Prelims Exam Topics

PRAGATI 2026

Context

The multilateral military exercise PRAGATI 2026 officially commenced at the Umroi Military Station in Meghalaya.

About PRAGATI

- **Acronym**: **PRAGATI** stands for *Partnership of Regional Armies for Growth and Transformation in the Indian Ocean Region*.
- **Host**: Jointly hosted by the Indian Army at Umroi, a premier joint-training node in Meghalaya.
- **Participating Nations (13 Total)**: India plus **12 friendly foreign countries**:
    - *South Asia / IOR*: Bhutan, Maldives, Nepal, Seychelles, Sri Lanka.
    - *Southeast Asia (ASEAN)*: Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Vietnam.
- **Core Objectives**: Counter-terrorism, interoperability, establishing a framework to exchange tactical best practices.

BIS NOTIFIES NEW STANDARDS FOR HIGH-BLEND ETHANOL AND DME-LPG FUELS

Context

The Bureau of Indian Standards (BIS) has officially published two critical fuel standards aimed at advancing India's green energy transition, lowering carbon footprints, and reducing crude oil import dependency.

About High-Blend Ethanol Standards (IS 19850: 2026)

- **The Framework**: This standard specifies the parameters for higher-concentration ethanol-petrol blends, specifically **E22, E25, E27, and E30** (ranging from 22% to 30% ethanol).
- **Composition**: The fuel is an admixture of gasoline and completely water-free (**anhydrous**) ethanol.

About DME Blended LPG Standards (IS 18698: 2026)

- **The Framework**: This standard supersedes the older 2024 regulations regarding **Dimethyl Ether (DME)** blended Liquefied Petroleum Gas (LPG).

- **What is DME?**: DME is a clean-burning, synthetic fuel alternative that shares near-identical physical and chemical properties with LPG, making it an efficient blending agent for household and industrial gas.
- **Production Pathways**: DME is manufactured from synthesis gas (syngas) via two methods:
    1. **Indirect Route**: Syngas⟶Methanol ⟶DME.
    2. **Direct Route**: Syngas⟶ DME.
- **Global Landscape**: China currently dominates the market, controlling nearly **90%** of global DME production capacity.

VENUS ORBITER MISSION

Context

India's upcoming interplanetary exploration program has gained international momentum with Sweden officially partnering on the Venus Orbiter Mission (VOM), colloquially known as Shukrayaan.

About Venus Orbiter Mission

- **Mission Mandate:** VOM marks India's first dedicated scientific mission to explore Venus. It is designed to investigate:
    - The Venusian surface and subsurface topography.
    - Complex atmospheric dynamics and chemistry.
    - The specific influence of solar radiation and solar winds on the Venusian atmosphere.
- **Launch Vehicle**: ISRO's heaviest rocket, the **Launch Vehicle Mark-3 (LVM-3)**, has been selected to inject the spacecraft into an initial **Elliptical Parking Orbit (EPO)** before it begins its transit toward Venus.

VEERA PASI

Context

The legacy of Veera Pasi, an iconic subaltern figure of the 1857 Uprising, has gained renewed national attention.

About Veera Pasi

- **Identity & Origin**: Born on November 11, 1835, in Lodhwari village, **Raebareli (Uttar Pradesh)**, into the marginalized **Pasi (Dalit) community**.
- **1857 Revolt Role**: Served as a trusted military commander under **Rana Beni Madhav Baksh Singh** (ruler of the Shankarpur Estate, Awadh) during the 1857 Uprising.

- **The Prison Rescue**: Achieved legendary status by executing a daring armed raid to rescue Rana Beni Madhav from British captivity.
    - The British government placed a massive bounty of ₹50,000 on his head, eventually killing him as he died defending his ruler.

Related Pasi Icons of the Freedom Struggle

- **Veerangana Uda Devi**: A Pasi woman warrior who climbed a pipal tree during the 1857 **Siege of Lucknow (Secundra Bagh)** and single-handedly shot dead over 30 British soldiers before being martyred.
- **Maharaja Bijli Pasi**: An early medieval king of the Pasi community, frequently invoked alongside 1857 icons to symbolize historic subaltern sovereignty and resistance.

THORIUM AND INDIA'S LONG-TERM ENERGY SECURITY

Context

India's push towards a **100 GWe nuclear energy mission by 2047** have renewed focus on thorium-based nuclear energy for long-term energy security.

Importance of Thorium in Energy Security

- **Abundant Domestic** Resource: India possesses nearly 25% of global thorium reserves, providing long-term indigenous fuel availability.
- **Reducing Uranium Import Dependence:** Rising global uranium demand and geopolitical uncertainties may create nuclear fuel-supply risks within 10–15 years.
- **Thorium-HALEU Fuel Pathway:** Thorium-HALEU fuel can improve fuel efficiency, safety, waste minimisation and proliferation resistance while accelerating thorium utilisation.
- **Thorium Molten Salt Reactor (TMSR)**: TMSRs are considered ideal Stage-III reactors for sustainable thorium-based electricity generation.
- **Higher Fuel Utilisation:** Thorium-U-233 fuel cycle offers significantly higher energy extraction compared to conventional uranium fuel cycles.
- **Long-Term Strategic Advantage:** Thorium-based systems can help India transition from a major energy importer to a long-term clean-energy producer.

Current Nuclear Power Landscape in India

- **Installed Capacity:** India's nuclear capacity **is 8.78 GW**; generation **56,681 million units in 2024–25**.
- **Electricity Share:** Nuclear contributes **3% of India's electricity** (**3.1% in 2024–25**).

- **Expansion Plans:** Capacity projected to reach **22.38 GW by 2031–32** (fleet deployment of **700 MW PHWRs + ~1000 MW reactors via international cooperation**).
- **International Cooperation:** India has **civil nuclear cooperation agreements with 18 countries**, supporting fuel supply and reactor technology partnerships.

Long-Term Mission

- **100 GW Target:** India aims for **100 GW nuclear capacity by 2047** under the **Nuclear Energy Mission (Budget 2025–26)**, supporting **net-zero emissions by 2070**.
- **Financial Support: Nuclear Energy Mission** allocates **₹20,000 crore** for **Small Modular Reactor (SMR) design and deployment**.
- **SMR Deployment:** Target of **≥5 indigenous SMRs operational by 2033**.
- **BARC Innovations:** Development of next-generation reactors (**BSMR-200(with 200 MWe capacity), SMR-55, high-temperature gas-cooled reactor 5 MWth for hydrogen production**).
- **SHANTI Act 2025:** New legal framework enabling **regulated private participation and investment in the nuclear sector**.

MAHARASHTRA WETLAND MAPPING DRIVE

Context

National Centre for Sustainable Coastal Management (NCSCM) completed documentation and ground-truthing of over **23,415 wetlands** in Maharashtra for legal protection under Wetlands Rules.

Wetland Distribution in Maharashtra

- **Major Wetland Regions:** Chhatrapati Sambhajinagar and Nagpur divisions have the highest wetlands. (5,196 and 5,086 wetlands)
- **Leading Districts:** Ahmednagar, Nashik and Chandrapur contain the highest number of wetlands. (1,596; 1,236; 1,231 wetlands)

Importance of Wetlands

- **Flood Buffering:** Wetlands absorb excess rainwater and reduce urban flooding.
- **Groundwater Recharge:** Help replenish aquifers and maintain water balance.
- **Carbon & Biodiversity Role:** Support carbon sequestration and rich biodiversity.

Wetland Protection Framework

- **National Wetland Atlas:** ISRO–MoEFCC initiative for satellite-based wetland mapping and monitoring. (Updated decadal-change version released in 2020)

- **Role of NCSCM:** NCSCM under Ministry of Environment, Forest and Climate Change (MoEFCC) conducts wetland mapping, documentation and conservation support
- **Wetlands Rules:** Wetlands (Conservation and Management) Rules regulate conservation and prohibited activities under Environment Protection Act, 1986. (Rules notified in 2010; revised in 2017)
- **Restricted Activities:** Reclamation, dumping, permanent construction and untreated discharge are prohibited.
- **Judicial Intervention:** Supreme Court directions accelerated wetland demarcation and protection.

HYDROELECTRIC PROJECTS IN UPPER GANGA BASIN

Context

The Union government informed the Supreme Court that no new hydropower projects should be permitted in the upper Ganga basin of Uttarakhand beyond the seven already commissioned or substantially completed projects.

Various Projects on the Ganga Basin

- **Tehri Pumped Storage Project:** On Bhagirathi River *(1,000 MW; under development)*
- **Tapovan Vishnugad Project:** On Dhauliganga River *(520 MW; under construction; affected during 2021 Rishiganga flood)*
- **Vishnugad Pipalkoti Project**: On Alaknanda River *(444 MW; under construction)*
- **Singoli Bhatwari Projec**t: On Mandakini River *(99 MW; commissioned)*
- **Phata Byung Project:** On Mandakini River *(76 MW; commissioned)*
- **Madhmaheshwar Project**: Small hydropower project in upper Ganga basin *(commissioned)*
- **Kailganga-II Project:** Small hydropower project in upper Ganga basin *(commissioned)*

Upper Ganga Basin

- **Bhagirathi River:** Originates from Gangotri Glacier near Gaumukh.
- **Alaknanda River:** Originates near Satopanth and Bhagirath Kharak glaciers in Uttarakhand.
- Panchaprayag
    - **Vishnuprayag:** Confluence of Alaknanda and Dhauliganga rivers.
    - **Nandprayag:** Confluence of Alaknanda and Nandakini rivers.
    - **Karnaprayag:** Confluence of Alaknanda and Pindar rivers.
    - **Rudraprayag:** Confluence of Alaknanda and Mandakini rivers.

- **Devprayag:** Confluence of Bhagirathi and Alaknanda rivers; from here the river is officially called the Ganga.

- **Characteristics:** Steep-gradient Himalayan rivers with high hydropower potential, glacial origin and ecologically fragile terrain.

NEW CRYSTAL FOUND IN TRINITY NUCLEAR-TEST DEBRIS

Context

Scientists discovered a new rare crystal structure called a **clathrate** in "trinitite"

About the New Crystal

- **What is it?**: Newly identified **calcium–copper–silicon crystal** belonging to the Type-I clathrate family.
    - Silicon atoms form cage-like frameworks that trap other elements inside is called Clathrate Structure
- **Found In:** Discovered inside red trinitite, a copper-rich variety of trinitite formed during the Trinity explosion.
    - **Trinity Test is** First-ever nuclear weapon test conducted by the United States on 16 July 1945 at New Mexico under the Manhattan Project; the explosion formed radioactive glass called **"trinitite".**
- **Formation Conditions:** Formed under extreme temperature and pressure generated during the nuclear blast. *(>1,500°C and ~8 GPa pressure)*
- **Metastable Nature:** Crystal is metastable, meaning it can exist only under rapidly changing extreme conditions.
- **Relation with Quasicrystals:** Researchers found that the crystal and previously discovered Trinity quasicrystal formed in the same event but belong to different structural families.
- **Scientific Importance:** Shows how extreme environments can create rare materials not easily produced in conventional laboratories.
- **Potential Significance:** Findings may help develop new synthetic materials and improve understanding of matter under extreme conditions.

ARUNACHAL KIWI

Context

The Union Minister for Development of North Eastern Region (DoNER) and Communications launched the mission "Arunachal Kiwi: The USP of Arunachal Pradesh."

About "Arunachal Kiwi: The USP of Arunachal Pradesh

- **Strategic Outlay**: A ₹167-crore cluster-based cultivation and value-chain development program implemented via a "whole-of-government" convergence model.
- **The "Brand North East" Blueprint**: Mandates a specific flagship product unique to each Northeastern state:
    - **Arunachal Pradesh**: Organic Kiwi
    - **Sikkim**: Organic State
    - **Meghalaya**: Lakadong Turmeric
    - **Mizoram**: Ginger
    - **Tripura**: Queen Pineapple
    - **Nagaland**: Coffee

About Arunachal Organic Kiwi

- **Horticultural Prominence**: It is the major cash crop of the state; Arunachal Pradesh single-handedly contributes over **50% of India's total kiwi production** (7,050+ metric tonnes annually).
- **Agro-Climatic Conditions**: Thrives in the temperate zones, well-defined seasons, and organic matter-rich fertile soils of high-altitude belts like the **Lower Subansiri district (Ziro Valley)**.
- In 2020, Arunachal Pradesh became the **first state in India to receive organic certification for kiwi cultivation** under the *Mission Organic Value Chain Development for North Eastern Region (MOVCD-NER)*.

Mains Exam Topics

ORAL REMARKS AND INSTITUTIONAL LIMITS OF THE JUDICIARY

Context

Oral remarks by the Chief Justice during a court hearing, and the clarification that followed, have reignited debate on the institutional limits of judicial speech in the digital age.

What Are Oral Remarks vs. Judicial Orders?

- Oral remarks are informal observations made during hearings to test arguments; not legally binding.
- Judicial orders/judgments are formal, written, reasoned, and legally binding decisions of the court.
- In the digital era, oral remarks spread instantly, often shaping public opinion before any written judgment is delivered.
- This blurs the line between courtroom exchange and authoritative judicial pronouncement.

Constitutional and Legal Framework

- **Restatement of Values of Judicial Life (1997):** Supreme Court guidelines requiring judges to avoid public debates or comments on matters that may come before courts.
- **Judicial Discipline (Item 8):** Restrains judges from commenting on political or sensitive issues that may affect impartiality.
- **Benjamin Cardozo's Judicial Standard:** Benjamin Cardozo emphasized that judgments must be guided by legal principles, precedent, and constitutional values, not personal emotions.
    - **Core Principle:** Bench remarks should test legal arguments, not become platforms for personal opinions.
- **Oath of Office (Third Schedule):** Judges swear to perform duties "without fear or favour, affection or ill-will," ensuring impartial conduct.
- **Article 121:** Parliament cannot discuss the conduct of Supreme Court or High Court judges except during impeachment proceedings.
- **Article 211:** Similar restriction imposed on State Legislatures regarding judicial conduct.
    - Articles 121 and 211 uphold judicial independence through mutual institutional restraint between judiciary and legislature.

Notable Instances: Oral Remarks Raising Institutional Concerns

- **Justice S.A. Bobde, India (2021):** During a bail hearing in a rape case, he asked whether the accused would "marry the victim," triggering widespread criticism for appearing to trivialise sexual violence and victim dignity.
    - The episode sparked debate on the sensitivity and appropriateness of judicial remarks made from the Bench.
- **CJI D.Y. Chandrachud, India (2023):** In the Marriage Equality case, certain oral observations during hearings differed from the final written judgment delivered later, reinforcing that oral remarks do not constitute binding judicial reasoning.
- **CJI Surya Kant, India (2025):** Remarks concerning the designation of senior advocates reignited discussions on judicial language, courtroom restraint, and the constitutional limits of Bench speech.

How Technology Has Changed the Stakes

- **Instant Amplification:** Oral observations made during court hearings often trend on social media within hours.
- **Premature Public Perception:** Public opinion is frequently shaped before the final written judgment is delivered.
- **Reputational Harm:** Institutions and individuals may face lasting reputational damage from remarks that may never form part of the official order.
- **Pressure for Clarifications:** Courts increasingly face demands to clarify oral observations, despite such clarifications having no formal legal status.
- **Blurring of Boundaries:** The distinction between exploratory courtroom exchanges and authoritative judicial pronouncements is becoming increasingly unclear in public perception.

Way Forward

- **Internal Guidelines:** The Supreme Court could codify specific standards for bench language, building on the 1997 Restatement and the Bangalore Principles.
- **Media Literacy:** Bar associations and media councils could develop shared protocols on reporting oral observations differently from judgments.
- **Judicial Training:** Sensitisation programmes at the National Judicial Academy on the consequences of digital amplification would help orient newer judges.
- **Institutional Discipline, Not Censorship:** The goal is not to silence judges but to ensure that judicial authority is exercised through reasoned written orders — where accountability, precedent, and appeal all operate — and not through courtroom observations that carry none of those safeguards.