Today's Prelims Topics

PM Vishwakarma Scheme

Context

The PM Vishwakarma Scheme has completed two years since its launch, and in this period, around 30 lakh artisans and craftsmen have been registered under it.

About the Scheme

- A Central Government scheme to support **traditional artisans and craftspeople** working with their **hands and tools** in 18 identified trades.
- **Eligibility:** Must be **18 years or older**,
    - Must be a **self-employed artisan/craftsperson** in one of the 18 trades (like carpenter, blacksmith, potter, tailor, barber, basket maker, etc.).
    - Cannot be a **government employee** or family member of one.
    - Should not have taken loans under PMEGP, MUDRA, or PM SVANidhi in the last 5 years (unless repaid fully).
    - Only **one member per family** can apply.
- **Benefits:** Recognition ⟶ PM Vishwakarma ID Card & Certificate, Skill Training, Toolkit Incentive, Credit/ Loan Support, Digital Empowerment& Market Support (such as marketing, branding)
- **Implementation:**
    - **National Steering Committee (NSC):** Policy & decisions (chaired by MSME Ministry).
    - **State Monitoring Committee (SMC):** State-level implementation.
    - **District Implementation Committee (DIC):** Field-level roll-out.
    - **Credit Oversight Committee**: Ensures smooth flow of loans.
    - **Ministries involved**: MSME, Skill Development, Financial Services.

Source: The Hindu

UNESCO's Tentative World Heritage List

Context

India adds 7 new natural sites to UNESCO's Tentative World Heritage List.

- These sites are:
    1. Deccan Traps at Panchgani and Mahabaleshwar (Maharashtra)
    2. Geological Heritage of St. Mary's Island Cluster (Udupi, Karnataka)
    3. Meghalayan Age Caves (East Khasi Hills, Meghalaya)
    4. Naga Hill Ophiolite (Kiphire, Nagaland)
    5. Natural Heritage of Erra Matti Dibbalu (Visakhapatnam, Andhra Pradesh)
    6. Natural Heritage of Tirumala Hills (Tirupati, Andhra Pradesh)
    7. Natural Heritage of Varkala (Kerala)
- The sites are in Tentative status means not included yet.
- Recent included site is: Maratha Military Landscapes of India (2025).
- **Total number sites**: 44 (36 cultural, 6 natural, 1 mixed)

UNESCO Categories of Heritage Sites

Type	What it covers / Criteria	Examples of features
Cultural Heritage	Sites of human creativity, history, architecture, art, monuments, archaeological sites, etc. These are designated under criteria i–vi.	Monuments, historic buildings, temples, archaeological excavations, etc.
Natural Heritage	Sites of outstanding natural beauty, geology, ecology, biodiversity, natural habitats of threatened species, etc. Criteria vii–x.	National parks, forests, mountain ranges, natural formations, etc.
Mixed Heritage	Sites that qualify for both cultural and natural heritage — i.e. they have both significant human history or architecture and natural / ecological / geological importance.	A place that has sacred human history and unique biodiversity/geology, etc.

Source: Money Control

Unified Pension System

Context

Central Government employees have till September 30, 2025, to opt for the Unified Pension Scheme (UPS) under the National Pension System (NPS).

About Unified Pension Scheme (UPS)

- Announced in **August 2024**, effective from **April 1, 2025**.
- Applies to central government employees who joined service **on or after January 1, 2004** (who were under NPS).
- **Provides:**
    - Assured payout of 50% of the average basic pay of the last 12 months before retirement (after completing 25 years of service).
    - If the employee dies, spouse gets up to 60% of the pension being drawn.
- **Contributions:**
    - **Employee**: 10% of basic pay + Dearness Allowance (DA)
    - **Employer (Govt):** 10% of basic pay + DA
- Has an assured pension feature, unlike NPS.

- **Dearness allowance:** It is a **cost-of-living adjustment allowance** paid to central and state government employees, public sector employees, and pensioners in India.

Difference Between NPS and UPS

Feature	NPS (National Pension System)	UPS (Unified Pension Scheme)
Nature	Mandatory for govt employees since Jan 1, 2004	Optional (employees can choose)
Contribution	10% employee + 14% govt of basic + DA	10% employee + 10% govt of basic + DA
Payout	Based on accumulated corpus (no assured pension)	Assured pension: 50% of last 12 months' avg basic pay after 25 years service
Assured Benefit	✗ No assured payout	☑ Yes, assured
Death Benefits	Depends on accumulated corpus	Spouse gets up to 60% of pension
Flexibility	Only corpus-based annuity	More flexible, guaranteed payout
OPS Link	NPS replaced OPS	UPS is seen as a middle ground between OPS and NPS

Source: Indian Express

Chathh

Context

The Ministry of Culture has initiated efforts to secure UNESCO recognition for Chhath festival by nominating it to the Representative List of Intangible Cultural Heritage of Humanity.

About Chhath Festival

- An **ancient Vedic festival** dedicated to the **Sun God (Surya)** and **Chhathi Maiya** (consort of the Sun God, considered as Usha, the dawn goddess).
- **Purpose**:
    - To thank Surya for sustaining life on earth.
    - To seek blessings for prosperity, health, and wellbeing.
- **Key Rituals**:
    - **Nahay Khay**: Devotees bathe and prepare vegetarian food.
    - **Lohanda/Kharna**: Fasting without water, broken after evening prayers.
    - **Sandhya Arghya**: Offering 'Arghya' (water and prayers) to the **setting sun**.
    - **Usha Arghya**: Final offering to the **rising sun** the next morning.
- Celebrated on riverbanks, symbolising reverence for **nature and water bodies**.

Source: The Hindu

Ion Chromatography

Context

Scientists at the University of Tasmania, Australia,have developed a portable ion chromatograph (**Aquamonitrix**).

What is Chromatography?

- Chromatography is a **separation technique** used to separate the components of a mixture based on their movement through a medium.
- **How it works**:
  - Mixture (sample) is dissolved in a "mobile phase" (liquid or gas).
  - Passed through a "stationary phase" (solid surface or column).
  - Different components move at different speeds ⟶ get separated.
- **Applications**: Used in **forensics, pharmaceuticals, food safety, water testing, and chemical analysis**.

What is Ion Chromatography (IC)?

- **Special type of chromatography** designed to separate and measure **ions (charged particles)** in a solution.
- **How it works**:
  - Sample solution passes through a column filled with material that interacts with ions.
  - Different ions (anions or cations) are separated based on how strongly they interact with the column.
  - A detector (like UV absorbance) identifies and measures them.
- **Uses**:
  - Detecting pollutants (nitrate, nitrite, fluoride, sulfate, chloride).
  - Monitoring **drinking water safety, soil chemistry, industrial processes, and environmental pollution**.

Source: The Hindu

India-ILO MOU

Context

The Union government has signed a memorandum of understanding (MoU) with the International Labour Organisation (ILO) to advance the International Reference Classification of Occupations (IRCO).

Significance of the MoU (India–ILO)

- **Global Employability of Indian Workers:** Aligns India's occupational and skills classification with **international standards**.
    - Facilitates **mutual recognition of qualifications** ⟶ makes Indian workers more competitive abroad.
- **Addresses Global Skill Shortages:** Ageing populations and digital transformation in developed economies ⟶ India can position its large young workforce to fill these gaps.
- **Supports Migration Pathways:** Links with G20 commitment (2023) to promote **skills-based migration pathways**.
- **Boosts Domestic Skill Ecosystem:** Supports government schemes like **PM Viksit Bharat Rozgar Yojana**, targeting 35 million formal jobs in 2 years.

About ILO

- **Established:** on April 11, 1919 by the Treaty of Versailles.
- **Members**: 187 member states (186 UN member states + the Cook Islands).
    - **India is a founding member of ILO.**
- **Headquarters**: Geneva, Switzerland.
- It's a **specialised agency** of the United Nations (UN).
- It is the **only tripartite** UN agency. It brings together governments, employers and workers of 187 Member States.
- **Nobel Peace Prize**: Awarded in **1969** for its efforts to promote peace and justice for workers.
- **Reports:**
    - World Employment and Social Outlook (WESO)
    - Global Wage Report
    - World Social Protection Report

Source: The Hindu

Lake Natron

Context

The Tanzanian government has halted a proposed large-scale soda ash mining project at Lake Natron, citing ecological risks to the Lesser Flamingos

About Lake Natron

- **Location**: Northern Tanzania, near the border with Kenya; lies in the Great Rift Valley.
- **Type**: A **salt lake** (alkaline lake) with highly caustic, soda-rich waters
- Declared a **Ramsar Site of International Importance** in 2001.
- Protected under the **East African Community Transboundary Ecosystem Management Act (2010)**.
- 75% of the population of lesser Flamingo breed at Lake Natron.

Lesser Flamingo (*Phoeniconaias minor*)

- **Features**: It is the **smallest of all flamingos** but has the largest population.
    - It possesses the **"hallux" or hind toe** that some other flamingos do not have.
    - Males are a little taller than females.
    - Flamingos build **mud cone nests** on lake flats.
    - It is serially monogamous, meaning they form pairs that remain together while they are raising the young.
- **Geographical distribution:** Africa, Asia continents and in that especially Sub-Saharan Africa, South Asia, North Africa
    - They mostly eat **blue-green algae** but **occasionally** will **take crustaceans and small insects.**
- **Conservation Status:**
    - **CMS (Convention on Migratory Species):** Included in Appendix II.
    - **Conservation Status (IUCN):** Near Threatened (NT).

Fact

- **Rann of Kutch** is declared as the **"Flamingo City".**

Source: DowntoEarth

Rashtriya Gokul Mission

Context

PM Modi inaugurated the Sex Sorted Semen facility established under the "Rashtriya Gokul Mission" scheme.

More in News

- 'Gausort' technology launched in 2024 will be used in sex sorting

About Rashtriya Gokul Mission (RGM)

- RGM was launched in **December 2014** under the **National Programme for Bovine Breeding and Dairy Development (NPBBDD)**.
- It focuses on **scientific conservation, breed improvement and productivity enhancement** of indigenous bovine breeds.
- **Implementing Agency:** Department of Animal Husbandry & Dairying (DAHD), Ministry of Fisheries, Animal Husbandry & Dairying.
- It supports **States and Union Territories** in infrastructure development for indigenous cattle breeding.

Facts

- India has been the **largest milk producer since 1998**, contributing **~25% of global output**.
- **State-wise Trends:**
  - **Uttar Pradesh**: Largest producer (16.21% share).
  - **West Bengal**: Fastest growth (9.76% in 2023-24).
- **Livestock Base:**
  - **World's largest livestock owner**: 303.76 million bovines, 74.26 million goats.
    - Total livestock: 536.76 million.
- **Farmer Participation**
  - **~50 million dairy farmers**; about **8 crore people employed**.
  - Strong cooperative network: **22 milk federations, 240 district unions, 28 marketing dairies, 24 producer organizations**.
  - Women's participation significant – **35% members in cooperatives** with **48,000 women dairy societies**.
- **Economic Contribution:** Dairy is India's **largest agricultural commodity**, contributing **~5% to GDP**.

Source: PIB

Swasth Nari, Sashakt Parivar Abhiyaan

Context

Prime Minister Modi launched 'Swasth Nari, Sashakt Parivar Abhiyaan' and 8th Poshan Maah on 17th September 2025.

About the Abhiyaan

- **Led by:**
  - **Ministry of Health & Family Welfare (MoHFW)** ⟶ preventive, promotive, curative services.
  - **Ministry of Women & Child Development (MoWCD)** ⟶ Poshan activities, mobilisation through Anganwadis, nutrition counselling.
- **Duration**: 17 Sept – 2 Oct 2025.
- **Objectives:**
  - Provide **preventive, promotive, and curative health services** to women, adolescent girls, and children.
  - Strengthen **screening, early detection, and treatment linkages** for:
    - Non-communicable diseases (hypertension, diabetes, obesity).
    - Anaemia, TB, and sickle cell disease.
    - Maternal, child, and adolescent health.
  - Mobilise communities for **healthy lifestyle practices** (nutrition, physical activity, mental health, menstrual hygiene).
  - Promote **voluntary blood donation, organ donation**, and digital health services.

Source: PIB

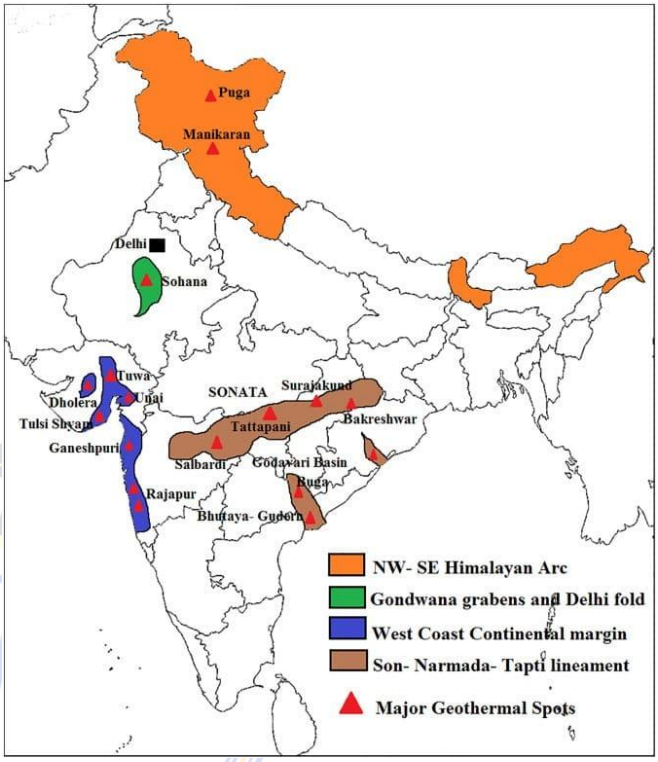
India's 1st National Policy on Geothermal Energy

Context

The Indian government launched its first national policy on geothermal energy.

About the Policy

- It encourages **repurposing abandoned oil and gas wells** and deploying ground source heat pumps for heating and cooling.
- It also promotes **joint ventures** between geothermal developers and oil, gas, and mineral firms and proposes fiscal incentives such as **tax holidays, import duty exemptions and viability gap funding**.



What is meant by Geothermal Energy?

- Geothermal energy is **heat stored beneath the Earth's surface**, tapped via **hot springs, geysers, or subsurface reservoirs**.
- **Geothermal in India:** 381 hot springs and 10 geothermal provinces, including Ladakh, Himachal Pradesh and Gujarat.
    - **E.g.,** Puga Valley (Ladakh), Manikaran (HP), Tattapani (Chhattisgarh), Bakreswar (West Bengal).

Source: Economic Times

Places in News

Dongsha Islands

News? Taiwan's Coast Guard Administration (CGA) dispatched vessels to repel a Chinese coast guard ship and a Chinese fishing boat near Dongsha Island.

About Dongsha Island

- Northern part of the South China Sea.
- **Controlled by**: Taiwan (Republic of China, ROC), administered by Kaohsiung City.
- **Claimed by**: People's Republic of China (PRC), as part of its "Nine-Dash Line" claim.
- **Geography**: A **coral atoll** with a large lagoon in the center.

Source: Economic TImes

Mains Topics

Ethanol Blending in India - Promises vs Impact

Context

Ethanol blending in petrol rose from **4.2% in FY18 to 18.9% in FY25**, nearing the **E20 target for FY26**, but it has **not reduced crude oil imports or petrol prices significantly**.

Ethanol Blending Programme: Background

- **Launch:** 2003, mandating 5% blending (E5) in select regions.
- **Expansion:** National Policy on Biofuels, 2018 (revised 2022).
- **Target:** Achieve **E20 by 2025-26** (advanced from 2030).
- **Objectives:**
    - Reduce crude oil import dependence.
    - Lower greenhouse gas emissions.
    - Generate additional income for farmers (ethanol production from sugarcane, maize, rice, damaged grains).

Achievements So Far

- **Rapid Growth in Blending:** From **4.2% in FY18** to **18.9% in FY25**, nearing the **E20 target**.
- **Global Leadership:** India is now the **third-largest ethanol producer** after the US and Brazil.
- **Farmer Benefits:** Additional demand for sugarcane and surplus grains has supported farm incomes.

Why Ethanol Blending Has Not Reduced Crude Oil Imports

- **Blending Covers Only Petrol:** Ethanol is mixed only with petrol, which is a small part of India's fuel use.
    - Diesel, ATF, LPG, and petrochemicals – the bigger crude products – remain untouched.
- **High Diesel Dependence:** India's freight, transport, and agriculture sectors run mainly on diesel.
- **Rising Fuel Demand:** Petrol use rose **7.5% in FY25**, driven by growing private vehicle use and weak public transport systems.
- **Other Petroleum Needs:** Crude is also refined into aviation fuel, LPG, and petrochemicals, where demand is rising.
- **Imports Driven by Global Factors:** India's fuel prices and import needs are tied to global oil markets (OPEC supply, Russia–Ukraine war).

Issues in India's Ethanol Blending Programme

Production Constraints

- **Feedstock Dependence:** Over-reliance on sugarcane ⟶ water-intensive, risks food vs fuel debate.
- **Limited Diversification:** Slow adoption of maize, rice, damaged grains, or cellulosic ethanol.
- **Supply Chain Gaps:** Seasonal availability of feedstocks creates volatility in production.

Infrastructure & Technology

- **Blending Capacity:** Many depots and retail pumps lack blending and distribution infrastructure.
- **Vehicle Compatibility:** Only recently are **E20-compatible vehicles** being introduced; older engines risk damage.
- **Storage Issues:** Ethanol is hygroscopic (absorbs water), leading to storage and handling challenges.

Economic Issues

- **Cost Volatility:** Ethanol procurement prices need government subsidies; profitability for OMCs is uneven.
- **Global Oil Market:** Crude imports remain tied to global prices and geopolitical disruptions (Russia-Ukraine war, OPEC supply).

Other Concerns

- **Coordination across Ministries & Stakeholders:** Multiple agencies involved (petroleum, agriculture, environment, transport) - coordination gaps persist.
- **Land Use:** Pressure on food crops if large-scale diversion happens.

Are Indian Vehicles and Makers Ready for Higher Ethanol Blends?

- **Current Vehicles:** Most vehicles were designed for petrol with low ethanol percentages (E5–E10). For **E20**, vehicles need stronger parts (fuel pipes, seals) and engine re-tuning.
- **Automakers' Role:** Making **flex-fuel vehicles** (run on any petrol-ethanol mix) is possible but requires redesign and extra costs for testing, certification, and dealer training.
    - Companies can adjust **engine software, fuel systems, and emission controls** for E20.
- **Standards & Testing:** BIS and testing agencies must finalise E20 rules. Automakers need clarity on standards to update warranties and engine designs.
- **Service & Repairs:** Mechanics need training for ethanol-related issues. Spare parts and fuel system materials must be ethanol-friendly.
- **Consumer Confidence:** People worry about **mileage, performance, and engine life**.

Way Forward

- **Diversify Feedstock:** Encourage ethanol production from maize, rice, sorghum, bamboo, and **2G biofuels** (agri-residues, waste biomass).
- **Strengthen Infrastructure:** Expand blending depots, pipelines, and storage capacity.

- **Technology Push:** Promote research in flex-fuel engines, hybrid vehicles, and advanced ethanol production methods.
- **Balanced Approach:** Ensure **food vs fuel balance**, avoiding over-reliance on sugarcane.
- **Diesel Alternatives:** Explore **biodiesel, compressed biogas (CBG), and hydrogen blending** to reduce crude demand beyond petrol.
- **Market Linkages:** Reduce heavy price controls; allow ethanol blending to reflect in consumer fuel costs, improving demand-supply efficiency.
- **Integrated Energy Strategy:** Align ethanol blending with **EV adoption, renewable energy, and green hydrogen** to build a multi-pronged energy security plan.

Brazil's Ethanol Success (Case Study)

- Started in **1970s (Proálcool Programme)** to cut oil imports and use surplus sugarcane.
- Government fixed **mandatory blending (E20–E27)** and gave subsidies/tax breaks.
- Introduced **flex-fuel vehicles (FFVs)** that run on petrol or ethanol in any mix.
- Built strong supply chain: sugarcane farms, distilleries, and blending infrastructure.
- Ethanol kept **cheaper than petrol**, encouraging consumer use.
- **Impact:** Lower oil imports, extra farmer income, reduced emissions, global biofuel leadership.

Source: The Hindu Business Line

Extreme Rainfall and Fragile Himalayas

Context

The recent spate of disasters in Uttarakhand and Himachal Pradesh is a reminder that the Himalayas are becoming a **climate hotspot**.

Current Situation

- In the past few weeks, **Uttarakhand and Himachal Pradesh** have witnessed **very heavy rainfall**, cloudbursts, and landslides.
- In Uttarakhand alone, at least **15 deaths** were reported in Dehradun and adjoining districts due to landslides.
- Across northwestern India, rainfall in August was **34% above normal**, and for the overall season so far, the surplus is **over 30%**. In the first half of September, rainfall was **67% above normal**.

Why Do Hilly Regions Receive More Rainfall?

- **Active Monsoon Systems:** Consecutive low-pressure systems formed in the **Bay of Bengal** have travelled further north than usual this season, intensifying rainfall in the Himalayan states.
- **Geographical Factors:** In mountains, warm, moist air is forced to rise rapidly, building massive, vertically developed clouds that produce intense localised precipitation.
- **Comparison with Coastal/Plains Rainfall:** Places like Goa or Kerala often record **300 mm rainfall in a day** without major disruption due to drainage.
    - In contrast, such intensity in the **Himalayas is disastrous**, given the steep slopes and unstable soil.
- **Recent Examples:**
    - **Udhampur (J&K):** 630 mm rainfall in 24 hours (equivalent to Rajkot's yearly rainfall).
    - **Leh (Ladakh):** 59 mm in 48 hours – a record since 1973.

Why Are Hilly Regions More Vulnerable?

- **Topography:** Steep slopes mean rainfall does not percolate but rushes down, carrying soil, rocks, and debris.
- **Landslides & Mudslides:** Intense rainfall destabilises slopes, triggering landslides and flash floods.
- **Blocked Rivers:** When streams are choked, excess water and debris spill into settlements, damaging roads, bridges, and homes.
- **Disaster Variability:** Not all extreme events are equally damaging; impact depends on slope vulnerability, soil type, and whether debris enters rivers.

Role of Climate Change

- **Changing Western Disturbances:** Western disturbances, originating in the Mediterranean, traditionally influenced **winter precipitation**.
    - Now, they are shifting **southward** and interacting with the monsoon, intensifying rainfall in the Himalayas.
- **Global Warming Impact:** Rising temperatures increase the atmosphere's moisture-holding capacity, making extreme rainfall more frequent.
- **Arctic Linkages: Melting Arctic ice** may be altering global circulation, further complicating Himalayan rainfall patterns.
- **Future Outlook:** Meteorologists warn of **more frequent cloudbursts and heavy rainfall events**, interspersed with longer dry spells.

Human-Induced Exacerbation

- **Deforestation & Urbanisation:** Loss of natural vegetation reduces slope stability.
- **Unplanned Construction:** Roads, hotels, and hydropower projects disturb fragile slopes.
- **Encroachment in River Floodplains:** Settlements in hazard-prone zones increase vulnerability.
- **Tourism Pressure:** Large tourist influx during monsoon adds to stress on fragile infrastructure.

Source: Indian Express

Artificial Intelligence for Viksit Bharat

Context

Artificial Intelligence (AI) is emerging as a key driver for India's vision of Viksit Bharat 2047, with the potential to boost productivity, accelerate innovation, and enable inclusive growth across sectors. NITI Aayog has also released a Report titled "AI for Viksit Bharat

How AI Can Aid Viksit Bharat

- **Boosting Productivity:** AI-led automation and analytics can improve efficiency across industries, contributing an additional **$500-600 billion to GDP by 2035**.
- **Accelerating Innovation:** Generative AI can cut R&D costs and timelines, especially in pharma, mobility, and advanced manufacturing.
- **Empowering Governance:** AI-based decision systems can strengthen public service delivery, reduce leakages, and improve transparency.
- **Skilling and Jobs:** AI can reskill workers, prepare youth for digital-first careers, and "future-proof" jobs.
- **Inclusive Growth:** AI integration with **Digital Public Infrastructure (DPI)** (like UPI, Aadhaar) can widen access to finance, healthcare, and education.

Sectors of Application

- **Banking & Financial Services:** AI for fraud detection, risk management, explainable credit scoring, and personalised customer services.
    - Estimated value-add: **$50–55 billion by 2035**.
- **Manufacturing:** AI-enabled **smart factories, predictive maintenance, and digital twins**.
    - Potential GDP contribution: **$85–100 billion** by 2035.
- **Pharmaceuticals:** AI can reduce drug discovery timelines by **60-80%**, lower R&D costs by 20-30%, and boost India's shift from generics to innovation.
- **Automotive Sector:** Software-Assisted Vehicles (SAVs), AI-based design of components, and real-time traffic data can transform India into a global hub.
- **Healthcare:** AI-driven diagnosis and R&D.
- **Agriculture:** Smart crop monitoring, drone-assisted pest control, supply-chain optimisation.
- **Education:** Personalised adaptive learning platforms.

Government Initiatives

- **IndiaAI Mission (2024):** ₹10,000 crore programme focusing on:
  - 38,000+ GPUs for AI compute infrastructure.
  - Development of India-specific **large language models** (LLMs).
  - Creation of AI/Data Labs in Tier-2 & Tier-3 cities.
  - AI Kosh – National dataset repository with 350+ curated datasets.
- **AIRAWAT:** India's AI Research Analysis & Workbench for high-end computers.
- **Digital Public Infrastructure (UPI, CoWIN, ONDC):** Strong backbone for AI-enabled services.
- **Skill Development:** AI curriculum integration in schools, higher education, and vocational training.
- **State-level policies:** Tamil Nadu, Karnataka, Telangana have launched AI strategies

Potential of AI for Viksit Bharat

- **Data Advantage:** India can become the **"Data Capital of the World"** with diverse, large-scale datasets.
- **Skilling Opportunity:** AI skilling can create a **globally competitive workforce**, narrowing the AI skill gap.
- **Global Hub:** By integrating AI into services, India can strengthen its position as a **technology services leader**.
- **Innovation Leapfrog:** AI-led R&D can enable India to bypass legacy bottlenecks in pharma, semiconductors, and mobility.
- **Geopolitical Edge:** India can emerge as a **responsible AI leader for the Global South**.
- **Cultural Advantage:** Multilingual datasets for Indic language LLMs can democratise AI access.

Challenges in Implementation

- **Data Issues:** Lack of standardized, high-quality datasets; privacy and consent challenges.
- **Infrastructure Gaps:** Limited access to high-performance computing (HPC), cloud infrastructure, and GPUs.
- **Talent Shortage:** Shortfall of skilled AI researchers, engineers, and domain experts.
- **Regulatory Hurdles:** Absence of comprehensive AI governance frameworks; risks of bias and misuse.
- **Industry Divide:** MSMEs and smaller firms may struggle to access expensive AI infrastructure.
- **Cybersecurity Risks:** Vulnerability to hacking, algorithmic bias, and misinformation.
- **Ethical Risks:** Algorithmic bias, misuse in surveillance, misinformation, election manipulation.
- **Environmental Concerns:** Training large models consumes significant energy, raising questions of sustainability.
- **Global Competition:** Need to align with evolving international standards (e.g., EU AI Act).

Way Forward

- **Build Sovereign AI Infrastructure:** Expand **AIRAWAT GPU clusters** and ensure equitable access.
- **Strengthen Data Ecosystems:** Operationalise **AI Kosh** with high-quality, certified, anonymised datasets.
- **Skilling at Scale:** Establish **AI Open University**, AI Chairs in top institutions, and sector-specific certification programmes.
- **Inclusive Access for MSMEs:** Provide shared AI labs, subsidised access to HPC, and plug-and-play AI SaaS tools.
- **Ethics & Governance:** Frame laws for **explainable, transparent, and accountable AI**, with clear liability rules.
- **Public-Private Partnerships:** Encourage collaboration for R&D, testing, and scaling AI innovations.
- **Global Engagement:** Position India as a **responsible AI leader** through cooperation with OECD, G20, and BRICS.

Source: NITI Aayog