.
 - 206** were critical.
 - 711** were semi-critical.
- Punjab, Rajasthan, Haryana and Delhi** recorded extraction above 100%, indicating particularly severe pressure.

Major Causes

- Water-intensive agriculture:** Paddy and wheat cultivation in water-stressed regions increases irrigation demand.
- Cheap electricity for pumping:** Low pumping costs can encourage excessive extraction where groundwater is poorly regulated.
- Climate variability:** Irregular rainfall and longer dry periods can reduce recharge while increasing irrigation demand.
- Weak local management:** Groundwater is largely invisible and privately accessed through wells, making collective regulation difficult.

Why It Matters

- Food security:** Irrigation-dependent agriculture is vulnerable when aquifers decline.
- Drinking water:** Rural households in many regions depend heavily on groundwater.
- Energy-water link:** Deeper groundwater requires greater pumping energy.
- Land degradation:** Excessive withdrawal can contribute to **land subsidence and saline intrusion** in vulnerable areas.
- Climate resilience:** Healthy aquifers act as underground water storage during rainfall variability.

Way Forward

- Shift from merely regulating **individual wells to managing the entire aquifer**.
- Promote **crop diversification** towards less water-intensive crops through procurement and price incentives.
- Expand **rainwater harvesting, recharge structures and restoration of wetlands and ponds**.
- Use real-time monitoring, GIS and aquifer-level water budgets for evidence-based decisions.
- Strengthen **community participation**, especially through Gram Panchayats and Water User Associations.

GOVERNMENT INITIATIVES

- NAQUIM:** Maps aquifers and prepares management plans for sustainable groundwater use.
- Atal Bhujal Yojana:** Promotes community-led groundwater management and demand-side measures in water-stressed areas.
- Jal Shakti Abhiyan - Catch the Rain:** Promotes rainwater harvesting and water conservation.
- Per Drop More Crop:** Promotes micro-irrigation to improve water-use efficiency.

Conclusion:

India's groundwater security requires a shift from **unlimited extraction to science-based, community-led and aquifer-level water management.**

IV. Waste management
1. NORTH EAST MODELS OF WASTE MANAGEMENT AND SUSTAINABLE RURAL GOVERNANCE
Why in news?

- The **Majuli model in Assam and the Tawang model in Arunachal Pradesh** have highlighted how rural communities can develop locally suitable systems for waste collection, segregation and recycling despite difficult geography.

Majuli Model: Decentralised Infrastructure

- Majuli has developed **Mini Material Collection Facilities and Central Material Collection Facilities (CMCFs)** closer to villages.
- The system combines local-government infrastructure with support from civil-society organisations such as **Saahas**.
- Waste is collected, segregated and linked with scrap dealers and recycling channels.
- As of July 2026, Majuli reported around **160 mini facilities and 19 central facilities**, with several made functional.
- The model is particularly relevant for a river-island region where transportation and connectivity create additional costs.

Tawang Model: Community-Led Collection

- Tawang faces a different challenge: **mountainous terrain and scattered settlements** make conventional door-to-door collection expensive.
- Under the **Swachhata Divas** approach, households store and segregate waste and bring it collectively to designated points.
- Waste is initially divided into multiple categories and undergoes further sorting at Material Recovery Facilities.
- Reports indicate that **26 villages** have conducted more than 150 such cleanliness days and collected about **30 tonnes of waste**, with over 20 tonnes subsequently sold to recyclers.
- The model demonstrates how community participation can substitute for costly daily primary collection in difficult terrain.

Why Rural Waste Management Matters

- India's waste challenge is no longer restricted to large cities. Changing consumption patterns have increased the use of **plastic packaging, packaged food and other non-biodegradable materials even in remote rural areas.**
- The consequences include:
 - Open dumping and burning
 - Pollution of rivers and soil
 - Loss of recyclable materials
 - Health risks
 - Higher transportation costs
 - Pressure on fragile ecosystems

- Therefore, rural waste management requires solutions adapted to **settlement pattern, terrain, population density and local markets**.

Current Policy Framework

- The **Solid Waste Management Rules, 2026**, which came into force from **1 April 2026**, replaced the 2016 Rules.
- They mandate **four-stream segregation at source** into wet, dry, sanitary and special-care waste and introduce stronger provisions for circular economy and Extended Producer Responsibility.
- The **Swachh Bharat Mission-Grameen Phase II** focuses on Solid and Liquid Waste Management and transforming villages into **ODF Plus (Model)** villages.
- As of August 2026, government data reported liquid-waste management arrangements in **5,63,809 of 5,86,944 villages**.

Challenges

- **Geographical barriers:** Islands, mountains and scattered settlements raise collection and transportation costs.
- **Weak recycling markets:** Remote areas may lack nearby buyers for recovered materials.
- **Limited manpower:** Panchayats often face shortages of trained sanitation workers.
- **Poor source segregation:** Mixed waste reduces the value of recyclable material.
- **Data gaps:** Reliable village-level information on waste generation and processing remains important for evidence-based planning.

Way Forward

- **Make households, SHGs, schools and local institutions active participants** rather than treating waste management as only a government responsibility.
- Adopt **village-level collection and sorting** wherever door-to-door collection is economically unsuitable.
- **Combine user charges, Panchayat resources, Finance Commission grants and value recovery from recyclable waste.** SBM(G) Phase II already envisages convergence of **multiple financing sources for rural waste management**.
- **Producers should contribute** to the recovery and **transportation of packaging waste** reaching remote markets.

Conclusion

The Majuli and Tawang experiences show that India's rural waste challenge cannot be solved through a uniform urban model. locally adapted systems combining community participation, decentralisation, and sustainable financing can create a more circular and resilient waste-management ecosystem.

V. Renewable Energy

1. HARNESSING INDIA'S UNTAPPED GEOTHERMAL ENERGY

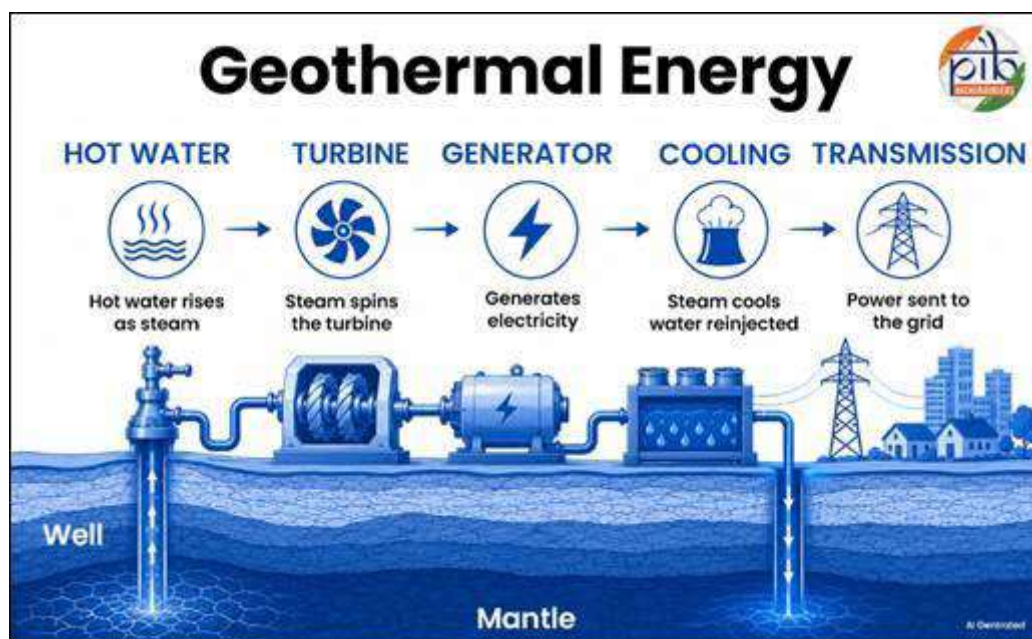
Why in news?

- Recently, India commissioned its first two geothermal wells at Puga Valley in Ladakh, strengthening prospects for reliable and round-the-clock renewable energy.

What is Geothermal Energy?

- Geothermal energy refers to the **heat stored beneath the Earth's surface**, which can be used to generate electricity or provide heating and cooling.
- Unlike solar and wind power, geothermal energy can provide **continuous generation**, irrespective of weather conditions or time of day.

- Earth's internal heat comes mainly from **radioactive decay of elements such as uranium, thorium and potassium**, along with residual heat from the planet's formation.
- In areas with favourable geological conditions, fractures and faults allow underground heat to warm water, producing **hot-water and steam reservoirs**.



How Does Geothermal Energy Generate Power?

- **Exploration and drilling:** Wells are drilled into underground geothermal reservoirs.
- **Extraction:** Hot water or steam is brought to the surface through production wells.
- **Electricity generation:** Steam or geothermal fluid drives a **turbine connected to an electric generator**.
- **Reinjection:** After extracting heat, the cooled fluid can be returned underground to maintain reservoir pressure and improve sustainability.
- **Direct utilisation:** Geothermal heat can also support **space heating, agriculture, aquaculture, district heating and cooling applications**.

India's Geothermal Potential

- India's varied geological structure provides opportunities for geothermal development across several regions.
- The **Geological Survey of India (GSI)** has mapped around **381 hot springs** across the country.
- India has identified **10 major geothermal provinces** with varying resource characteristics.
- The country's theoretical geothermal potential is estimated at approximately **10.6 GW**.
- Around **42 locations** have been identified as promising for electricity generation and direct heat applications.
- Important geothermal regions include: **Himalayan Province, West Coast Province, Mahanadi and Godavari regions, South Indian Cratonic region**

Puga Valley: A Major Step Forward

- In **July 2026**, the ONGC Energy Centre commissioned two geothermal wells in **Puga Valley, Ladakh**, at an altitude exceeding **14,000 feet**.
- The wells have been drilled to a depth of approximately **1,000 metres** and will help assess the geothermal reservoir.
- The project is intended to support the development of India's first **1-MW demonstration geothermal power project**.

- Subsurface temperatures of up to around **135°C** have been reported from the Puga geothermal field.
- The project can provide valuable experience in **deep drilling, reservoir assessment, power generation and long-term resource management**.

Key Challenges

- **High Initial Investment:** Exploration, deep drilling and reservoir testing require significant capital, while uncertainty about resource quality increases investment risks.
- **Resource Uncertainty:** Geothermal resources are unevenly distributed, requiring detailed **geological, geochemical and geophysical surveys** before commercial development.
- **Induced Seismicity:** Fluid injection and extraction, particularly under **Enhanced Geothermal Systems (EGS)**, can generate micro-seismic activity and potentially larger earthquakes.
- **Water Management:** Improper extraction or disposal of geothermal fluids can affect groundwater systems and create risks of contamination.
- **Environmental Concerns:** Geothermal projects may cause land disturbance, release dissolved gases and minerals, generate thermal pollution and affect local ecosystems if poorly managed.

Way Forward

- **Expand resource mapping:** Develop high-resolution geological, geochemical and geophysical databases to identify commercially viable geothermal reservoirs.
- **Promote EGS and AGS:** Enhanced and Advanced Geothermal Systems can expand geothermal development beyond conventional hot-spring regions.
- **Repurpose existing wells:** Converting abandoned oil and gas wells can reduce drilling costs and accelerate geothermal experimentation.
- **Develop specialised technology:** Strengthen domestic capabilities in deep drilling, heat-resistant equipment, reservoir modelling and geothermal turbines.

GOVERNMENT INITIATIVES

National Policy on Geothermal Energy, 2025

- With the **Ministry of New and Renewable Energy (MNRE)** as the nodal ministry, the policy seeks to integrate geothermal energy into India's renewable-energy strategy.
- **Key areas include:**
 - Supporting geothermal exploration, drilling and reservoir management.
 - Promoting **Ground Source Heat Pump (GSHP)** systems.
 - Exploring the conversion of abandoned oil and gas wells for geothermal applications.
 - Creating a **national geothermal data repository**.
 - Supporting pilot projects and Centres of Excellence.
 - Encouraging **public-private partnerships** and investment.

RE-RTD Programme

- The Renewable Energy Research and Technology Development programme supports the development of **indigenous, efficient and cost-effective renewable-energy technologies**, including geothermal applications.

Conclusion

India can unlock geothermal energy as a reliable clean-energy source by combining resource mapping, indigenous technology, responsible investment and strong environmental safeguards.

VI. Global Warming and Climate Change

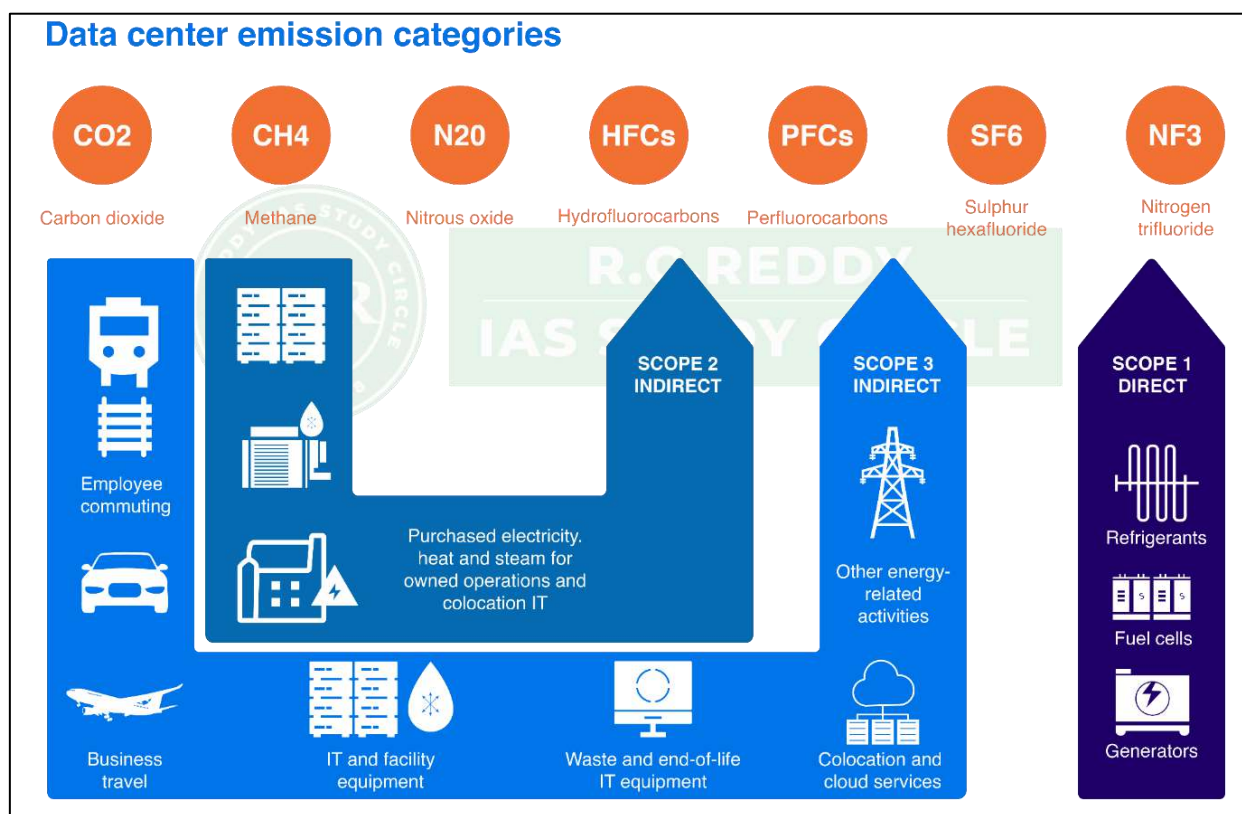
1. INDIA'S DATA CENTRE BOOM AND CLIMATE IMPACT

Why in news?

- Recently, India highlighted raising concerns over rising electricity, water demand and environmental sustainability amid rapid AI expansion.

Data Centres in India

- Data centre capacity in India has nearly tripled from 520 megawatts in 2020 to nearly 1.5 gigawatts today.
- By 2030, it is projected to hit 6.5 GW, which is a fourfold expansion in just four years.
- Electricity demand from these facilities is expected to rise from about 13 terawatt-hours (TWh) in 2024 to roughly 57 TWh by 2030.
- Most data centres are clustered around existing tech hubs of Mumbai, Hyderabad, Bengaluru, and the National Capital Region. These are precisely the places where water and grid stress are already most acute.



Concerns with Expansion of Data Centres

- Water Consumption:** A 100 MW data centre consumes about 2 million litres of water daily. That is equivalent to the daily use of roughly 6,500 households.
- India's data centres consumed an estimated 150 billion litres of water in 2024-25. By 2030, that figure is projected to more than double to 358 billion litres annually.
- India's power grid** is already straining under record demand. India curtailed 300 GW-hours of renewable energy in the first quarter of 2026 alone, simply because the grid could not carry it.
- Rise in Surface Temperature:** A study found that data centres raise land surface temperatures by an average of 2°C within a 10 km radius, with extreme cases reaching 9.1°C.

Way Ahead

- Governments should introduce **phased power and water use standards** with enforceable benchmarks.
- A **national AI Energy Star rating** would let buyers and regulators compare how energy-efficient a facility or model actually is.
- A **national sustainability framework**: It would establish minimum standards for renewable energy sourcing, water consumption disclosure, grid impact assessment, and thermal load evaluation.
- It would create a **common set of expectations** for investors and a common set of protections for consumers.

Conclusion

India must ensure AI-driven growth remains energy-efficient and climate-resilient by combining clean power, resource conservation, innovation and responsible digital infrastructure.

2. SEA-LEVEL RISE AND GROWING THREAT TO HUMAN RIGHTS

Why in news?

- A recent **UN Special Report on challenges related to sea-level rise** has highlighted that rising seas are increasingly threatening **human rights and territorial existence of states**.

Scale and Drivers of Sea-Level Rise

- Sea-level rise is mainly caused by **thermal expansion of warming oceans** and the loss of glaciers and ice sheets.
- In 2024, the annual global rate of sea-level rise reached around **5.9 mm**, indicating an accelerating trend.
- Nearly **770 million people** live in coastal areas less than five metres above the high-tide line, making them particularly exposed to flooding, erosion and storm surges.
- Without adequate adaptation, climate-induced displacement could affect hundreds of millions of people in the coming decades.

Why is it a Human-Rights Issue?

- Rising seas can directly affect several basic rights:
- **Right to adequate housing**: Permanent inundation and coastal erosion can destroy homes and settlements.
- **Right to food and water**: Saltwater intrusion can contaminate freshwater sources and reduce agricultural productivity.
- **Right to health**: Flooding and damaged sanitation systems can increase exposure to water-borne diseases.
- **Right to education**: Damage to schools and displacement can disrupt children's education.
- **Cultural rights**: Loss of ancestral lands can threaten the cultural identity and traditional knowledge of Indigenous and coastal communities.



Economic and Legal Implications

- Sea-level rise can damage **ports, roads, housing, industries and other critical infrastructure**.
- Coastal economic assets exposed to rising seas already represent enormous financial value, while future losses could increase substantially without adaptation.
- It also creates complex questions concerning **statehood, sovereignty, nationality and maritime boundaries**.
- For island nations, permanent loss of habitable territory raises questions about how their territorial and political rights can be protected.

India's Vulnerability

- **Mumbai, Kolkata and Chennai**, which face risks from flooding and storm surges.
- **Sundarbans and the Ganga-Brahmaputra-Meghna delta**, due to their low-lying geography.
- **Lakshadweep and parts of the Andaman and Nicobar Islands**, where limited land availability increases vulnerability.
- Local **land subsidence**, groundwater extraction and sediment changes can further increase relative sea-level rise in some areas.

Challenges

- **Rising coastal exposure:** Rapid urbanisation and population growth are increasing settlements in vulnerable coastal zones.
- **Infrastructure vulnerability:** Flooding, erosion and storm surges can damage roads, ports, homes and public facilities.
- **Adaptation finance gap:** Developing countries lack adequate resources to finance large-scale coastal resilience and relocation.
- **Displacement and cultural loss:** Inundation can disrupt livelihoods, traditional knowledge, community networks and cultural identities.

Way Forward

- **Strengthen coastal planning:** Integrate updated sea-level projections and vulnerability maps into urban and infrastructure planning.
- **Promote nature-based solutions:** Restore mangroves, wetlands and coastal ecosystems to reduce erosion and storm-surge impacts.
- **Improve resilience systems:** Expand early-warning systems, climate-resilient infrastructure and disaster preparedness in vulnerable coastal regions.
- **Enhance international cooperation:** Mobilise predictable climate finance, technology transfer and capacity-building for vulnerable developing countries.

GOVERNMENT INITIATIVES

- **NCCR:** Monitors shoreline changes and coastal vulnerability.
- **INCOIS:** Provides ocean observations, forecasts and early-warning services.
- **Coastal Regulation Zone framework:** Regulates development in ecologically sensitive coastal areas.
- **NDMA and state agencies:** Strengthen cyclone preparedness, evacuation and disaster resilience.
- **Mangrove restoration:** Provides a nature-based defence against erosion and storm surges.

Conclusion

Sea-level rise demonstrates how **climate change, human security and human rights are increasingly interconnected**. For India, combining emission reduction with resilient infrastructure, ecosystem-based adaptation and inclusive coastal governance is essential to protect both **coastal communities and the country's long-term development gains**.

3. MELTING OF HIMALAYAN GLACIERS AND INDIA'S RESPONSE

Why in news?

- Recent **Himalayan floods and glacier-related hazards** have renewed concerns over accelerating ice loss and the growing risk of **GLOFs and flash floods**.

Himalayan Glaciers

- The **Hindu Kush Himalaya (HKH)** is a major source of water for South Asian river systems, including the **Indus, Ganga and Brahmaputra**.
- Glaciers act as **natural water storage**, releasing meltwater gradually and supporting rivers during dry periods.
- The HKH cryosphere supports the lives and livelihoods of **nearly two billion people** across Asia.
- ICIMOD 2026:** Glacier ice-loss rates in the HKH have **doubled since 2000**, highlighting accelerating climate risks.

Major Causes of Glacier Retreat

- Global warming:** Rising temperatures increase melting and reduce snowfall, weakening long-term glacier mass.
- Black carbon:** Soot from incomplete combustion settles on snow and ice, reducing **albedo** and increasing heat absorption.
- Air pollution:** Transport, industries, brick kilns, biomass burning and household fuels contribute to black-carbon emissions.
- Land-use changes:** Roads, hydropower projects and unplanned tourism can increase local environmental stress and disaster exposure.
- Changing precipitation:** Warmer conditions can shift snowfall towards rainfall, reducing accumulation of new ice.

The 'Peak Water' Problem

- Initially, rapid melting can **increase river flows** because more glacier water enters rivers.
- After glaciers shrink substantially, their capacity to provide meltwater declines.
- ICIMOD projects that water availability in the HKH could **peak around mid-century and decline thereafter**.
- This creates a shift from **short-term flood risk to long-term water scarcity**.

Major Impacts on India

- Water Security:** Reduced glacier reserves can affect the **long-term flow of Himalayan rivers**, particularly during dry seasons.
- Agriculture:** Changes in river flows can affect irrigation-dependent agriculture in the **Indo-Gangetic plains**.
- Hydropower:** Changing water availability and sudden floods can damage **hydropower infrastructure**, especially in fragile mountain valleys.
- Disaster Risk:** Their sudden failure can cause **Glacial Lake Outburst Floods (GLOFs)**, landslides and flash floods.

Why Glacier Loss is a Strategic Concern

- **Economic security:** Floods and landslides can damage roads, bridges, hydropower projects and settlements.
- **Food security:** Changes in water availability can affect downstream irrigation.
- **Energy security:** Himalayan rivers are important for hydropower generation.
- **Transboundary dimension:** Himalayan rivers and hazards cross national boundaries, requiring cooperation among **India, Nepal, Bhutan and China**.

Government Initiatives

- **National Mission for Sustaining the Himalayan Ecosystem (NMSHE)** under NAPCC focuses on climate research, vulnerability assessment, capacity building and community participation.
- **Glacier monitoring and GLOF risk assessment** are essential for identifying vulnerable lakes and downstream settlements.
- **Early-warning systems** and community-based disaster preparedness can reduce loss of life.
- India also needs greater **regional data sharing** on glaciers, river flows and transboundary hazards.

Way Forward

- Shift towards **risk-sensitive infrastructure planning** in mountain regions.
- Strengthen satellite-based glacier monitoring and **real-time GLOF early-warning systems**.
- Reduce **black-carbon emissions** from transport, brick kilns, biomass burning and inefficient household fuels.
- Promote climate-resilient agriculture, water conservation and **community-based disaster preparedness**.
- Strengthen **transboundary cooperation** for sharing hydrological and hazard information.

Conclusion

Protecting Himalayan glaciers requires combining rapid climate mitigation with scientific monitoring and risk-sensitive development to secure India's water, food and economic future.

VII. Indian Initiatives, efforts and Commitments

1. ACCESS AND BENEFIT-SHARING (ABS) AND STRENGTHENING BIODIVERSITY CONSERVATION IN INDIA

Why in news?

- The National Biodiversity Authority (NBA) has crossed **₹200 crore in cumulative disbursements** under India's Access and Benefit-Sharing (ABS) framework.

What is Access and Benefit-Sharing?

- Access and Benefit-Sharing is a mechanism under which benefits arising from the **use of biological and genetic resources** are shared fairly with the communities and stakeholders associated with those resources.
- It seeks to ensure that the commercial utilisation of biodiversity contributes to: **Conservation of biodiversity, Sustainable use of biological resources, Improvement of local community livelihoods**
- Thus, ABS connects **biodiversity conservation with community welfare and sustainable development**.

How does the ABS Framework Work?

- India's biodiversity governance follows a **three-tier institutional structure**:
- **National Level - National Biodiversity Authority (NBA):** Regulates and facilitates access to biological resources and benefit-sharing at the national level.

- **State Level - State Biodiversity Boards (SBBs):** Advise state governments and oversee biodiversity-related activities within their jurisdictions.
- **Local Level - Biodiversity Management Committees (BMCs):** Established by local bodies for conservation, sustainable use and documentation of biodiversity.
- An important instrument at the local level is the **People's Biodiversity Register (PBR)**, which documents locally available biological resources and associated traditional knowledge.

Utilisation of ABS Funds

- Preparation and updating of **People's Biodiversity Registers**
- **In-situ and ex-situ conservation**, Restoration of degraded ecosystems.
- Strengthening of **Biodiversity Heritage Sites**, Capacity building of **Biodiversity Management Committees**
- ABS can convert the **economic value generated from biodiversity utilisation into resources for conservation and community development.**

Legal Framework in India

- The **Biological Diversity Act, 2002** was enacted to implement India's obligations under the **Convention on Biological Diversity (CBD)**.
- The Act establishes the institutional architecture consisting of: **NBA → State Biodiversity Boards → Biodiversity Management Committees**
- The NBA is a statutory body established in **2003** and advises the Central Government on biodiversity conservation, sustainable use and equitable benefit-sharing.
- The **Biological Diversity (Amendment) Act, 2023** subsequently modified several provisions of the 2002 framework, including provisions relating to access and benefit-sharing.

Significance for India

- ABS provides an additional financial resource for biodiversity conservation.
- It recognises the role of local communities and traditional knowledge holders.
- It links economic utilisation of biodiversity with ecological sustainability.
- Benefit-sharing can provide incentives for preserving indigenous and local knowledge.
- BMCs and PBRs strengthen biodiversity management at the grassroots level.

Way Forward

- Strengthen the capacity and financial resources of **BMCs and State Biodiversity Boards.**
- Use digital systems to improve monitoring of biological-resource utilisation and benefit flows.
- Promote research and innovation while ensuring that biodiversity utilisation remains ecologically sustainable.
- Align India's ABS implementation with the **Kunming-Montreal Global Biodiversity Framework.**

INTERNATIONAL POLICIES

Convention on Biological Diversity (CBD)

- The CBD was opened for signature at the **Rio Earth Summit in 1992** and entered into force in **1993**.
- **It has three core objectives:**
 - Conservation of biological diversity
 - Sustainable use of biodiversity components
 - Fair and equitable sharing of benefits arising from genetic-resource utilisation

Nagoya Protocol

- The **Nagoya Protocol**, adopted in **2010** and entering into force in **2014**, provides an international framework for implementing the CBD's objective of fair and equitable benefit-sharing.
- It emphasises **access to genetic resources, prior arrangements and sharing of benefits** arising from their utilisation.

Kunming-Montreal Global Biodiversity Framework

- Adopted at **CBD COP15 in 2022**, the framework contains **23 targets for 2030** and **four long-term global goals for 2050**.
- **Target 13** specifically relates to ensuring fair and equitable sharing of benefits arising from the utilisation of genetic resources and associated traditional knowledge.

Conclusion

India's ABS framework represents a shift from viewing biodiversity merely as a natural resource towards recognising it as a **shared ecological and economic asset**, where conservation, sustainable utilisation and community welfare must progress together.

C. DISASTER MANAGEMENT

I. Disasters and their management

1. NEPAL FLASH FLOOD DISASTER

Why in news?

- Recently, a **flash flood in the Lhende Khola-Bhote Koshi river system of Nepal** highlighted the growing risk of disasters and their potential **downstream impacts on India**, particularly Bihar and Uttar Pradesh.

What is a Flash Flood?

- A flash flood is a **rapid and unexpected rise in water levels**, usually occurring within a few hours of intense rainfall, cloudbursts, dam failures, or sudden release of water from glacial or landslide-dammed lakes.
- Flash floods develop quickly, leaving **limited time for forecasting, evacuation and emergency response**.
- Fast-moving water can carry **rocks, sediments and debris**, causing severe damage to lives, infrastructure and property.
- Steep slopes and narrow valleys accelerate **surface runoff**, causing streams and rivers to rise rapidly.

Causes of Flash Floods

- **Extreme Rainfall and Cloudbursts:** Short-duration, high-intensity precipitation can overwhelm streams and drainage systems.
- **Interaction of Weather Systems:** The interaction of monsoon systems with **Western Disturbances** can intensify rainfall over the Himalayan region.
- **Climate Change:** Rising temperatures can increase atmospheric moisture and extreme precipitation. Glacier retreat and the expansion of glacial lakes can also increase the risk of **Glacial Lake Outburst Floods (GLOFs)**.
- **Fragile Geomorphology:** The young Himalayan mountains have steep slopes, unstable rocks and loose sediments, facilitating landslides, debris flows and rapid runoff.

India's Vulnerability

- India faces considerable flash-flood risks across the **Himalayan region, Northeast and Western Ghats**, as well as urban areas with inadequate drainage.
- The Himalayan region faces **compound hazards**, including cloudbursts, landslides, flash floods and GLOFs. Moreover, transboundary rivers such as the **Kosi and Gandak** can carry upstream flood risks into densely populated Indian plains.
- Therefore, disaster management requires close cooperation between India and neighbouring countries for **real-time hydrological, meteorological and glacial data sharing**.

Impacts of Flash Floods

- **Loss of Life and Infrastructure:** Causes deaths, destroys houses, roads, bridges, hydropower projects and livestock.
- **Economic and Environmental Damage:** Damages agricultural land, disrupts transport and supply chains, and triggers landslides and debris flows.
- **Long-term Consequences:** Contaminates water sources, disrupts livelihoods and causes prolonged economic and developmental losses, as seen in the **Kedarnath (2013)** and **Chamoli (2021)** disasters.

Global and Indian Initiatives

- The **Sendai Framework for Disaster Risk Reduction (2015-2030)** promotes risk understanding, disaster governance and investment in resilience.
- The **WMO's Early Warnings for All initiative** seeks universal access to effective multi-hazard early-warning systems.
- In India, the **Disaster Management Act**, NDMA guidelines, IMD weather forecasting, CWC flood forecasting and the **Flash Flood Guidance System (FFGS)** strengthen preparedness.
- **Doppler weather radars, satellite monitoring** and geological assessments further improve hazard detection and response.

Way Forward

- Adopt a **basin-level, multi-hazard disaster-management approach**.
- Strengthen real-time monitoring of rainfall, rivers, glaciers and glacial lakes.
- Expand community-based early-warning systems and evacuation preparedness.
- Improve **transboundary data sharing** across the Himalayan region.
- Restrict construction in high-risk zones through scientific **carrying-capacity assessments**.

Conclusion

The Nepal flash flood demonstrates that Himalayan disasters are increasingly **cascading and transboundary**. Resilient development requires scientific forecasting, ecological safeguards, community preparedness and regional cooperation.

D. SCIENCE AND TECHNOLOGY

I. Developments and their Applications and Effects in Everyday Life.

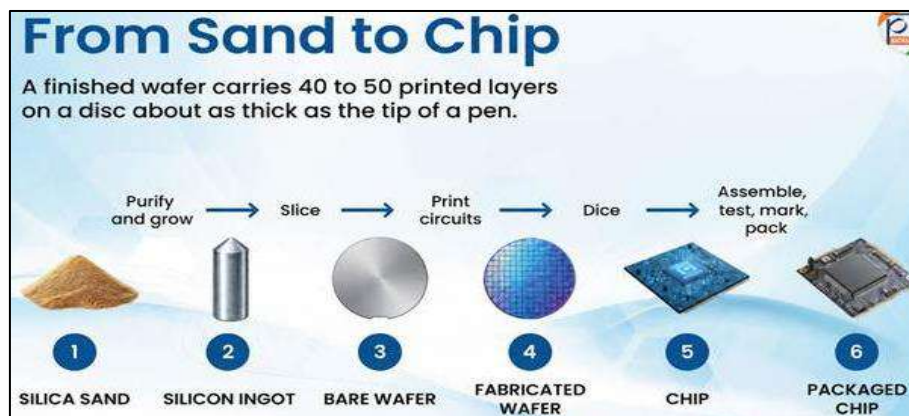
1. INDIA'S EMERGING SEMICONDUCTOR ECOSYSTEM

Why in news?

- Recently **SEMICON India 2026**, held with the theme “**Silicon to Systems: Building the Ecosystem**,” highlights India’s shift from semiconductor policy to actual manufacturing.

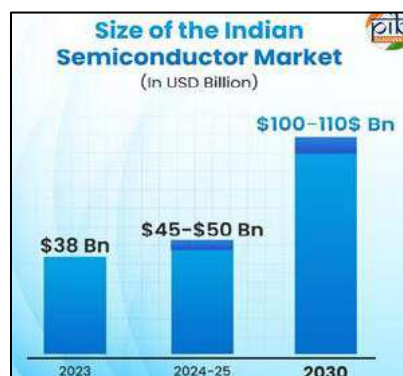
What are Semiconductors?

- Semiconductors are materials whose electrical conductivity can be **controlled**, making them suitable for processing digital signals.
- Silicon** is the most widely used material because it is abundant, stable and suitable for chip manufacturing.
- Chips are essential for **smartphones, automobiles, AI systems, telecom, satellites, medical devices and defence equipment**.



Why is India Building a Semiconductor Ecosystem?

- Rising demand:** India's semiconductor market is estimated to reach around **\$100-110 billion by 2030**.
- Import dependence:** Domestic demand has historically been met substantially through imports, exposing India to global supply disruptions.
- Strategic importance:** Chips are increasingly linked to **national security, digital infrastructure and technological sovereignty**.
- Global supply-chain diversification:** Geopolitical tensions and concentration of advanced chip production have encouraged countries to build more resilient supply chains.



Building Indigenous Chip Design

- The **Design Linked Incentive (DLI) Scheme** supports Indian start-ups and companies developing semiconductor designs.
- By March 2026, **24 companies received fiscal support and 105 applicants received access to electronic-design tools.**
- **Example:** Indigenous processor development can reduce dependence on imported intellectual property and strengthen applications in defence, telecom and strategic sectors.

Importance for India

- **Economic:** Creates high-value manufacturing and skilled employment.
- **Industrial:** Supports automobiles, electronics, telecom and renewable-energy industries.
- **Strategic:** Strengthens security of supply for defence, space and communication systems.
- **Technological:** Helps India move from **electronics assembly towards higher domestic value addition.**
- **Global:** Enables India to participate more deeply in global electronics and semiconductor value chains.

Challenges

- **High cost:** Fabs require very large capital investment and long gestation periods.
- **Technology dependence:** Advanced manufacturing equipment and specialised materials are largely imported.
- **Infrastructure:** Fabs require uninterrupted power, ultra-pure water and highly reliable logistics.
- **Skill gap:** India needs more specialised talent in chip design, fabrication, packaging and semiconductor equipment.
- **Rapid technological change:** Large investments can become outdated as chip technologies advance rapidly.

Way Forward

- Develop domestic capabilities in **equipment, materials, gases and semiconductor manufacturing machinery.**
- Strengthen university-industry collaboration for **chip design, R&D and specialised skills.**
- Build reliable ecosystems around fabs, including **power, water, logistics and testing facilities.**
- Use international partnerships while gradually increasing **Indian intellectual property and domestic value addition.**

INDIA SEMICONDUCTOR MISSION

Semicon India Programme - 1.0

- Launched in **December 2021** with an outlay of **₹76,000 crore** to establish a domestic semiconductor and display ecosystem.
- Supports **fabs, compound semiconductors, packaging, testing, chip design, research and skill development.**
- By 2026, **12 projects worth over ₹1.64 lakh crore** had been approved; three had begun commercial production.

Semicon 2.0

- Approved in **July 2026** with an outlay of **₹1,27,500 crore.**
- Focuses on six broad areas: **Chip design, Fabrication facilities, Advanced packaging, Research and development**

Conclusion

India's semiconductor strategy must move beyond making chips to building the complete ecosystem that converts technological capability into long-term economic and strategic strength.

II. Achievements of Indians in Science & Technology

1. BUILDING INDIA'S SEMICONDUCTOR ECOSYSTEM

Why in news?

- The Union Cabinet approved **Semicon 2.0 in July 2026** with an outlay of **₹1,27,500 crore**, expanding India's semiconductor strategy beyond fabs and packaging.

From Semicon 1.0 to 2.0

- The **Semicon India Programme 1.0**, approved in 2021, had a financial outlay of **₹76,000 crore**.
- It focused on establishing the basic semiconductor ecosystem, including fabrication, assembly, testing, packaging and design.
- Under the programme, **12 semiconductor projects** have been approved across six states, involving investment commitments of more than **₹1.64 lakh crore**.
- Five semiconductor manufacturing facilities have now commenced commercial production, indicating a transition from policy support towards actual manufacturing capacity.
- Semicon 2.0** seeks to fill the gaps in the wider value chain, particularly in equipment, materials, advanced R&D and specialised skills.



Six Pillars of Semicon 2.0

Chip Design

- Supports semiconductor IP, chips, System-on-Chips and module design.
- India already has a strong base of semiconductor design talent, with domestic programmes supporting hundreds of chip-design initiatives.

Machines and Materials

- Promotes domestic production and R&D of: Semiconductor equipment, Speciality chemicals, Industrial gases and Other critical materials.
- This can increase domestic value addition and create opportunities for precision-manufacturing firms.

More Fabrication Units

- Encourages additional **silicon, compound semiconductor, discrete-component and display fabs**.
- It aims to expand manufacturing capacity across different technology segments.

Advanced ATMP/OSAT

- Strengthens **Assembly, Testing, Marking and Packaging (ATMP) and Outsourced Semiconductor Assembly and Test (OSAT)** facilities.
- Advanced packaging is increasingly important for improving chip performance and integration.

Research and Development

- India intends to move beyond the initial **28-110 nm** technology range towards more advanced semiconductor technologies.
- Collaboration between industry, universities and domestic and international R&D institutions will be important.

Talent Development

- Semiconductor manufacturing requires specialised engineers, technicians and researchers.
- Around **70,000 design engineers** have been trained under earlier initiatives, while the next phase seeks deeper training in chip design, clean-room operations, fabrication and precision manufacturing.

Why Semiconductors Matter for India

- **Digital economy:** Chips power smartphones, computers, telecom networks, AI systems and data centres.
- **Strategic security:** Defence, satellites, communications and advanced surveillance depend on reliable semiconductor supplies.
- **Automobile and EV sector:** Modern vehicles increasingly depend on power electronics and computing chips.
- **Supply-chain resilience:** Domestic capabilities can reduce vulnerabilities arising from global disruptions.

Challenges

- **Very high capital costs:** Semiconductor fabs require huge upfront investments and long gestation periods.
- **Technology dependence:** Advanced manufacturing equipment and specialised technologies remain concentrated among a limited number of global firms.
- **Infrastructure intensity:** Fabs require uninterrupted power, ultra-pure water, clean rooms and efficient logistics.
- **Rapid technological change:** Technology nodes and manufacturing processes evolve quickly, creating risks of technological obsolescence.

Way Forward

- Strengthen **industry-academia-government R&D partnerships**.
- Develop domestic capabilities in **equipment, chemicals, gases and materials**.
- Expand semiconductor training from chip design to **fabrication, packaging and precision manufacturing**.
- Encourage MSMEs to participate in the semiconductor supply chain.
- Build reliable **power, water, logistics and testing infrastructure** around semiconductor clusters.

Conclusion

Semicon 2.0 marks a shift from creating a semiconductor base to building a **complete value chain**, combining design, manufacturing, materials, research and skilled talent to strengthen India's technological and supply-chain resilience.

III. Awareness in the fields of IT, Space,

1. BALANCING PRIVATE PARTICIPATION WITH ISRO'S CORE CAPABILITIES

Why in news?

- Recent concerns over transferring **launch-vehicle manufacturing and spaceport operations** have renewed debate on the right balance between **private participation and ISRO's strategic role**.

India's Emerging Private Space Sector

- Space reforms:** Since 2020, private entities have been allowed to undertake a wider range of space activities.
- Indian Space Policy 2023:** Promotes private participation across the **entire space value chain**, including satellites, launch services and space-based applications.
- Growing ecosystem:** Start-ups such as **Skyroot Aerospace, Agnikul Cosmos, Pixxel and Dhruva Space** are developing launch vehicles, satellites and space-data applications.
- Market potential:** India's space economy is estimated at around **\$8.4 billion**, with the government targeting about **\$44 billion by 2033**.



Why Private Participation Matters

- Higher production capacity:** Industry can manufacture launch vehicles and satellites at larger scale.
- Faster innovation:** Start-ups can experiment with new technologies and business models.
- Investment:** Private capital reduces dependence on government funding for commercial activities.
- Employment:** Expansion of the space industry creates demand for engineers, software specialists and skilled technicians.
- Global competitiveness:** A larger industrial base can help India capture a greater share of the global space market.

Why ISRO's Core Role Must Remain Strong

- Advanced R&D:** ISRO develops technologies where commercial returns may be uncertain or long-term.
- Strategic capability:** Space systems have implications for **national security, communication, navigation and disaster management**.
- Complex missions:** Programmes such as **Gaganyaan, lunar exploration and the Bharatiya Antariksh Station** require strong public-sector technological leadership.
- Knowledge retention:** Excessive outsourcing of critical capabilities could weaken India's **in-house expertise and system-integration capacity**.

challenges

- **Technology transfer:** Publicly developed technologies require transparent valuation and safeguards.
- **Strategic autonomy:** Critical technologies should not become excessively dependent on private or foreign entities.
- **Quality and safety:** Launch vehicles and spaceports require strict technical and safety standards.
- **Institutional balance:** Commercialisation should expand industry without weakening ISRO's research ecosystem.

Way Forward

- Follow a **complementary public-private model**, rather than treating ISRO and industry as substitutes.
- Let industry handle **mature technologies, manufacturing and commercial services**, while ISRO focuses on frontier R&D and strategic missions.
- Strengthen **technology-transfer safeguards, certification, cybersecurity and safety standards**.
- Expand public-private research programmes to ensure that knowledge and advanced capabilities remain within India.

INSTITUTIONAL FRAMEWORK**IN-SPACE**

- **Indian National Space Promotion and Authorisation Centre** acts as a **single-window agency** for promoting, authorising and supervising private space activities.
- It facilitates private access to **ISRO infrastructure, facilities, technology and expertise**.

NewSpace India Limited

- **NSIL**, the commercial arm of the Department of Space, supports **commercialisation of launch vehicles, satellites and space services**.
- This allows ISRO to concentrate more on **research and development and advanced missions**.

Conclusion

India's space ambitions require private industry for scale and ISRO for strategic depth; their complementary strengths can build a globally competitive space ecosystem.

E. SECURITY**I. Various Security Forces and Agencies and their Mandate.****1. INDIA APPROVES TRANSFER OF MISSILE TECHNOLOGY TO DEFENCE INDUSTRY****Why in news?**

- Recently, the Defence Minister approved the **transfer of technology (ToT) for conventional missile systems developed by DRDO to Indian defence manufacturers**, aimed at accelerating indigenous production.

What is Missile Technology Transfer?

- **Technology Transfer (ToT)** refers to the transfer of technical knowledge, designs, production processes and operational expertise from a research institution or one organisation to another for manufacturing, integration or further development.
- In defence, effective ToT enables India to move beyond limited prototype development towards **large-scale production, indigenous upgrades and technological self-reliance**.

Major Forms of Technology Transfer

- **Vertical Technology Transfer:** Movement of technology across different stages, from research and development to industrial production. For example, DRDO transferring missile technologies to Indian manufacturers for mass production.
- **Horizontal Technology Transfer:** Transfer between organisations operating at similar technological levels through licensing, joint ventures or institutional agreements.
- **Know-how:** Practical knowledge required for manufacturing, including designs, production processes, assembly instructions and equipment specifications.
- **Know-why:** Deeper understanding of the underlying scientific principles and design logic, enabling indigenous modification, improvement and future innovation.
- **Dual-use Technology:** Technologies developed for one sector that can be adapted for civilian or military applications. For example, commercial navigation technologies can support precision-guided systems, while defence technologies may contribute to space applications.

Significance for India

- **Promotes Aatmanirbharta:** Domestic production reduces dependence on foreign suppliers and strengthens India's strategic autonomy.
- **Enables Mass Production:** DRDO primarily focuses on research and development. Transferring technologies to industry allows successful systems to be manufactured at scale.
- **Strengthens Supply-Chain Resilience:** Indigenous manufacturing can reduce vulnerabilities arising from geopolitical tensions, sanctions and disruptions in foreign supply chains.
- **Boosts Defence Industrial Ecosystem:** Private companies and MSMEs can participate in high-technology defence manufacturing, creating domestic capabilities across the supply chain.

Challenges

- **Technology Absorption:** Companies may lack specialised machinery, advanced materials, testing facilities and skilled manpower required for sophisticated missile systems.
- **High Capital Requirements:** Missile manufacturing requires substantial investment in testing infrastructure, quality assurance and specialised production facilities.
- **Intellectual Property and Security Risks:** Wider industrial participation increases risks of technology leakage, cyber-espionage, intellectual-property theft and unauthorised reverse engineering.

Way Forward

- Establish dedicated **technology-absorption programmes** to help industries acquire advanced manufacturing capabilities.
- Strengthen collaboration among **DRDO, defence PSUs, private firms, MSMEs and academic institutions**.
- Increase investment in indigenous R&D, testing facilities and advanced materials.
- Develop robust cybersecurity and intellectual-property protection mechanisms.

Conclusion

Effective missile technology transfer can help India evolve from a major defence importer into a **self-reliant defence manufacturing and export hub**, strengthening both national security and technological sovereignty.

2. RAKSHA FRAMEWORK FOR DEFENCE DIPLOMACY

Why in news?

- **Recently, the Defence Minister** released the '**RAKSHA**' document, outlining India's strategic roadmap for defence partnerships over the next decade.

What is Defence Diplomacy?

- Defence diplomacy refers to the **peaceful and cooperative use of defence capabilities and military institutions to advance national security and foreign-policy objectives**.
- It involves activities such as **joint military exercises, training programmes, port visits, defence dialogues, information sharing, humanitarian assistance and capacity building**.
- Such engagements can strengthen mutual confidence, improve interoperability and contribute to regional stability without necessarily involving formal military alliances.

Major Objectives

- **Building Strategic Trust:** Regular military exchanges, communication mechanisms and confidence-building measures can reduce misunderstandings and help manage security tensions.
- **Promoting Maritime Security:** Cooperation among regional navies can improve maritime-domain awareness and help counter **piracy, terrorism, trafficking and other threats to Sea Lines of Communication (SLOCs)**.
- **Strengthening Partner Capacities:** India can assist friendly countries through **military training, technical expertise, hydrographic assistance, equipment supplies and institutional capacity building**.
- **Enhancing Strategic Interoperability:** Joint exercises and operational exchanges improve coordination among partner forces and strengthen India's ability to cooperate during security contingencies, without requiring binding defence alliances.

Challenges

- Defence diplomacy requires close coordination between the **Ministry of Defence and Ministry of External Affairs**; institutional gaps can delay implementation of strategic initiatives.
- **Expanding defence cooperation** with one country can affect India's relationships with other major powers, requiring careful management of competing strategic interests.
- **Growing demand from partner countries** for military training, professional exchanges and specialised courses can place pressure on existing academies and training infrastructure.
- **Defence exports require sustained maintenance, repair and overhaul, spare parts, technical assistance and training**, making after-sales support essential for long-term partnerships.

RAKSHA Framework

- The **RAKSHA** document provides a **10-year strategic vision for India's global defence partnerships** and seeks to align defence engagement with broader national-security objectives.
- Deepening **bilateral and multilateral defence cooperation** with countries sharing common security interests.
- **Expanding joint exercises**, professional military training, exchange of expertise and sharing of operational best practices with partner countries.
- **Using India's growing domestic defence-industrial base** to expand exports and establish the country as a reliable supplier of defence equipment.
- **India's defence exports** reached a record **₹38,424 crore in FY 2025-26**, reflecting the expansion of its defence manufacturing ecosystem.

MAHASAGAR

- India's **MAHASAGAR vision (Mutual and Holistic Advancement for Security and Growth Across Regions)** places maritime cooperation, capacity building and shared regional security at the centre of India's Indian Ocean engagement.
- Initiatives such as **IOS SAGAR** demonstrate this approach through multinational naval cooperation, professional exchanges and interoperability with Indian Ocean partners.
- **In 2026, IOS SAGAR** involved personnel from **16 partner countries** during its regional deployment.
- Such initiatives complement India's **Neighbourhood First** approach and strengthen cooperation across the Indian Ocean.

Way Ahead

- **Establish faster coordination mechanisms** between the MEA, MoD, armed forces and defence industry.
- **Increase specialised training infrastructure** and opportunities for partner-country personnel.
- **Develop reliable MRO, spare-parts** and technical-support networks for exported defence platforms.
- **Expand information sharing, maritime-domain awareness, HADR** and joint exercises in the Indian Ocean.

Conclusion

India can use defence diplomacy to combine strategic partnerships, indigenous capabilities and capacity building for a secure, stable and cooperative regional order.



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