
Prelims Exam Topics

INDIAN PRIME MINISTER'S VISIT TO FRANCE

Context

The Indian Prime Minister met the French President in Nice, their first meeting since India-France ties were elevated to a 'Special Global Strategic Partnership' in February 2026.

Key Outcomes

- **Trade:** High-level mechanism to double bilateral trade from \$16 billion to \$32 billion within five years; Economic Security Dialogue established; cooperation on SMEs, aviation, and railways.
- **Innovation:** Adopted **India-France Innovation Roadmap 2030**
- **AI:** Joint India-France AI Working Group on AI governance; 'Trusted AI' made a central pillar; ICCR India Chair on 'AI, Innovation and Culture' at Université Paris-Saclay;
 - Centre of Digital Sciences established between DST and INRIA.
- **Defence:** Emphasis on co-design, co-development, and co-production; covers air, naval, helicopters, missiles (Rafale, Scorpene submarines, Shakti engines).
 - General Security Agreement on exchange and protection of classified information.
- **Space:** Letter of Intent between ISRO and CNES on microgravity research and human space exploration; private sector collaboration expanded.
- **Health:** Letter of Intent between ICMR and Health Data Hub of France for consent-based data sharing.
- **Nuclear:** India's **SHANTI Act** noted as opening new opportunities including on Small Modular Reactors (SMRs).
- **People-to-People:** Visa-free transit for Indians at French airports; France targets 30,000 Indian students by 2030; Mutual Recognition of Qualifications (MRQ) framework to be expanded.
- **Digital:** UPI expanded to airports in Nice and Paris; 19 institutional agreements signed.
- **Skilling:** National Centre of Excellence for Skilling in Aeronautics at NSTI, Kanpur established.
- **Startups:** 10 additional Indian startups to be incubated at Station F, Paris; India-France InnoXchange Bridge launched as a bilateral startup corridor.

India-France Innovation Roadmap 2030

- Builds upon **Horizon 2047 Roadmap**; aligns India's **Viksit Bharat 2047** with France's

France 2030.

- **Four pillars:** Trusted AI, Academic Mobility, Technological Sovereignty & Industry-Academia linkages, AI-based solutions for global health challenges.
- **Key instruments:** CEFIPRA (Indo-French Centre for Promotion of Advanced Research), India-France Innovation Network (IFIN), Franco-Indian Campus in Life Sciences for Health.

XUANZANG**Context**

India and China are proposing a joint UNESCO heritage nomination centered on the legacy of the 7th-century monk Xuanzang.

About Xuanzang (Hiuen Tsang)

- 7th-century Chinese Buddhist monk, scholar, traveller, and translator; born in 602 CE in Henan province, China; original name Chen Yi.
- Left China secretly in 629 CE travelling 16,000 km via the Gobi Desert, Hindu Kush, and Silk Route cities to reach India.
- Spent 16 years in India (629–645 CE); visited sacred Buddhist sites including Nalanda, Bodhi Gaya, Sarnath, and Lumbini.
- Studied at **Nalanda University** under scholar **Shilabhadra**, mastering Sanskrit, Buddhist philosophy, and the **Yogachara (Vijnanavada)** school of thought.
- Met Emperor **Harsha** of Kannauj, attended the Kumbh Mela at Prayag, and was patronised by Harsha for his return journey to China.
- Collected ~600 original Buddhist manuscripts
 - Though he only translated 75 distinct sections before his death, his work included the most critical Mahayana scriptures and permanently shaped East Asian Buddhism.
- Wrote **Si-Yu-Ki (Great Tang Records on the Western Regions)**-the most reliable historical account of 7th-century India covering geography, society, religion, and Nalanda.
- His travelogue later helped British scholars like **Sir Alexander Cunningham** identify and revive lost Buddhist sites across the subcontinent.

ARBUSCULAR MYCORRHIZAL (AM) FUNGI

Context

A new study in Science has published the first-ever global map of Arbuscular Mycorrhizal (AM) fungi. It found that around 40% of global AM fungal networks occur in grassland ecosystems, including South Sudan, The Tibetan Plateau, and Banni Grasslands.

About Arbuscular Mycorrhizal (AM) fungi

- It is a type of soil fungi that penetrate and colonise plant root cells, forming a symbiotic network, supplying phosphorus and nutrients to plants in exchange for carbon sugars.
- Spread through thread-like structures called hyphae; associated with ~70% of all plant species.
- **Significance:** AM networks sequester ~4 billion tonnes of CO₂-equivalent annually (~11% of human emissions), store ~300 million tonnes of carbon.
- **Am Fungi vs. Ectomycorrhizal Fungi:** Unlike AM fungi, ectomycorrhizal fungi colonise only the outer surface of roots without penetrating cells; typically associated with trees like oaks and pines.

PROJECT KUSHA

Context

The Union Defence Minister called Project Kusha a "game changer" for India's security architecture.

About Project Kusha

- Also known as Extended Range Air Defence System (ERADS) or PGLRSAM (Programme Long Range Surface-to-Air Missile).
- Developed by DRDO to bridge the operational gap between India's existing MR-SAM (80 km range) and the Russian S-400 (400 km).
- **Interceptor Variants:** M1 (~150 km), M2 (~250 km), and M3 (~350–400 km) — each tailored for specific engagement ranges.
- **Speed:** Achieves Mach 5.5
- Part of **Mission Sudarshan Chakra**; India's goal of a multi-layered air and missile defence shield by 2035.

ILO CONVENTION NO. 193- PLATFORM ECONOMY

Context

ILO adopted Convention No. 193 'Concerning Decent Work in the Platform Economy' at its 114th session in Geneva; the first-ever binding international treaty to regulate gig and platform work.

About the Convention

- Covers all platform workers both online (freelancers, remote taskers) and location-based (delivery, taxi drivers) in formal and informal arrangements.
- **Key Provisions**
 - Correct classification based on actual work performed; employees entitled to at least minimum wage on time.
 - Guarantees freedom of association, non-discrimination, social security, and right to refuse dangerous tasks without penalty.
 - Platforms must disclose automated monitoring systems; workers can demand human review of significant automated decisions.

About International Labour Organization

- Established in 1919 under the Treaty of Versailles; became the UN's first specialised agency in 1946.
- Has 187 member states; India is a founding member and has held a permanent seat on the ILO Governing Body since 1922.
- **Mandate:** Promote social justice, decent work, and international labour standards on the principle that lasting peace rests on social justice.
- Awarded the 1969 Nobel Peace Prize.
- **Key Reports:** World Employment and Social Outlook (WESO), Global Wage Report, World Social Protection Report.
- **India & ILO Core Conventions:** India has ratified 6 of 8 fundamental ILO Conventions. The two unratified are: No. 87 - Freedom of Association and Protection of the Right to Organise; No. 98 - Right to Organise and Collective Bargaining.

INTERIM REPORT ON STUDENT MENTAL HEALTH IN HIGHER EDUCATIONAL INSTITUTIONS (HEIS)

Context

The Supreme Court-constituted National Task Force (NTF) released its interim report on student mental health in Higher Educational Institutions (HEIs).

About Interim report on student mental health in Higher Educational Institutions (HEIs)

- **Background:** NTF was constituted by the Supreme Court in 2025 in the Amit Kumar v. Union of India case to address student mental health and prevent suicides in HEIs.
- **Key findings**
 - 75% of mental health conditions manifest before age 24.
 - Student suicides comprised 7.6% of total suicides in India (NCRB 2022).
 - 65% of 2,119 HEIs surveyed provide no access to mental health services.
- **Key Reasons for Student Suicides**
 - **Silent Burdens:** Conditions like depression often go unrecognised, delaying timely support.
 - **Massification of HE:** Gross Enrolment Ratio rose from 8% (2001) to 28.4% (2021-22), bringing structural inequalities in access and outcomes.
 - **Geographical & Social Barriers:** Rural students face higher financial and social costs; marginalised communities face stigma, caste-based inequity, and low social esteem.
 - **Weak Institutional Framework:** Interventions remain generic and reactive; the existing Suicide Prevention Strategy (2022) by MoHFW lacks clear implementation guidelines.
- **Key Recommendations**
 - Centralised, categorised data on suicides in HEIs.
 - Time-bound uniform reporting of all student suicide cases by HEIs.
 - Strengthened accessibility for marginalised groups (PwD, transgender students, etc.).
 - Student-friendly mental health services and less stress-inducing campus environments.

SC RULING ON HOMEMAKERS' UNPAID LABOUR

Context

The Supreme Court ruled that unpaid domestic labour of homemakers must be assigned an independent economic value while calculating compensation in motor accident death cases

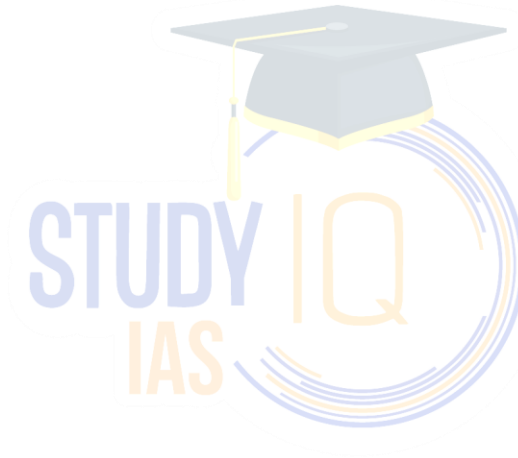
Key Directions

- SC created a new, distinct head of compensation called "**loss of domestic care**" in motor accident claims.
- ₹30,000/month fixed as minimum notional income for homemakers with no direct monetary earnings; acts as a "stand-in" income.

- Where the homemaker also has a proven income, this compensation is awarded in addition to that income.
- Amount to be enhanced by **10% cumulatively every 3 years**.

Significance

- First time the SC prescribed a **concrete minimum benchmark** for assessing loss of domestic care (earlier rulings cautioned against treating homemakers' services as valueless but gave no specific figure).
- Recognises that household tasks support the paid workforce and enable economic productivity, yet are absent from conventional indicators like **GDP**.
- SC described homemakers as "**nation builders**" and architects of India's "**human capital**".



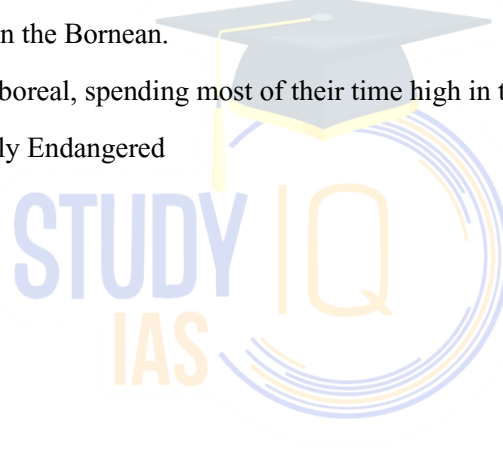
Species in News

TAPANULI ORANGUTAN

News: Cyclone Senyar (Nov 2025) wiped out ~7% of the global Tapanuli orangutan population across the Batang Toru ecosystem.

About Tapanuli orangutan

- One of three orangutan species, alongside the Sumatran and Bornean orangutans, formally recognised as a distinct species only in 2017.
- **Habitat:** Found in tropical and subtropical moist broadleaf forests south of Lake Toba, Sumatra.
- **Features:** Closely resembles the Sumatran orangutan in build and fur colour, more so than the Bornean.
 - Exclusively arboreal, spending most of their time high in the forest canopy.
- **IUCN Status:** Critically Endangered



News in short

Nanographene	<ul style="list-style-type: none">● Scientists led by Nobel laureate Omar Yaghi have created two new 3D porous structures using nanographene● Nanographene is a nanoscale fragment of graphene, is constituted of carbon atom, and has a planar structure like a honeycomb.● Use: High surface area and tunable pore structure make it useful in gas storage, carbon capture, drug delivery, and catalysis.
Drop shopping	<ul style="list-style-type: none">● Drop shipping has come under scrutiny as AI-powered storefronts make it increasingly difficult for consumers to distinguish original sellers from middlemen on social media platforms.● Drop Shopping is a business model where a middleman (drop shipper) takes orders from customers and passes them to the actual manufacturer/seller, who then fulfils delivery, without the drop shipper ever holding the product.



Mains Exam Topics

URBAN WATER REUSE: BUILDING A CIRCULAR WATER ECONOMY FOR INDIA

Context

Cities like Delhi, Ahmedabad, and Barmer already face acute summer water stress, making treated used water reuse a critical urban resilience strategy.

Why Is Urban Water Reuse Critical for India?

- **Addressing the Urban Water Deficit:** India's cities face a growing gap between water supply and demand, driven by population growth, climate change, and over-extraction of groundwater.
 - *E.g.*, Thane city can bridge its entire water deficit of 53 million litres per day simply by scaling up reuse of treated used water (CEEW analysis).
- **Unlocking a Large Economic Opportunity:** Treated used water reuse can create a market worth over ₹3 lakh crore and generate 1 lakh additional jobs by 2047.
 - *E.g.*, Non-potable reuse applications include irrigation of horticultural crops, construction, textile manufacturing, lake rejuvenation, etc.
- **Reducing Dependence on Distant Sources:** Sourcing water from far-off regions raises costs and increases dependence on upper riparian states, creating inter-state tensions.
 - *E.g.*, Delhi currently imports water from distant sources, leading to higher costs and supply vulnerabilities during summers.
- **Supporting India's Viksit Bharat Goals:** Water security is a prerequisite for sustained urban economic growth, industrial expansion, and climate resilience.
 - *E.g.*, The Economic Survey 2025-26 has explicitly called for a circular water mission as part of India's long-term development roadmap.

What Are the Key Challenges in Urban Water Reuse?

- **Low Sewage Treatment Capacity:** Absence of pipeline infrastructure to transport sewage to treatment plants, along with energy and staffing deficits, keeps large volumes of used water untreated
 - *E.g.*, Urban areas have less than 50% networked sewage treatment coverage, and less than one-third of sewage was actually treated in 2021.
- **Poor Plant Functionality:** Many sewage treatment plants (STPs) fail to meet effluent discharge standards set by the Central Pollution Control Board (CPCB).

- **Weak Reuse Policy Implementation:** While 14 states have notified water reuse policies, city-specific reuse plans are largely absent.
- **Limited Private Finance:** Private capital is deterred by uncertain revenue streams, unclear pricing frameworks, and weak regulatory enforcement.
 - *E.g.*, Less than one-third of India's treated wastewater is currently reused.
- **Linear Water Management Mindset:** Conventional water governance treats water as a use-and-dispose resource. Cultural and institutional resistance to the idea of reusing treated wastewater remains a barrier.

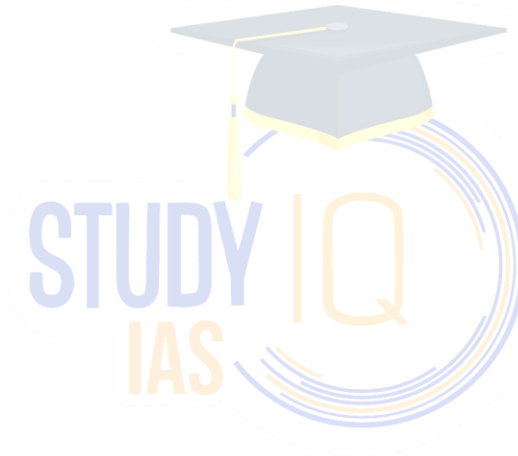
What Is the Way Forward?

- **City-Specific Reuse Plans:** Every city must prepare a tailored water reuse plan with clear targets, reuse avenues, quality norms, and revenue generation options.
 - *E.g.*, Chennai's plan should prioritise lake rejuvenation, Surat's should target industrial reuse, and Delhi's should focus on peri-urban agriculture.
- **Enable Private Financing Through Blended Finance Models:** Governments should share financial risk with private developers through instruments like the Hybrid Annuity Model
 - *E.g.*, The National Mission for Clean Ganga adopted the hybrid annuity model to successfully mobilise private investment in sewage treatment.
- **Strengthen STP Compliance Using Technology:** Cities should leverage AI-based monitoring systems to detect industrial effluent violations and improve plant performance.
 - *E.g.*, Cities in Gujarat offer financial incentives to industries that fully implement Zero Liquid Discharge (ZLD) norms.
- **Establish a National Circular Water Mission:** A dedicated national mission should drive technological, institutional, financial, and behavioural reforms to shift water management from linear to circular.
- **Market-Based Pricing With Targeted Subsidies:** Introduce freshwater pricing for all users to drive efficiency, while retaining subsidies for those at the base of the economic pyramid.
- **Behavioural Change and Public Communication:** Shifting public perception is essential to mainstreaming treated water reuse as a normal part of urban life.
 - *E.g.*, Singapore's NEWater programme successfully normalised treated used water

City-level Best Practices

- **Nagpur:** Treats 130 MLD of sewage to a tertiary level and sells it to the MahaGenCo thermal power plant for cooling.

- **Chennai:** Built two 45 MLD Tertiary Treatment Reverse Osmosis (TTRO) plants. These plants turn secondary sewage into ultra-pure water for industrial hubs (like auto manufacturing).
- **Bengaluru:** Uses treated wastewater to rejuvenate dying ecosystems and support agriculture in neighboring arid districts.
- **Tirupur:** Adopted Zero Liquid Discharge (ZLD). Nearly 95% of water used in dyeing is recovered and reused in a closed-loop system, preventing toxic runoff into local rivers.



INDIA'S ETHANOL BLENDING PROGRAMME: BEYOND E20

Context

The government has exempted higher ethanol blends (E22-E30) from central excise duty and proposed recognising E85 and E100 fuels under Central Motor Vehicles Rules. The push beyond E20 reflects both energy security imperatives and the political economy of agricultural surpluses.

Why Is India Pushing for Higher Ethanol Blending?

- **Reducing Import Dependence:** India's heavy reliance on imported crude makes the economy vulnerable to geopolitical price shocks and supply disruptions.
 - *E.g.*, The West Asia conflict drove up crude prices sharply.
- **Earning Foreign Exchange Savings:** Every percentage point rise in ethanol blending displaces crude imports, directly conserving foreign exchange.
 - *E.g.*, India's crude import bill routinely exceeds \$100 billion annually.
- **Supporting the Agricultural Sector:** Higher ethanol demand creates a stable institutional buyer for farmers growing sugarcane, maize, and other feedstocks,
 - *E.g.*, The agricultural lobby from Maharashtra and Uttar Pradesh has actively pushed for higher ethanol blending targets, as sugarcane farmers face significant overcapacity.
- **Reducing Carbon Emissions:** Ethanol is a cleaner-burning fuel than petrol.
 - E85 and E100 fuels alongside flex fuel vehicles can significantly reduce lifecycle carbon emissions from the transport sector.
- **Promoting Energy Security and Strategic Autonomy:** Domestic ethanol production from agricultural feedstocks insulates India from OPEC pricing decisions
 - *E.g.*, Brazil's ethanol programme, today provides 30%+ of its transport fuel from domestic sources.

What Are the Key Challenges in Transitioning Beyond E20?

- **Engine Damage to Non-Compliant Vehicles:** Ethanol has a higher water content than petrol, making it corrosive to engine parts not designed for high ethanol blends.
- **Drop in Fuel Efficiency:** Higher ethanol blends reduce mileage because ethanol has lower energy density than petrol, with consumers already reporting a 5-12% drop after the E10 to E20 transition.
- **Cold Start Problems:** Ethanol burns at a higher temperature than petrol, making vehicles running on high ethanol blends difficult to start in cold weather conditions.

- This is a practical concern for consumers in states like Himachal Pradesh, and Uttarakhand.
- **Rapid Recertification Burden on Automakers:** Moving from E20 to E25 requires fresh engine calibration, corrosion resistance testing, and homologation for all existing vehicle models.
- **Infrastructure Constraints of Oil Marketing Companies (OMCs):** OMCs like Indian Oil and Bharat Petroleum can offer only two ethanol blend grades at any given time. This limits consumer choice and complicates the rollout of multiple blends simultaneously.
- **Flex Fuel Vehicle (FFV) Ecosystem Is Underdeveloped:** The transition to E85 and E100 fuels requires a mature FFV market.

What Is the Way Forward?

- **Phased Transition with Adequate Lead Time:** The government must give consumers, automakers, and fuel retailers sufficient notice before raising the base blend to E25.
 - *E.g.*, Brazil rolled out its ethanol programme in phases, ensuring existing vehicle owners were not disadvantaged at any stage.
- **Introduce Consumer Choice at the Pump:** Petrol stations should offer multiple blend grades so consumers can choose based on their vehicle type and efficiency preference.
 - *E.g.*, Brazilian law mandates a choice between blended petrol and E100 at nearly every pump, giving consumers pricing and efficiency control.
- **Price Incentives for Higher Ethanol Blends:** Higher ethanol blends must be priced lower than standard petrol to drive consumer adoption.
 - *E.g.*, Brazil's flex fuel cars became a mass-market success because government price support made ethanol blends consistently cheaper than petrol at the pump.
- **Government Mandates for Automakers:** Clear regulatory mandates must require automakers to produce FFV-compatible vehicles with defined timelines, rather than leaving the transition to market forces alone.
 - *E.g.*, Brazil combined automaker mandates with public awareness campaigns to achieve near-universal FFV adoption.
- **Diversify Ethanol Feedstock Beyond Sugarcane:** Over-dependence on sugarcane makes the programme vulnerable. Maize, rice straw, and cellulosic ethanol must be scaled up.
- **Commission Independent Vehicle Compatibility Studies:** The government must fund multi-year studies on the real impact of higher blends on non-compliant engines