

# NEXT IAS

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## PRIME MINISTER HELD OFFICIAL TALKS WITH PRESIDENT OF FRANCE

### Context

- PM Modi held bilateral talks with French President Emmanuel Macron in France.
  - ♦ This marked the **first meeting between the two leaders since India-France ties were elevated to a “Special Global Strategic Partnership”** earlier this year.

### Major Highlights

- Adoption of the “**Innovation Roadmap 2030**”, aimed at providing **long-term direction to bilateral cooperation in technology and innovation**.
- The two leaders also agreed to **establish a Joint India-France AI Working Group** to deepen collaboration in artificial intelligence.
- Jointly inaugurated the maiden **edition of Bharat Innovates 2026**, it is an initiative of the Union Ministry of Education.
  - ♦ It serves as a premier platform for advancing innovation-led partnerships between India’s deep tech innovators and global stakeholders.

### Major Highlights of the India-France Relations

- **India–France Strategic Partnership:** It was launched on 26 January 1998 and is India’s first-ever Strategic Partnership.
  - ♦ **Core vision:** Enhance strategic autonomy and deepen bilateral cooperation.
  - ♦ **Key Strategic Pillars:** Defence and security, Civil nuclear cooperation and Space collaboration.
  - ♦ **Expanding areas:** Indo-Pacific cooperation, maritime security, digitalisation, cyber security, climate change, sustainable development, advanced technologies, and, counter-terrorism.
- **Defence Cooperation:** It is reviewed via the Annual Defence Dialogue (Minister-level) and High Committee on Defence Cooperation (HCDC) (Secretary-level).
  - ♦ **Rafale Fighter Jets:** India procured 36 Rafales from Dassault Aviation.
  - ♦ **Scorpene Submarines (Project P-75):** Collaboration with France’s Naval Group, 6 submarines built in India; latest is INS Vagsheer.

- ♦ **Combat Aircraft Engine Development:** HAL and France’s Safran Helicopter Engines signed an agreement under the IMRH programme to co-develop engines.
- ♦ Recently both nations formally concluded an **Inter-Governmental Agreement (IGA) to procure 26 Rafale-M fighter jets for the Indian Navy**.
- ♦ **Future plans:** Co-development of next-gen fighter jet engines.
- ♦ **Joint Exercises:** Shakti, Varuna, FRINJEX-23.
- **Economic Cooperation:** France is India’s third-largest trading partner within the European Union, after the Netherlands and Germany.
  - ♦ Bilateral trade has more than doubled over the past decade, reaching Euros 13.59 billion (USD 15.81 billion) in 2025-26.
  - ♦ The trade relationship is expected to gain further momentum following the **signing of the India-European Union Free Trade Agreement**.
  - ♦ Both countries are also moving to **jointly develop technologies and integrate existing technologies**.
  - ♦ The process of **enabling Unified Payment Interface (UPI) has been successful in France**.
- **Space Cooperation:** There is a over 60 years of collaboration between ISRO and CNES (French space agency)
  - ♦ France is a key supplier of components, launch services (Arianespace).
  - ♦ **Joint missions:** TRISHNA (satellite mission), MDA systems, ground station support.
- **Energy Cooperation:**
  - ♦ **International Solar Alliance (ISA):** Co-founded by India and France in 2015 to promote solar energy worldwide.
  - ♦ **Nuclear Energy Cooperation:** The first meeting of the special task force on nuclear energy in the framework of the Indo-French Strategic Dialogue, was convened in 2025.
    - Both sides have agreed to work on establishing a partnership on low and medium power modular reactors or Small Modular Reactors (SMR) and Advanced Modular Reactors (AMR).

### Areas of Concern

- **Trade Imbalance:** Bilateral trade remains below potential, especially compared to India’s trade with other EU nations.

- **Technology Transfer & Defence Restrictions:** While France has supported India's defence goals, there are concerns over the depth of technology transfer in big items.
- **Nuclear Liability Concerns:** Despite a civil nuclear agreement in 2008 and plans for reactors at Jaitapur, progress has been slow.
- **Geopolitical Differences:** France's strong economic ties with China sometimes dilute full alignment with India on Indo-Pacific issues.
  - ♦ Differences in approach to Middle East geopolitics occasionally diverge.
- ♦ More than half are actively employed, largely on foreign-flagged ships.
- ♦ Nearly one in **every six seafarers** on large merchant vessels globally is Indian.
- ♦ Around **23,000 Indian seafarers** are estimated to be working in the **Gulf region**, with the United Arab Emirates accounting for a major share.
- **Strategic Importance:** Indian seafarers play a crucial role in maintaining global supply chains. They contribute significantly to **India's remittance inflows**.
  - ♦ Their presence is particularly important in oil and gas transportation, which directly affects **India's energy security**.

### Future Outlook

- **Horizon 2047 Roadmap envisions:** In 2023, to mark the **25th anniversary** of the India-France Strategic Partnership, both countries adopted the Horizon 2047 Roadmap to guide and strengthen bilateral relations up to 2047.
  - ♦ Joint development and production of advanced defence technologies.
  - ♦ Export of jointly developed products to third countries for global good.
  - ♦ Deeper maritime and space security cooperation.
  - ♦ Growing convergence in the Indo-Pacific through strategic dialogue and joint military presence.

### Conclusion

- India-France defence cooperation is a cornerstone of their wider Strategic Partnership.
- With shared interests in sovereignty, multilateralism, and regional stability, both countries are set to elevate ties further under the Horizon 2047 vision, making defence ties more collaborative, innovative, and export-oriented.

Source: PIB

## PROTECTING INDIAN SEAFARERS IN THE GULF

### Context

- India recently lodged a strong protest with the United States after U.S. naval strikes on merchant vessels in the Persian Gulf resulted in the deaths of three Indian seafarers.

### Indian Seafarers in Global Shipping

- **India's Global Maritime Workforce:** India is one of the **world's largest suppliers** of maritime manpower. Approximately **3.5 lakh Indian seafarers** serve on merchant vessels across the world.

### Does international maritime law adequately protect civilian crews?

- The nodal agency for regulating global shipping is the **IMO, a United Nations agency**.
- Though the IMO has the means to regulate the technical, commercial, environmental and safety aspects of global shipping through consensus and rulemaking, it has often fallen short in protecting ships and seafarers.
- The law governing the oceans is the **United Nations Convention on the Law of the Sea (UNCLOS)**. Its acts and mandates are extensive and are an outcome of decades of negotiations and consensus-building.
- UNCLOS is thorough and considers various situations, including transits across straits such as the Hormuz. The U.S. refused to sign it on the grounds that UNCLOS considers the deep seabed as the commons. Iran has signed the convention but has not ratified it.

### Foreign Flags of Convenience (FOC) and India's Constraints

- **A Flag of Convenience (FOC)** refers to a practice where a ship is registered in a country different from the country where its actual owner is based.
  - ♦ Under this system, **a vessel flies the flag of the country** in which it is registered to benefit from **lower taxes and registration fees**, thereby reducing operating costs.
  - ♦ Countries such as **Panama, Liberia, and the Marshall Islands** are among the most popular Flag of Convenience registries.
- Under international maritime law, the **flag state bears the primary responsibility** for the vessel's regulation, safety, and protection.

- ◆ This limits India's ability to directly intervene during maritime disputes, attacks, detentions, or other emergencies involving such vessels.
- ◆ India often has to rely on **diplomatic engagement, consular support, and cooperation with the flag state** to safeguard the interests of Indian seafarers.

#### India's Efforts to Protect Seafarers

- **Operation Sankalp:** India launched Operation Sankalp to safeguard merchant shipping in the **Gulf region**. Its key features are;
  - ◆ Maritime surveillance and deployment of Indian Navy warships.
  - ◆ Assistance to vessels threatened by attacks along with escort and protection missions.
- **Anti-Piracy Operations:** India has successfully rescued hijacked vessels, neutralized piracy threats off the Somali coast and protected merchant shipping from Houthi attacks in the Red Sea region.

Source: TH

## EMPOWERING INDIA'S YOUTH FOR A DEVELOPED NATION

#### Context

- India, with nearly **65%** of its population below 35 years of age, is leveraging its demographic dividend to realise the vision of **Viksit Bharat @ 2047**.

#### Focus on Youth-led Development

- **The National Youth Policy (NYP) 2014** provided the foundational framework for youth development in the country.
  - ◆ It defined youth as individuals **aged 15–29 years** and identified **key areas** such as education, employment, skill development, health, sports, social participation, and empowerment.
- **The proposed National Youth Policy 2025** framework further underscores emerging priorities such as future-ready skills, leadership, digital participation, and sustainable development.
- Youth are increasingly viewed as **active partners in governance and nation-building** rather than passive beneficiaries of government programmes.

#### Transforming Education for the Future

- **Strengthening School Education:** More than **1.49 lakh schools** have been covered under **ICT and digital education** initiatives.

- ◆ Over **1.76 lakh smart classrooms and 1.79 lakh ICT laboratories** have been sanctioned.
- ◆ Residential schooling initiatives such as Kasturba Gandhi Balika Vidyalayas and **Netaji Subhash Chandra Bose Awasiya Vidyalayas** have improved educational access for girls and disadvantaged communities.
- ◆ Hostel facilities under **PM-JANMAN** and **Dharti Aaba Janjatiya Gram Utkarsh Abhiyan** have expanded opportunities for tribal students.
- **The National Education Policy, 2020:**
  - ◆ **The National Credit Framework (NCrF)**, allows students to accumulate credits across academic, skill-based, and experiential learning.
  - ◆ **The Academic Bank of Credits (ABC)** enables students to store, transfer, and redeem credits across institutions without losing academic progress.
  - ◆ **The Automated Permanent Academic Account Registry (APAAR ID)** accumulates academic and skill credits earned throughout a student's learning journey.
- **Digital Learning and Innovation: SWAYAM** hosts over 18,500 courses with more than 6 crore enrolments.
  - ◆ **DIKSHA (Digital Infrastructure for Knowledge Sharing)** provides digital learning resources in multiple Indian languages.
  - ◆ **One Nation One Subscription** has expanded access to academic and research resources.
  - ◆ More than **10,000 Atal Tinkering Labs** are nurturing innovation among school students.

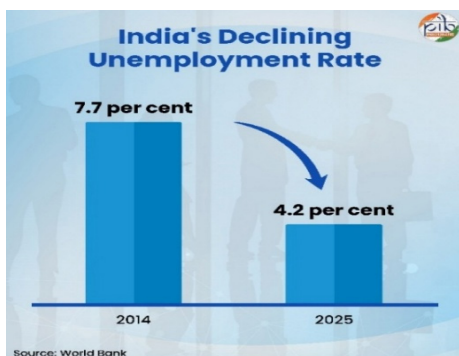
#### Building a Skilled and Employable Workforce

- **Skill India Mission (SIM):** Launched in **2015**, the Skill India Mission provides **skill, re-skill, and up-skill** training through an extensive network of skill development centres. Key schemes to ensure that the programme is implemented effectively:
  - ◆ **Pradhan Mantri Kaushal Vikas Yojana (PMKVY)**
  - ◆ **Jan Shikshan Sansthan (JSS)**
  - ◆ **National Apprenticeship Promotion Scheme (NAPS)**
  - ◆ **Craftsman Training Scheme (CTS) in Industrial Training Institutes (ITIs).**

- **SOAR (Skilling for AI Readiness):** Launched in 2025, SOAR introduces Artificial Intelligence awareness and foundational AI skills to school students from Classes **6 to 12**.
  - ♦ It also equips educators to integrate AI concepts into learning.
- **Prime Minister Internship Scheme (PMIS): Launched in 2024**, this initiative aims to provide structured, paid internship opportunities to youth across the country.
- **Skill India Digital Hub (SIDH):** Launched in 2023, SIDH serves as a **unified Digital Public Infrastructure platform** that integrates learners, training providers, employers, and Government programmes on a single digital platform.

### Employment Generation and Economic Empowerment

- **Rozgar Melas:** Launched in **2022**, it is a key step toward boosting employment generation and strengthening the workforce across the country.
- **Pradhan Mantri Viksit Bharat Rozgar Yojana:** It provides employment-linked incentives to both employers and first-time formal-sector employees.
- **National Career Service (NCS) Portal:** Launched in July 2015, it connects job-seeking youth with employers across sectors, reducing information asymmetry and bringing employment opportunities to youth across all geographies.
- **Manufacturing as an Employment Engine:** Make in India and Production Linked Incentive (PLI) Schemes have strengthened domestic manufacturing.



### Promoting Entrepreneurship and Innovation

- **Startup India Revolution:** India has emerged as the world's **third-largest** startup ecosystem.
  - ♦ More than **2.3 lakh startups** have been recognised under Startup India.
  - ♦ Over **120 unicorns** operate within the country.
  - ♦ Nearly **half of all recognised startups** originate from **Tier-II and Tier-III cities**.

### The Funding Architecture:

- ♦ **Pradhan Mantri MUDRA Yojana (PMMY):** Launched in **2015**, the PMMY is the flagship programme aimed at funding micro enterprises and small businesses.
- ♦ **Credit Guarantee Scheme for Startups (CGSS):** This scheme provides collateral-free loans to DPIIT-recognised startups through financial institutions.
- ♦ **Startup India Investor Connect Portal:** Launched in **2023**, it enables young entrepreneurs to reach multiple investors through a single application.

### Digital Youth Engagement

- **Mera Yuva Bharat (MY Bharat):** It combines physical engagement with digital connectivity to create a single, unified ecosystem for India's youth aged 15 to 29.
  - ♦ It offers learning, volunteering, mentorship, career services, and civic participation through a single platform.
- **The Pradhan Mantri Gramin Digital Saksharta Abhiyan (PMGDISHA)** was launched in **2017** to ensure digital literacy amongst citizens in rural India.
  - ♦ It trained citizens, including the youth to use digital devices, navigate the internet, access Government services online, and conduct digital financial transactions.

### Sports as a Vehicle of Youth Empowerment

- **Khelo India – National Programme for Development of Sports:** It aims to promote mass participation and sporting excellence in both rural and urban areas.
- **Target Olympic Podium Scheme (TOPS):** TOPS provides customised, athlete-centric support that includes foreign coaching, international training exposure, advanced sports science, equipment, and a monthly stipend.
- **The Fit India Movement**, launched in **2019**, has transformed fitness from an individual effort into a national movement.

### Health and Well-Being of Youth

- **Rashtriya Kishor Swasthya Karyakram (RKSK):** It addresses adolescent health through a holistic framework covering nutrition, mental health, reproductive health, and prevention of substance abuse.

- **Mental Health Support (Tele-MANAS):** To provide stigma-free mental healthcare, the **Tele-MANAS 24/7** helpline offers professional tele-counselling services.
- **The Ayushman Bharat Digital Mission (ABDM)** launched in **2021**, helps India's youth by making healthcare more digital, accessible and affordable.

### Youth Leadership and Global Engagement

- **National Service Scheme and Nehru Yuva Kendra Sangathan** continue to promote youth involvement in social service, environmental conservation, literacy, and disaster management.
- **Youth exchange programmes** and international platforms such as **Y20, BIMSTEC Youth Summit, and SCO engagements** are expanding India's global youth footprint and fostering leadership skills.

### What are the challenges?

- **Quality-Quantity Gap in Skilling:** Despite large training numbers, employability outcomes remain weak; industry often finds certified youth unprepared for actual job roles, indicating curriculum-industry misalignment.
- **Credential-Job Mismatch:** Graduate unemployment coexists with skill shortages in manufacturing and technology sectors, reflecting structural rigidity in education-to-employment pathways.
- **Regional and Social Inequalities:** Unequal access to education, skills, and opportunities persists across regions and social groups.
- **Geographic Concentration:** Economic opportunities, startup ecosystems, and quality education remain concentrated in a few states; aspirational districts and northeastern states remain significantly underserved.
- **Gig Economy Vulnerability:** Significant youth employment is in platform-based gig work without social security, EPF coverage, or career progression, raising concerns about formalisation quality versus quantity.
- **Mental Health Burden:** Rising competitive pressure, unemployment anxiety, and digital overexposure among youth create a growing mental health crisis inadequately addressed by existing healthcare infrastructure.

### Concluding remarks

- India's demographic dividend presents a historic opportunity to accelerate economic growth, foster innovation, and strengthen nation-building.

- Realising this potential requires **empowering young people with the knowledge, skills, and opportunities** needed to thrive in a rapidly changing world.

Source: PIB

## INDIA'S SPACE ECONOMY

### Context

- India's space economy, currently valued at **\$8 billion and contributing 2–3% of the global space economy**, is projected to grow **five-fold to \$40–45 billion** over the next decade, with its **global share targeted at 8% by 2030**.

### India's Space Sector: Key Strengths

- **Cost Competitiveness:** India's space missions cost a fraction of global benchmarks. Mangalyaan cost \$74 million versus NASA's MAVEN at \$671 million, establishing India as a destination for affordable launch and satellite services.
- **Proven Track Record:** Chandrayaan-3's successful south pole lunar landing (2023), Aditya-L1 solar observatory, Space Docking Experiment (SpaDeX, 2025), and ISRO's commercial arm NewSpace India Limited (NSIL) managing global satellite launches demonstrate end-to-end capability.
- **Diverse Industrial Applications:** Space-derived data supports agriculture (crop monitoring), disaster management, urban planning, defence, navigation (NavIC), and weather forecasting, embedding space economy across productive sectors.
- **Strategic Autonomy:** Indigenous cryogenic engine development, GSLV and LVM3 launch vehicles, and upcoming Gaganyaan crewed mission reduce dependence on foreign launch infrastructure for both civilian and defence satellites.

### Recent Structural Reforms

- **Space Sector FDI Liberalisation (2024):** 100% FDI permitted in satellite manufacturing and operation, launch vehicles, and spaceports, with up to 74% under automatic route, unlocking global capital for Indian space ventures.
- **Indian Space Policy, 2023:** Clearly delineates roles between ISRO (R&D and national missions), NSIL (commercial operations), and IN-SPACE (regulatory enabler for private players), creating a structured three-tier ecosystem.

- **IN-SPACe (Indian National Space Promotion and Authorisation Centre):** Single-window regulator enabling private companies to access ISRO facilities, launch infrastructure, and technical expertise, reducing entry barriers significantly.
- **Geospatial Data Liberalisation (2021):** Removed licensing requirements for geospatial data below 1-metre resolution, enabling private mapping, analytics, and location-tech companies to build commercial products on space-derived data.

### Significance

- **Economic Multiplier:** Every dollar invested in space generates \$7–8 in downstream economic activity through satellite communications, remote sensing, precision agriculture, and navigation services.
- **Defence and Security:** Military satellite surveillance, encrypted communication, and missile tracking systems built on indigenous space infrastructure strengthen strategic deterrence without foreign dependency.
- **Climate and Disaster Resilience:** Satellites enable real-time flood mapping, cyclone tracking, and forest fire monitoring, directly supporting India's climate adaptation and disaster risk reduction frameworks.
- **Global Launch Market Share:** India targets 10% of the global commercial launch market by 2030. NSIL's launch service contracts with international clients position India as a reliable, low-cost alternative to European and US providers.

### Challenges

- **Private Sector Scaling Gap:** Despite 400+ companies, most Indian space startups remain pre-revenue, limited domestic procurement mandates restrict their ability to scale beyond prototype stage.
- **Regulatory Lag:** The Space Activities Bill remains pending, creating legal uncertainty around liability, intellectual property rights, and spectrum allocation for private operators.
- **Skilled Talent Bottleneck:** Advanced aerospace engineering requires specialised talent in propulsion, materials science, and embedded systems that Indian universities currently produce in inadequate numbers.
- **Infrastructure Access Constraints:** Private launch companies depend heavily on ISRO-owned launch pads at Sriharikota; limited slots and scheduling conflicts restrict commercial launch frequency.

- **Global Competition Intensity:** SpaceX's Starlink, Arianespace, and China's growing commercial launch capacity compress pricing and market share, demanding rapid Indian capability scaling.
- **Critical Mineral Dependency:** Satellite and launch vehicle manufacturing requires rare earth elements and advanced composites, many of which India currently imports, creating supply chain vulnerability.

### Way Forward

- **Fast-track the Space Activities Bill** to provide legal certainty on liability, IP ownership, orbital slot management, and spectrum rights for private operators.
- **Mandate domestic space procurement targets** for government departments, creating assured demand that allows Indian startups to graduate from prototype to production scale.
- **Establish dedicated aerospace engineering curricula** in IITs and NITs aligned with industry requirements in propulsion, avionics, and satellite systems to address the talent bottleneck.
- **Develop a second launch complex** with private operator access, reducing scheduling dependency on ISRO infrastructure and increasing overall national launch cadence.
- **Leverage bilateral space cooperation** agreements with USA (Artemis Accords), France, and Japan to access advanced technologies, joint missions, and export markets for Indian launch services.
- **Create a Space Economy Development Fund** under the RDI corpus to provide patient capital for deep-tech space startups requiring long gestation periods before commercial viability.

Source: PIB

## INDIA'S PUSH BEYOND E20 FUEL

### Context

- The Union Government has exempted higher ethanol-petrol blends (22%-30% ethanol) from central excise duty and proposed amendments to recognize E85 and E100 fuels under the Central Motor Vehicles Rules.

### What is Ethanol?

- Ethanol is **99.9%** pure alcohol that can be blended with petrol. It can be produced from **sugarcane, maize, wheat, etc** which are having high starch content.

- Alcohol production involves **fermentation of sugar** using yeast. In cane juice or molasses, sugar is present in the form of **sucrose** that is **broken down into glucose and fructose**.

### Ethanol Blending Programme

- Ethanol blending refers to the **practice of mixing ethanol with gasoline** to create a fuel mixture that can be used in internal combustion engines.
- The '**National Policy on Biofuels**' notified by the government in 2018 envisaged an indicative target of 20% ethanol blending in petrol by 2030.
  - In 2014 only 1.5 per cent** ethanol was blended in petrol in India.
- Given the encouraging performance and various interventions made by the government **the 20% target was achieved in 2025**.
  - The programme has reportedly saved approximately **₹1.13 lakh crore in foreign exchange** and reduced nearly **544 lakh metric tonnes of CO<sub>2</sub>** emissions cumulatively.
- In June 2026, the government introduced **E85 for flex-fuel vehicles**; E100 is expected to be offered in the near future too.

### Why is India Promoting Higher Ethanol Blends?

- Enhancing Energy Security:** India imports nearly 88.5% of its crude oil requirements.
  - Greater ethanol blending can **reduce dependence on imported petroleum** and improve energy resilience.
  - It will also **reduce foreign exchange outflows** and improve macroeconomic stability.
- Supporting Farmers:** Ethanol production creates an additional market for sugarcane, maize, and surplus food grains, providing income support to farmers, particularly in states such as Uttar Pradesh and Maharashtra.
- Environmental Benefits:** Ethanol is a renewable fuel that emits fewer pollutants compared to conventional petrol and higher blending can contribute to reduced carbon emissions and cleaner transportation.
- Rural Industrialisation:** Expansion of distilleries has stimulated rural infrastructure development and generated non-farm employment opportunities.
- Global Biofuel Leadership:** India is a founding member of the **Global Biofuel Alliance** launched during the **G20 Summit**.
  - The programme strengthens India's role as a global leader in sustainable biofuels.

### Initiatives Taken by Government

- National Policy on Biofuels, 2018 (Amended 2022):** It expanded eligible feedstocks to include **maize, damaged food grains, sugar beet, and surplus rice**.
  - It reduced dependence on sugarcane as the sole ethanol source.
- Ethanol Procurement Pricing:** The government annually notifies ethanol procurement prices for **Oil Marketing Companies (OMCs)**.
  - This provides investment certainty to distilleries and income stability to farmers.
- Interest Subvention Scheme:** Provides subsidized credit for establishing and expanding distillery capacity.
- Flex-Fuel Vehicle Initiative:** The Ministry of Road Transport and Highways has encouraged manufacturers to develop flex-fuel vehicles capable of operating on higher ethanol blends.
- India has launched E85 fuel** as part of its long-term strategy to move beyond E20 blending and promote flex-fuel vehicles (FFVs).
  - The rollout commences across **48 Public Sector OMC's retail outlets (ROs)** in the country, enabling flex-fuel vehicle users to access this cleaner fuel.

### Concerns Regarding Higher Ethanol Blending

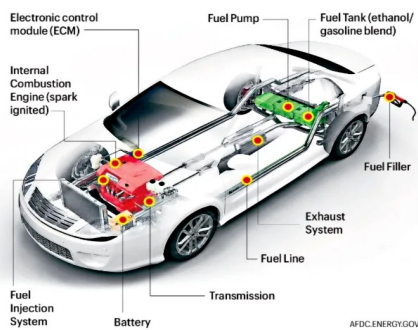
- Vehicle Compatibility Issues:** Ethanol is highly **hygroscopic** i.e. it actively absorbs moisture from the atmosphere.
  - Higher ethanol blends may **damage engine components**, fuel lines, rubber seals, and metal parts in vehicles not specifically designed for such fuels.
- Mileage:** Ethanol contains **lower energy per litre than petrol**. The customers had flagged a drop in mileage after the E10 to E20 shift.
- Feedstock Volatility:** Sugarcane production remains highly dependent on monsoon conditions. Drought years can disrupt ethanol supply and blending targets.
- Food versus Fuel Debate:** Diversion of rice and maize towards ethanol production can raise concerns regarding food security and inflation.
- Blending Compliance:** Ensuring uniform blending standards across urban and rural fuel stations remains a logistical challenge.

### What are Flex-Fuel Vehicles (FFVs)?

- Flex-fuel vehicles are **capable of operating on varying blends of petrol and ethanol**, including E85 and E100.
  - These vehicles use specialized engines and fuel systems designed to withstand high ethanol concentrations.
- India is currently exploring the wider adoption of flex-fuel technology.

### • HOW A FLEX FUEL CAR IS POWERED

- THE ECM:** Controls the fuel mixture, ignition timing, and emissions system; detects and troubleshoots problems.
- FUEL FILLER:** A nozzle from a fuel dispenser attaches to the receptacle on the vehicle to fill the tank.
- FUEL INJECTION SYSTEM:** Introduces fuel into the engine's combustion chambers for ignition.
- FUEL LINE:** A metal tube or flexible hose (or a combination of these) transfers fuel from the tank to the engine's fuel injection system.
- FUEL PUMP:** A pump that transfers fuel from the tank to the engine's fuel injection system via the fuel line.
- FUEL TANK (ETHANOL/GASOLINE BLEND):** Stores fuel on board the vehicle to power the engine.



### Brazil's Ethanol Programme

- Long-term policy commitment:** Brazil launched its ethanol programme in the **1970s in response to global oil market uncertainties** and consistently supported it for over **five decades**.
- Phased Implementation:** Brazil gradually expanded ethanol usage over several decades and existing vehicle owners were not adversely affected by sudden policy shifts.
- Consumer choice:** At most Brazilian fuel stations, consumers can choose between petrol blended with **27-32% ethanol and E100** (pure hydrous ethanol).
- Promotion of Flex-Fuel Vehicles:** Brazil encouraged large-scale adoption of flex-fuel vehicles through supportive policies and industry cooperation.

### Way Ahead

- India should adopt a **gradual and evidence-based transition** towards higher ethanol blends.
- Consumer interests and vehicle compatibility** concerns should be adequately addressed.
- Wider adoption of flex-fuel vehicles** should be encouraged through incentives and technological support.
- Alternative feedstocks** such as agricultural residues and second-generation biofuels should be promoted.

Source: IE

## NEWS IN SHORT

### INDIA-CHINA EXPLORE JOINT UNESCO NOMINATION FOR XUANZANG'S RECORDS

#### Context

- India and China are in advanced discussions regarding a joint UNESCO nomination for Xuanzang's work, 'The Great Tang Records on the Western Regions'.

#### Who Was Xuanzang?

- Xuanzang (**Hiuen Tsang**) was a Chinese Buddhist monk, scholar, and traveler who journeyed across India during the **7th century CE**.
- He spent nearly 19 years travelling through India and studying Buddhist philosophy.
- He studied at the ancient university of **Nalanda University**. His work, **The Great Tang Records on the Western Regions**, provides detailed information about:
  - Political conditions under **Harshavardhana** and other rulers.
  - Social and economic life in early medieval India.
  - Religious traditions and Buddhist institutions.
  - Economic and geographical conditions of early medieval India.

#### Other Joint Nominations Under Consideration

- Panchatantra with Iran:** India is exploring a joint UNESCO nomination of Panchatantra with Iran. The Panchatantra has influenced **Persian literature and folklore** for centuries and represents a shared literary heritage.
- Satyagraha with South Africa:** The idea reflects the historical association of Mahatma Gandhi's non-violent movement with South Africa.
- Shared Civilizational Traditions:**
  - Ramayana traditions** shared between **India and Indonesia**.
  - Buddhist scriptures** and heritage common to **India and China**.

Source: IE

## ARBUSCULAR MYCORRHIZAL (AM) FUNGI

### Context

- A new study published in Science has reported the **first global map of the earth's vast underground network of arbuscular mycorrhizal (AM) fungi.**

### About

- These fungi have **sustained plant life for millions of years** but their scale and distribution has been largely invisible until now.
  - ♦ **By forming symbiotic relationships with 70% of plant species,** trading nutrients for carbon, the AM networks sequester an estimated 4 billion tonnes of CO<sub>2</sub>-equivalent a year.
- **Grassland ecosystems** like those in South Sudan, the Tibetan plateau, and India's Banni grasslands house **40% of the world's AM fungal networks.**
- Grasslands are being **converted to farms four-times faster than forests,** these ecosystems are at extreme risk.
  - ♦ The work hopes to **move fungi from the periphery of environmental policy to the centre of climate action.**

### AM fungi

- These are **soil fungi** that form a **mutually beneficial symbiotic relationship** with the **roots of about 70% of terrestrial plant species.**
- They belong mainly to the **phylum Glomeromycota** and form specialized structures called **arbuscules inside root cells for nutrient exchange.**
  - ♦ AM fungi **enhance the uptake of essential nutrients** such as phosphorus, nitrogen, zinc, and copper, as well as water from the soil.
  - ♦ In return, **plants provide the fungi with carbohydrates and lipids** produced through photosynthesis.

### Fungi

- Fungi are **eukaryotic organisms** that include yeasts, molds, and mushrooms and belong to the kingdom Fungi.
- **They lack chlorophyll** and cannot perform photosynthesis; instead, they obtain nutrients by absorbing organic matter from their surroundings.

- Fungi reproduce through spores and can be either unicellular (e.g., yeast) or multicellular (e.g., mushrooms).
- They play an important role as decomposers, breaking down dead plants and animals and recycling nutrients in ecosystems.

Source: TH

## QUEEN PINEAPPLE

### Context

- Ahead of the pineapple festival in Delhi, Tripura eyes global status for **queen pineapple.**

### About

- The queen pineapple was declared the **state fruit of Tripura in 2018,** four years after it attained the **GI tag in 2014** for its **golden-yellow hue and a distinct aroma.**
- **Cultivation:** An area with 30–40% slope is generally selected for cultivation and plants require sandy soil and good drainage to prevent water logging and temperature range of 180°C to 32°C is most favorable for its cultivation.
  - ♦ Tripura's unique agro climatic condition makes it one of India's leading pineapple-producing regions where Queen and Kew varieties are mostly cultivated by tribal growers.
- **Mission Queen Pineapple:** It is a three year long centrally-funded farm-to-plate programme worth Rs 236 crore launched in 2026.
- India contributes roughly **6-8% of total global pineapple production.** On a regional scale, West Bengal and Assam are the top-producing states.

### Do you Know?

- Cultivation of pineapple **originated in South America** and gradually spread to other tropical parts of the world.
- Pineapple cultivation was introduced to India **by the Portuguese in 1548 AD.**
- **Costa Rica** is the leading global **producer and exporter of pineapple.**

Source: IE

## ARMY UNIFORMS-2026 MANUAL

### Context

- The Indian Army, the world's second-largest standing army, has introduced the Army Uniforms-2026 manual.

**About**

- The new manual replaces the **2015 uniform regulations** and reflects the Army's efforts to modernise military attire while preserving operational effectiveness and regimental traditions.
- Key changes include:
  - ◆ Introduction of the traditional **Bandi (Nehru) jacket** in formal military attire.
  - ◆ Removal of colonial-era terminology such as **"Royal"**.
  - ◆ Making **sword carriage by the Reviewing Officer optional**.
- The move reflects India's broader push towards decolonisation and indigenisation, a trend also seen in the replacement of colonial-era criminal laws by the **Bharatiya Nyaya Sanhita, Bharatiya Nagarik Suraksha Sanhita, and Bharatiya Sakshya Adhinyam**.



Source: TH

