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for

## **IAS EXAMINATION**



From  
**28<sup>th</sup> Sep** to **03<sup>rd</sup> Oct 2026**

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# INTERNATIONAL RELATIONS

## 1.1. 'ENEMY STATE' CLAUSES IN THE UN CHARTER

### Context

- Recently, Japan's Prime Minister Sanae Takaichi, in her address to the UN General Assembly (UNGA), called for the removal of the obsolete **"enemy state" clauses** from the UN Charter and advocated reforms to make the UN Security Council (UNSC) more representative of present-day global realities.



### What is an 'Enemy State'?

- The **UN Charter**, drafted towards the end of **World War II**, came into force on **24 October 1945**.
- It contains references to **"enemy states"** — a term applying to any state that was an **enemy of an Allied signatory during World War II** (primarily the **Axis Powers**: Germany, Italy, Japan).
- The clause was intended by the **Allied Powers** (Britain, USSR, USA) as a mechanism to counter the **re-emergence of militarism or fascism** in the defeated Axis states, without needing UN Security Council (UNSC) authorisation.

### Where It Appears in the UN Charter

| Article                 | Provision                                                                                                                                                  |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Article 53</b>       | Allows enforcement action against an "enemy state" under regional arrangements <b>without prior UNSC authorisation</b> — an exception to the general rule. |
| <b>Article 107</b>      | Permits Allied Powers to take enforcement action against former Axis "enemy states" as a result of WWII, without needing UN approval.                      |
| <b>Article 77(1)(b)</b> | Relates to applying the <b>"Trusteeship System"</b> to territories detached from "enemy states" after WWII.                                                |

### About UN Trusteeship System

- Established under the Charter (**Articles 73, 75**) for **"trust territories"** — regions whose people had not yet attained full self-government.
- There were **11 such territories**, located in **Africa and the Pacific Islands**.

### Issues Surrounding the Clauses

- Obsolete Provisions:** The UNGA recognised the "enemy state" clauses as **obsolete in 1995**, and the **2005 World Summit** called for their removal. However, they continue to remain part of the UN Charter.
- Charter Amendment Hurdles:** Under **Article 108**, amendments require a **two-thirds majority of the UNGA** and ratification by two-thirds of UN member states, including all five permanent members of the UNSC.

- **Link with UNSC Reform:** Removing these clauses would require reopening the UN Charter, potentially triggering broader debates on UNSC restructuring, permanent membership and representation, including the aspirations of countries such as **Japan and Germany**.

**Q. Question: With reference to the United Nations (UN) Charter, consider the following statements:**

1. Articles 53 and 107 permit enforcement actions against an "enemy state" without prior authorization from the UN Security Council.
2. The term "enemy state" applies to any state that was an enemy of any signatory of the UN Charter during the Second World War.
3. An amendment to remove these clauses from the UN Charter requires approval by a two-thirds majority in the UN General Assembly and ratification by all five permanent members of the UN Security Council.

**Which of the statements given above is/are correct?**

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Correct Answer: **(d) 1, 2 and 3**

**Explanation:**

- **Statement 1 is correct:** Under Paragraph 1 of Article 53 and Article 107 of the UN Charter, enforcement measures against an "enemy state" serve as an exception to the general rule requiring prior UN Security Council authorization for the use of military force.
- **Statement 2 is correct:** Paragraph 2 of Article 53 explicitly defines an "enemy state" as any state that was an enemy of any signatory of the UN Charter during the Second World War (such as Germany, Japan, or Italy).
- **Statement 3 is correct:** Under Article 108 of the UN Charter, any amendment to the Charter must be adopted by a two-thirds vote of the members of the UN General Assembly and ratified by two-thirds of the UN member states, including all five permanent members (P5) of the Security Council.

## 1.2. THE NEW DIMENSION OF INDIA JAPAN DEFENCE TIES

### Context

- Recently, Japan has urged India to fast-track approval for the transfer of **UNICORN technology**, following the July 2026 India–Japan agreement, signalling deeper defence technology cooperation and co-development.

### What is UNICORN Technology?

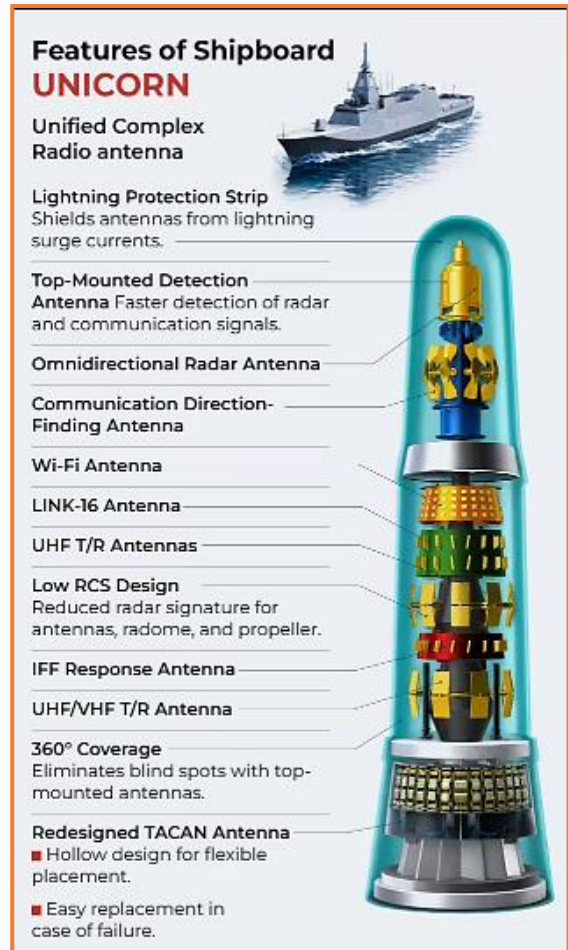
- **UNICORN** stands for **Unified Complex Radio Antenna**.
- It is an advanced **naval antenna system** developed by Japan.



- It integrates multiple communication and antenna functions into a **single integrated mast**.
- By integrating antennas into the mast, it can help reduce the ship's **radar signature and electromagnetic interference**.
- The system is intended for installation on **warships**.
- It is therefore associated with improved **stealth, communication and electronic warfare capabilities**.
- Presently utilized on the **Mogami-class stealth frigates** of the Japan Maritime Self-Defence Force (JMSDF). In India, it is planned to be co-developed involving public sector undertakings like **Bharat Electronics Limited (BEL)**.

#### Why is the Project Important?

- **Defence Technology Transfer:** Promotes technology transfer, co-development and defence production between India and Japan.
- **Make in India:** Strengthens domestic defence manufacturing and industrial capabilities.
- **Naval Modernisation:** Supports development of advanced and integrated Indian naval platforms.
- **Maritime Security:** Enhances maritime security, domain awareness and naval cooperation in the Indo-Pacific.



#### Q. Consider the following statements regarding the UNICORN project between India and Japan:

1. UNICORN stands for **Unified Complex Radio Antenna**.
2. It is an integrated naval antenna system intended for use on warships.
3. The project involves **co-development and co-production** between India and Japan.
4. Bharat Electronics Limited is associated with the Indian side of the project.

#### Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 1, 2 and 3 only
- (c) 2, 3 and 4 only
- (d) **1, 2, 3 and 4**

**Answer: (d) 1, 2, 3 and 4**

- **Statement 1 is correct:** UNICORN stands for **Unified Complex Radio Antenna**.
- **Statement 2 is correct:** It is an integrated antenna system for **naval platforms**.
- **Statement 3 is correct:** India and Japan are cooperating in its **co-development and co-production**.
- **Statement 4 is correct:** **Bharat Electronics Limited (BEL)** is involved on the Indian side.

### 1.3. EXERCISE TARANG SHAKTI

#### Context

- The **French Air and Space Force** is participating in the multinational air combat exercise '**Tarang Shakti**', hosted by the **Indian Air Force (IAF)**, as part of its ongoing **Mission Pégase**, aimed at enhancing military cooperation and interoperability between India and France.



#### About Exercise Tarang Shakti

- This is the **2nd edition** of Tarang Shakti, held at **Jodhpur Air Force Station**.
- It is India's **largest multinational air combat exercise**, hosted by the IAF.
- Seven foreign nations** are participating: USA, France, Germany, Australia, Bangladesh, Sri Lanka, and UAE.
- Notably features the **first-ever participation of the US F-35 stealth fighter jet** in an exercise on Indian soil.
- India's air assets** on display: Rafale, Mirage-2000, Jaguar, Tejas, MiG-29, and Su-30 MKI.

#### What is Mission Pégase?

- Long-Range Power Projection:** Mission Pégase 26 is France's **7th long-range strategic deployment**.
- Global Footprint:** Covering about **40,000 km** across the **Arctic, Indo-Pacific, Indian Ocean and Middle East**, it demonstrates France's ability to rapidly deploy air assets worldwide.

#### Significance

- Strengthens **India-France strategic partnership**, particularly in the **Indo-Pacific** context.
- Enhances **interoperability** among IAF and partner air forces through joint operations involving diverse aircraft platforms (including 5th-generation F-35).
- Reflects India's growing role as a hub for multinational defence exercises, alongside existing bilateral drills (Malabar, Varuna, Garuda, Shakti, etc.).
- Aligns with India's vision of an open, free, and rules-based Indo-Pacific, upholding freedom of navigation and international law.

#### Q. Consider the following statements regarding Exercise Tarang Shakti and Mission Pégase:

- Exercise Tarang Shakti is a bilateral air exercise conducted between India and France.
- Mission Pégase 26 involved the deployment of Dassault Rafale F4 fighters, Airbus A330 MRTT Phénix tankers, and Airbus A400M Atlas aircraft.
- France's Indian Ocean territories include Réunion and Mayotte.

Which of the statements given above is/are correct?

- (a) 1 and 2 only  
(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

**Answer: (b)**

**Explanation:**

- **Statement I is incorrect:** Tarang Shakti is a **multinational** air exercise hosted by the Indian Air Force, not a bilateral one. The bilateral air exercise between India and France is called **Exercise Garuda**. Tarang Shakti provides a multilateral platform *in addition to* bilateral exercises like Garuda (Air Force), Varuna (Navy), and Shakti (Army).
- **Statement II is correct:** As part of Mission Pégase 26, France deployed 4 Dassault Rafale F4 fighters, 3 Airbus A330 MRTT Phénix tankers, and 2 Airbus A400M Atlas aircraft to participate in the exercise.
- **Statement III is correct:** France holds territories in the Indian Ocean region, including **Réunion and Mayotte**, which underpin its strategic interest and presence in the Indo-Pacific region.

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## 2.1. STRENGTHENING THE GRID FOR GREEN POWER

### Context

- Recently, the Union Cabinet approved **Green Energy Corridor Phase-III (GEC-III)** to strengthen **intra-state transmission** and enable efficient **evacuation and integration of renewable energy**, supported by **Battery Energy Storage Systems (BESS)**.

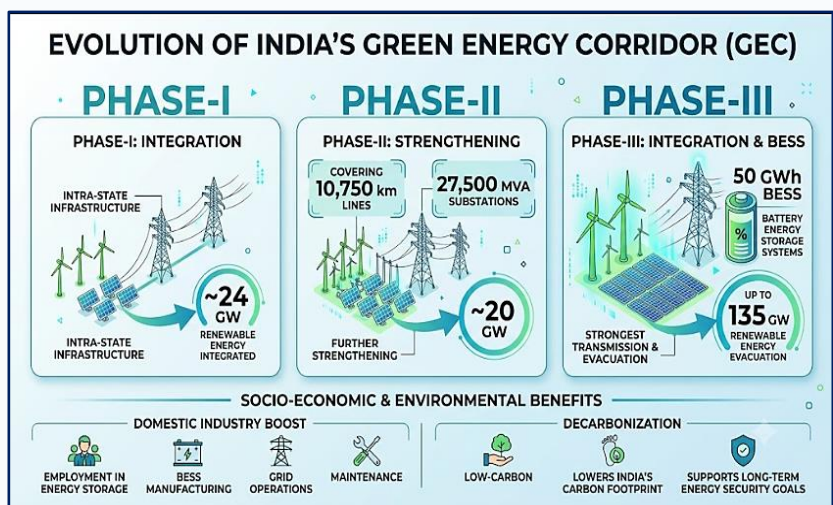


### About the Green Energy Corridor

- The **Green Energy Corridor (GEC)** is a transmission initiative to facilitate the evacuation and grid integration of large-scale renewable energy, especially from solar and wind-rich regions.
- Planning began following a 2012 Power Grid Corporation study, with implementation starting in 2015.

### Core Objectives & Targets

- RE Evacuation Capacity:** Strengthens the Intra-State Transmission System (InSTS) to enable the evacuation of up to **135 Gigawatt (GW)** of renewable energy across States and UTs.
- Energy Storage Integration:** Deploys **50 Gigawatt-hours (GWh)** of Battery Energy Storage Systems (BESS).
- Target Timeline:** Scheduled for completion by **FY 2032–33**.
- Long-Term Goal:** Supports India's broader objective of achieving **900 GW** of installed non-fossil fuel capacity by **2035**.



### Key Technical & Operational Features

- Grid Flexibility & Peak Management:** The 50 GWh BESS capacity will be installed at RE generation sites or critical grid nodes. It targets issues including:
  - Power intermittency and frequency fluctuations.
  - Network congestion.
  - Peak-hour curtailment (limiting active RE output).
  - Demand during non-solar hours.

## II. Implementation Models:

- **Greenfield Projects:** Executed via **Tariff Based Competitive Bidding (TBCB)** through Transmission Service Providers under the **Build-Own-Operate-Maintain (BOOM)** model.
- **Brownfield Upgrades:** Handled under a **Cost Plus Basis (CPB)**.
- **Nodal Agencies:** State Transmission Utilities (STUs) act as primary implementation agencies.

**Q. With reference to the Green Energy Corridor Phase-III (GEC-III), consider the following statements:**

1. It aims to facilitate the evacuation of up to 135 GW of renewable energy.
2. It provides for deployment of 50 GWh of Battery Energy Storage Systems.
3. State Transmission Utilities will be the overall implementing agencies under the scheme.
4. All transmission projects under GEC-III will be implemented through Tariff Based Competitive Bidding.

**Which of the statements given above is/are correct?**

- (a) 1, 2 and 3 only
- (b) 1 and 2 only
- (c) 2, 3 and 4 only
- (d) 1, 2, 3 and 4

**Answer: (a) 1, 2 and 3 only**

- **Statement 1 is Correct:** GEC-III aims to facilitate evacuation of up to **135 GW of renewable energy**.
- **Statement 2 is Correct:** The scheme provides for **50 GWh of Battery Energy Storage Systems (BESS)**.
- **Statement 3 is Correct:** **State Transmission Utilities (STUs)** will be the overall implementing agencies.
- **Statement 4 is Incorrect:** **Greenfield projects** will follow **Tariff Based Competitive Bidding (TBCB)**, whereas **brownfield upgradation and network strengthening** will be executed on a **Cost Plus Basis (CPB)**.

## 2.2. SULPHUR PRICE SURGE: CAUSES AND IMPACT ON INDIA

### Context

- Recently, the international price of sulphur has risen nearly four-fold in one year, adding to India's import burden.



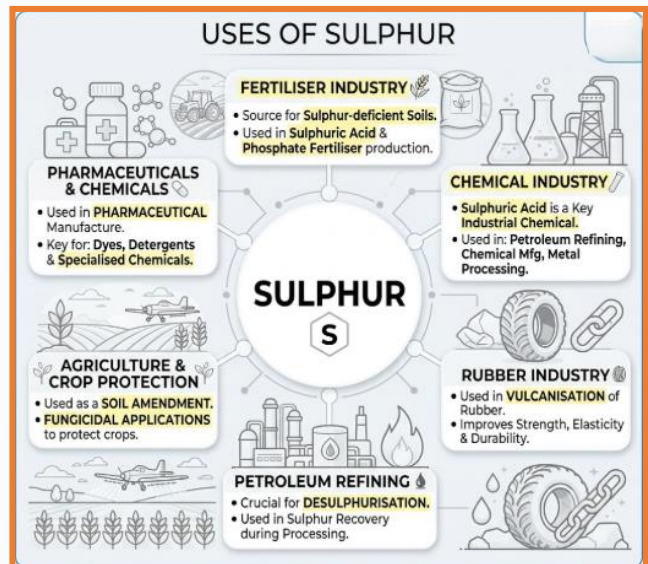
### Why Prices Rose?

- **Supply Disruptions in Russia:** Ukrainian drone strikes targeting Russian oil and gas processing infrastructure disrupted production and contributed to restrictions on Russia's exports of industrial sulphur.

- **Geopolitical Disruptions in West Asia:** The West Asian conflict affected regional production, transportation and maritime trade, with the region accounting for more than 45% of global seaborne sulphur trade.
- **China's Export Restrictions:** In 2026, China restricted sulphuric acid exports to prioritise domestic requirements, further tightening regional availability and contributing to upward pressure on sulphur-related markets.

### India's Sulphur Trade

- **Import Dependence:** India is a **net importer of sulphur**, as domestic production is insufficient to meet the requirements of key industries.
- **Major Import Sources:** Imports are primarily sourced from **West Asian producers**, particularly **the UAE, Saudi Arabia and Qatar**, owing to their large-scale petroleum and natural-gas processing capacity.
- **Key Domestic Uses:** Imported sulphur is mainly utilised in the production of **sulphuric acid, fertilisers, chemicals and other industrial products**.



### Production and Source of Sulphur

#### I. Sources

- **By-product:** About 92% of global sulphur comes from petroleum refining and natural gas processing.
- **Mined:** Only about 8% is mined directly from natural deposits or sulphur-rich minerals such as pyrites.

#### II. Top Producers (2025)

- **Ranking:** China (19 MMT), USA (8.1), Russia (7.5), Saudi Arabia (7.2) and UAE (6.3).
- **India:** Among the top 10 producers with 3.7 MMT (8th), but relies on imports to meet demand.

### Q. With reference to sulphur, consider the following statements:

- About 92% of global sulphur production comes from petroleum refining and natural gas processing.
  - India is among the top five sulphur-producing countries in the world.
  - Sulphuric acid is used in High-Pressure Acid Leach (HPAL) plants to extract nickel from laterite ores.
- Which of the statements given above is/are correct? (a) I and II only  
(b) II and III only  
(c) I and III only  
(d) I, II and III

**Answer: (c)**

**Statement I is Correct:** Sulphur is mainly a by-product of petroleum refining and natural gas processing; only about 8% is mined directly.

**Statement II is Incorrect:** India produced 3.7 MMT in 2025, ranking 8th; China, the USA, Russia, Saudi Arabia and the UAE are the top five.

**Statement III is Correct:** Sulphuric acid leaches nickel from laterite ores in HPAL plants, and the nickel is used in products like EV batteries.

### 2.3. INDIAN COFFEE SUSTAINABILITY CERTIFICATION FRAMEWORK

#### Context

- **Recently**, the Coffee Board of India developed the **Indian Coffee Sustainability Standard and Certification Scheme (INDICOFS)** to establish a structured sustainability certification system, with a focus on India's **traditional shade-grown coffee cultivation**.

#### About INDICOFS

- **INDICOFS** is a sustainability standard designed specifically for Indian coffee production. It covers **Environmental, Social and Governance (ESG)** aspects, including:
  - Economic sustainability
  - Resource utilisation
  - Crop production practices
  - Environmental conservation
  - Human well-being



#### Three-Level Certification Framework

| Level          | Nature                   | Key Feature                                                                         |
|----------------|--------------------------|-------------------------------------------------------------------------------------|
| <b>Level 1</b> | Self-Assessment          | Growers assess their own sustainability practices                                   |
| <b>Level 2</b> | Third-Party Verification | Independent agencies verify compliance                                              |
| <b>Level 3</b> | Benchmarking             | Practices are assessed against internationally recognised sustainability frameworks |

#### About Coffee Board of India

- **Statutory Status:** Established under the **Coffee Act VII of 1942**.
- **Administrative Ministry:** Functions as an autonomous body under the **Ministry of Commerce and Industry**, Government of India.
- **Headquarters:** **Bengaluru**, Karnataka.

**Q. With reference to the Indian Coffee Sustainability Standard and Certification Scheme (INDICOFS), consider the following statements:**

1. It has a three-level certification framework progressing from self-assessment to third-party verification and international benchmarking.
2. The scheme focuses only on the environmental sustainability of coffee cultivation.
3. The Coffee Board of India is associated with the implementation of the sustainability certification framework.

Which of the statements given above is/are correct?

- A. 1 and 2 only  
B. 1 and 3 only  
C. 2 and 3 only  
D. 1, 2 and 3

**Answer: B. 1 and 3 only**

- **Statement 1 is correct:** INDICOFS follows three progressive levels—**self-assessment, third-party verification and international benchmarking**.
- **Statement 2 is incorrect:** The framework is broader than environmental sustainability and incorporates **environmental, social and economic/ESG dimensions**.
- **Statement 3 is correct:** The **Coffee Board of India** has developed the sustainability standards and is involved in implementing the certification framework.

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# ENVIRONMENT & GEOGRAPHY

## 3.1. NIYAMGIRI HILLS BAUXITE MINING CONTROVERSY AND TRIBAL RIGHTS

### Context

- The National Alliance of People's Movements (NAPM) and environmental activists have cautioned against renewed proposals to revive bauxite mining across the Niyamgiri hills in Odisha's Kalahandi and Rayagada districts.



### About The Niyamgiri Landscape

- Geographical Location:** Niyamgiri is an ecologically sensitive hill range situated across the **Kalahandi and Rayagada** districts of south-western Odisha.
- Indigenous Inhabitants:** Home to the **Dongria Kondh**, designated as a **Particularly Vulnerable Tribal Group (PVTG)**.
- Cultural Significance:** The Dongria Kondh revere the hilltop of the Niyamgiri range as the sacred abode of **Niyam Raja** (their supreme deity and protector of the ecosystem).
- Mineral Profile:** The flat-topped hills (lateritic plateaus) host extensive, high-grade **bauxite** deposits (the primary ore of aluminium).

### Bauxite Production: India & World

- Bauxite:** Principal ore of aluminium.
- Processing:** Bayer process gives alumina ( $Al_2O_3$ ); electrolysis then gives aluminium.
- Guinea (2025):** 150 million metric tons; 34.1% global share.
- Australia (2025):** ~97 to 103 million metric tons.
- China (2025):** ~87 million metric tons.
- Distribution in India:** Odisha 52% (largest producer); Andhra Pradesh 18%; Gujarat 7%.

### Constitutional and Legal Framework for Gram Sabha's Role in Mining

| Legal Framework / Authority                      | Mandate & Significance                                                                                                                                                                  |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Orissa Mining Corporation vs. MoEF (2013)</b> | The Supreme Court ruled that the decision to permit mining rests with the <b>Gram Sabhas</b> , recognizing customary, cultural, and religious rights under the Forest Rights Act (FRA). |
| <b>Forest Rights Act (FRA), 2006</b>             | Recognizes individual forest rights (IFR) and <b>Community Forest Resource (CFR)</b> rights; mandates free, prior informed consent of the Gram Sabha for forest diversion.              |
| <b>PESA Act, 1996</b>                            | Panchayats (Extension to Scheduled Areas) Act mandates mandatory consultation and consent of <b>Gram Sabhas</b> before granting mining leases in Fifth Schedule areas.                  |
| <b>Fifth Schedule of the Constitution</b>        | Provides administrative autonomy and constitutional safeguards to tribal areas, shielding them from alienation of land.                                                                 |

**Q. With reference to the Dongria Kondh tribe and the legal provisions governing Scheduled Areas in India, consider the following statements:**

1. The Dongria Kondh community is classified as a Particularly Vulnerable Tribal Group (PVTG) indigenous to Odisha.
2. Under the Panchayats (Extension to Scheduled Areas) Act, 1996 (PESA), the recommendation of the Gram Sabha is mandatory prior to granting prospecting licences or mining leases for minerals in Scheduled Areas.
3. The Supreme Court in the 2013 Niyamgiri judgment held that the religious and cultural rights of tribal communities can be adjudicated and decided by the local Gram Sabha under the Forest Rights Act, 2006.

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2, and 3

**Answer: (d) 1, 2, and 3**

**Explanation:**

- **Statement 1 is correct:** The Dongria Kondh are one of the 13 Particularly Vulnerable Tribal Groups (PVTGs) identified in Odisha (out of 75 PVTGs across India).
- **Statement 2 is correct:** Section 4(k) of the PESA Act, 1996 explicitly stipulates that the prior recommendation of the Gram Sabha or the Panchayats at the appropriate level is mandatory before granting mining leases for minor minerals and concessions in Scheduled Areas.
- **Statement 3 is correct:** In *Orissa Mining Corporation v. MoEF (2013)*, the Supreme Court held that the Gram Sabha possesses the statutory authority under the Forest Rights Act (FRA), 2006 to determine if mining impinges on the religious, customary, and cultural rights of tribal communities.

### 3.2. THE TWELVE YEAR BLOOM OF NEELAKURINJI

#### Context

- A walkathon will be held in **Munnar, Idukki district of Kerala, on 1 October 2026** to commemorate conservationist **G. Rajkumar**, who worked to create awareness about the conservation of **Neelakurinji**. The event brings attention to the unique high-altitude ecosystem of the Western Ghats.

#### About Neelakurinji

- **Scientific name:** *Strobilanthes kunthiana*
- **Family:** Acanthaceae; **Genus:** *Strobilanthes*
- **Flowering Cycle:** Exhibits a unique gregarious mass-flowering cycle occurring once every **12 years**.



- **Life Strategy:** Plants with such long-interval blooming cycles are termed **polietesials**. It is **semelparous** (monocarpic), meaning the shrub flowers and fruits only once in its lifetime and dies shortly after.
- **Habitat & Distribution:** Endemic to the high-altitude montane grasslands (Shola-grassland ecosystems, often called "**sky islands**") of the **Western Ghats** across Kerala, Tamil Nadu, and Karnataka.
- **Conservation Status:** Classified as **Vulnerable** under the IUCN Red List criteria.
- **Protected Areas:** Safeguarded locally in regions like the **Kurinjomala Sanctuary** (Idukki district, Kerala) and **Eravikulam National Park**.
- The last major flowering in the Munnar–Eravikulam region occurred in **2018**, with the next major cycle expected around **2030**.

#### About Eravikulam National Park

- Located in **Idukki district, Kerala**.
- It is an important natural habitat of **Neelakurinji**.
- The park is also famous for the **Nilgiri Tahr**.
- Its landscape consists largely of **high-altitude grasslands interspersed with sholas**.
- **Anamudi**, the highest peak of the Western Ghats, lies within the park.

#### About Kurinjomala Wildlife Sanctuary

- **Location:** Idukki district, Kerala, near **Vattavada and Kottakamboor**.
- **Established:** 2006.
- **Purpose:** Long-term protection of **Neelakurinji (*Strobilanthes kunthiana*)** and its habitat.
- **Area:** About **32 sq km**.
- **Ecosystem:** **Shola forests and grasslands**, forming part of the southern Western Ghats protected-area network.

#### Q. Consider the following statements regarding Neelakurinji:

1. Neelakurinji is scientifically known as *Strobilanthes kunthiana*.
2. It is associated with the high-altitude shola-grassland ecosystems of the Western Ghats.
3. Its mass flowering generally occurs every 12 years.
4. Kurinjomala Wildlife Sanctuary is located in Idukki district of Kerala and was established for the conservation of Neelakurinji and its habitat.

Which of the statements given above are correct?

- A. 1 and 2 only
- B. 1, 2 and 3 only
- C. 2, 3 and 4 only
- D. 1, 2, 3 and 4

**Answer: D. 1, 2, 3 and 4**

- **Statement 1 is correct:** Neelakurinji is *Strobilanthes kunthiana*.

- **Statement 2 is correct:** It is associated with high-altitude shola-grassland habitats of the Western Ghats.
- **Statement 3 is correct:** It is famous for mass flowering approximately once every 12 years.
- **Statement 4 is correct:** Kurinjimala Wildlife Sanctuary in **Idukki, Kerala**, was established in 2006 for the long-term conservation of Neelakurinji and its habitat.

### 3.3. INDIAN COAST GUARD AVERTS OIL SPILL

#### Context

- Recently, the Indian Coast Guard (ICG) rescued the distressed Belize-flagged tanker MT Seagull 9, about 37 nautical miles east-south-east of Paradip (Odisha), and prevented a major oil spill.



#### About the Incident

- MT Seagull 9, a Belize-flagged vessel carrying palm oil, developed a dangerous tilt after engine failure and rapid ballast-tank flooding off the Odisha coast.
- The incident posed a risk of capsizing and marine pollution, prompting a rescue and stabilisation operation by the Indian Coast Guard.

#### Coast Guard Response

- **ICGS Vishwast:** Pressed into service; a specialist damage control team boarded the unstable vessel.
- **Damage control:** Submersible de-flooding pumps used; leakage arrested, two damaged seawater pipelines blanked and a third fractured line contained.
- **Stabilisation:** Concurrent cargo transfer and de-flooding eliminated the threat of capsizing.
- **Pollution response:** Pollution Control Vessel (PCV) and an additional Offshore Patrol Vessel (OPV) diverted to the location.
- **Aerial surveillance:** Dornier aircraft monitored in real time; a minor palm oil sheen seen on 27 September was confirmed fully dissipated on 28 September.
- **Multi-agency effort:** Paradip Port Authority tug Dolphin towed the stabilised vessel to the anchorage area off Paradip.

#### About the Indian Coast Guard

- **Ministry:** Functions under the Ministry of Defence; established under the Coast Guard Act, 1978.
- **Motto:** "Vayam Rakshamah" (We Protect).
- **Oil spills:** ICG is the Central Coordinating Authority for marine oil spill response under the National Oil Spill Disaster Contingency Plan (NOS-DCP).

**Q. Consider the following statements about the Indian Coast Guard (ICG):**

- I. It functions under the Ministry of Home Affairs.
- II. It is a statutory body established under the Coast Guard Act, 1978.
- III. It is the Central Coordinating Authority for marine oil spill response in Indian waters under the National Oil Spill Disaster Contingency Plan (NOS-DCP).

**Which of the statements given above is/are correct?**

- (a) I and II only
- (b) II and III only
- (c) I and III only
- (d) I, II and III

**Answer: (b)**

**Explanation**

**Statement I is Incorrect:** The ICG functions under the **Ministry of Defence**, not the Ministry of Home Affairs.

**Statement II is Correct:** The ICG began as an interim force in **1977** and became a statutory body under the **Coast Guard Act, 1978**.

**Statement III is Correct:** The ICG is the Central Coordinating Authority for marine oil spill response under the **NOS-DCP**, which is why it led the MT Seagull 9 operation.

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## 4.1. INDIA'S FIRST LNG-POWERED TRAIN

### Context

- India has introduced its **first LNG-powered train** from **Sabarmati Railway Station in Ahmedabad, Gujarat**, marking an important step toward using alternative fuels in railway transport.

### About the Train technology

- Dual-Fuel Technology:** Unlike pure LNG propulsion, the newly introduced train utilizes a **diesel-LNG dual-fuel system**.
- Fuel Substitution & Efficiency:** LNG can replace roughly **40% of conventional diesel consumption**.
- Driving Power Cars (DPCs):** Two 1,400 HP DPCs at the Sabarmati Integrated Coaching Depot were converted to support this dual-fuel capability.
- Emission Reduction:** The technology substantially lowers emissions of carbon dioxide, nitrogen oxides, and particulate matter (PM).



### About LNG

- Full Form: Liquefied Natural Gas
- State: Liquid
- Process: Cooled to about  $-162^{\circ}\text{C}$
- Storage: Cryogenic tanks
- Volume: More energy-dense; occupies less space
- Major Use: Heavy transport, shipping, railways
- Key Advantage: Suitable for long-distance, high-energy applications

### Q. Consider the following statements regarding Liquefied Natural Gas (LNG):

- LNG is produced by cooling natural gas to approximately  $-162^{\circ}\text{C}$ .
- LNG is primarily composed of methane.
- Unlike CNG, LNG is stored in a gaseous state under high pressure.
- LNG is a zero-emission fuel because it does not produce carbon dioxide during combustion.

### Which of the statements given above is/are correct?

- 1 and 2 only
- 1, 2 and 3 only
- 2 and 4 only
- 1, 2, 3 and 4

**Answer: (a) 1 and 2 only**

- **Statement 1 is Correct:** Natural gas is cooled to approximately  $-162^{\circ}\text{C}$  to convert it into liquid form.
- **Statement 2 is Correct:** LNG consists predominantly of **methane ( $\text{CH}_4$ )**.
- **Statement 3 is Incorrect:** **CNG** is stored as compressed gas under high pressure, whereas **LNG** is stored in liquid form at **cryogenic temperatures**.
- **Statement 4 is Incorrect:** LNG is still a **fossil fuel** and its combustion releases  **$\text{CO}_2$** . It is therefore not a zero-emission fuel.

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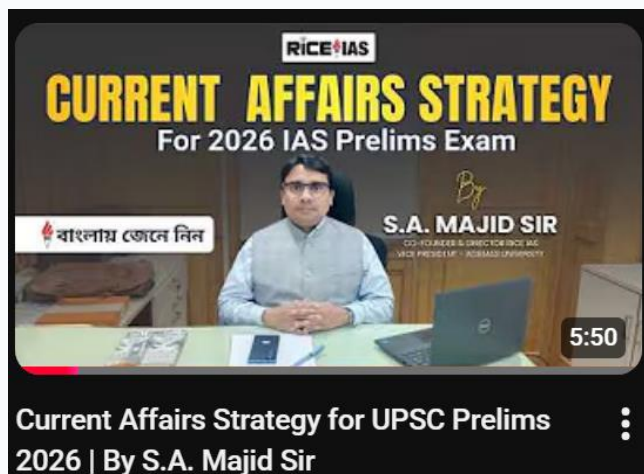
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