



Daily PIB Summary

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1. INDIA–AUSTRALIA CIVIL NUCLEAR COOPERATION



- India and Australia cooperate in the peaceful uses of nuclear energy under the **India–Australia Civil Nuclear Cooperation Agreement**.
- Australia supplies **uranium** to India for use in **civilian nuclear power reactors** under international safeguards.
- The partnership contributes to India's long-term **energy security**, diversification of fuel sources, and transition to low-carbon energy.
- Cooperation is governed by strict safeguards to ensure nuclear material is used only for peaceful purposes.
- Both countries support international nuclear safety, security, and non-proliferation frameworks while recognizing India's responsible nuclear record.
- Civil nuclear cooperation complements broader collaboration in clean energy, critical minerals, science and technology, and strategic affairs.
- The partnership strengthens bilateral relations under the **Comprehensive Strategic Partnership (CSP)**.

- It also contributes to India's objective of expanding clean energy generation while reducing dependence on fossil fuels.

BACKGROUND / CONTEXT

India–Australia Civil Nuclear Cooperation

Agreement

- **Signed: 2014.**
- **Entered into Force: 2015.**
- Enables Australia to export **uranium** to India for peaceful civilian purposes.
- Requires all supplied nuclear material to remain under **International Atomic Energy Agency (IAEA)** safeguards.

Why Australia is Important

- Australia possesses some of the **world's largest uranium reserves**.
- It is a reliable supplier of uranium for peaceful nuclear energy programmes.
- The partnership enhances India's long-term fuel security for nuclear power generation.

India's Civil Nuclear Programme

- Based on the **Three-Stage Nuclear Power Programme** proposed by **Dr. Homi J. Bhabha**:
 1. Pressurized Heavy Water Reactors (PHWRs).
 2. Fast Breeder Reactors (FBRs).
 3. Thorium-based reactors utilizing India's abundant thorium reserves.

KEY HIGHLIGHTS

- **Agreement:** India–Australia Civil Nuclear Cooperation Agreement.
- **Signed:** 2014.
- **Operational Since:** 2015.
- **Major Focus:** Peaceful use of nuclear energy and uranium supply.
- **Strategic Significance:** Strengthens the India–Australia Comprehensive Strategic Partnership.



- **Energy Significance:** Enhances fuel security and supports India's clean energy transition.
- **Environmental Significance:** Nuclear power provides low-carbon baseload electricity, aiding climate mitigation.
- **Challenges:** High capital costs, nuclear waste management, public acceptance, and ensuring robust safety standards.
- **Way Forward:** Expand cooperation in nuclear fuel supply, reactor technologies, research, nuclear safety, and clean energy innovation while strengthening international safeguards.

PRELIMS BOOSTER BOX

- **India–Australia Civil Nuclear Cooperation Agreement:** Signed in **2014**; entered into force in **2015**.
- **Comprehensive Strategic Partnership (CSP):** Established between India and Australia in **2020** to deepen cooperation across defence, trade, technology, energy, and critical minerals.
- **IAEA (International Atomic Energy Agency):** Autonomous international organization promoting the peaceful use of nuclear energy and verifying compliance with nuclear safeguards.
- **NSG (Nuclear Suppliers Group):** A multilateral export control regime that seeks to prevent nuclear proliferation while facilitating peaceful nuclear trade.
- **India–US Civil Nuclear Agreement (123 Agreement):** Signed in **2007**, paving the way for international civil nuclear cooperation with India.
- **Three–Stage Nuclear Power Programme:** Designed by **Dr. Homi J. Bhabha** to utilize India's limited uranium and abundant thorium resources.
- **PHWR (Pressurized Heavy Water Reactor):** The mainstay of India's current nuclear power generation.

- **Fast Breeder Reactor (FBR):** Produces more fissile material than it consumes, forming the second stage of India's nuclear programme.
- **Thorium:** India possesses one of the world's largest reserves of thorium, making it central to the third stage of the nuclear programme.

PadhAI-GENERATED UPSC MCQ

Consider the following statements:

1. The **India–Australia Civil Nuclear Cooperation Agreement** was signed in **2014** and entered into force in **2015**.
2. Under the agreement, Australia supplies uranium to India for use in civilian nuclear facilities subject to **IAEA safeguards**.
3. India's **Three–Stage Nuclear Power Programme** was conceived by **Dr. Homi J. Bhabha**.

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: (d)

2. NEW ULTRA-SENSITIVE AMMONIA SENSOR ENABLES PORTABLE, SELF-POWERED WEARABLE DEVICES FOR TOXIC GAS DETECTION





- I. The newly developed sensor can detect **trace amounts of ammonia** with high sensitivity and rapid response.
- II. It is designed to operate as a **self-powered wearable device**, reducing dependence on external power sources.
- III. The technology has potential applications in:
 - A. Industrial safety.
 - B. Occupational health.
 - C. Environmental monitoring.
 - D. Medical diagnostics (e.g., breath analysis).
- IV. Wearable sensors can continuously monitor air quality and alert users before ammonia reaches hazardous levels.
- V. The innovation integrates **advanced nanomaterials** and flexible electronics, enabling lightweight and portable devices.
- VI. The sensor supports the growing field of **Internet of Things (IoT)**-based health and environmental monitoring.
- VII. Such technologies contribute to safer workplaces and improved public health.
- VIII. The development showcases India's progress in advanced materials, nanotechnology, and sensor research.

BACKGROUND / CONTEXT

Ammonia (NH₃)

- I. A **colourless gas** with a characteristic pungent smell.
- II. Widely used in:
 - A. Fertilizer production.
 - B. Refrigeration systems.
 - C. Chemical industries.
 - D. Pharmaceuticals.
- III. At high concentrations, ammonia is **toxic**, causing irritation to the eyes, skin, and respiratory tract and, in severe cases, life-threatening health effects.

Gas Sensors

Gas sensors detect the presence and concentration of gases in the environment.

Applications include:

- Industrial safety.
- Air quality monitoring.
- Healthcare diagnostics.
- Smart wearables.
- Environmental surveillance.

Self-Powered Sensors

- Generate the required electrical energy from the environment or body movements (e.g., piezoelectric or triboelectric effects).
- Eliminate or reduce the need for conventional batteries.

KEY HIGHLIGHTS

- **Innovation:** Ultra-sensitive ammonia gas sensor.
- **Technology:** Wearable, flexible, self-powered sensing device.
- **Applications:** Industrial safety, healthcare, environmental monitoring, and IoT-enabled smart systems.
- **Scientific Significance:** Advances nanotechnology, flexible electronics, and sensor engineering.
- **Health Significance:** Enables early detection of toxic ammonia exposure and improves workplace safety.
- **Economic Significance:** Supports indigenous development of advanced sensing technologies and wearable electronics.
- **Challenges:** Large-scale manufacturing, long-term durability, calibration, and cost-effective commercialization.
- **Way Forward:** Improve sensor stability, integrate with AI and IoT platforms, expand detection to multiple hazardous gases, and promote commercialization through industry-research collaboration.

PRELIMS BOOSTER BOX

- **Ammonia (NH₃):** A colourless, pungent, alkaline gas widely used in fertilizer production and industrial processes.
- **Nanotechnology:** Manipulation of materials at the nanoscale (1–100 nanometres) to achieve enhanced physical and chemical properties.
- **Wearable Electronics:** Smart electronic devices designed to be worn on the body for continuous monitoring or communication.
- **Internet of Things (IoT):** A network of interconnected devices that collect, exchange, and process data over the internet.
- **Flexible Electronics:** Electronic circuits fabricated on flexible substrates, allowing bending and stretching.
- **Piezoelectric Effect:** Generation of electrical charge in response to mechanical stress.
- **Triboelectric Effect:** Generation of electrical charge through friction or contact between different materials.
- **Gas Sensor:** A device that detects and measures the concentration of specific gases in the environment.
- **Occupational Safety:** Measures adopted to protect workers from hazards in the workplace.
- **Environmental Monitoring:** Continuous observation and measurement of environmental parameters such as air, water, and soil quality.

PadhAI-GENERATED UPSC MCQ

Consider the following statements:

1. **Ammonia (NH₃)** is a colourless gas with a pungent odour and is widely used in fertilizer production.
2. **Self-powered sensors** can generate the electrical energy required for operation from ambient sources or body movements.
3. **Nanotechnology** deals with the manipulation of materials typically in the size range of **1–100 nanometres**.

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: (d)

3. NESAC'S SPACE-BASED APPLICATIONS STRENGTHEN BORDER MANAGEMENT AND DRIVE DEVELOPMENT ACROSS THE NORTHEAST



- NESAC utilizes **satellite remote sensing, Geographic Information Systems (GIS), Global Navigation Satellite Systems (GNSS), and communication technologies** to support governance and development in the Northeast.
- Space-based applications assist in **border area mapping**, infrastructure planning, and monitoring of strategic regions.
- NESAC provides crucial support for **disaster management**, including flood forecasting, landslide monitoring, forest fire detection, and damage assessment.
- The Centre contributes to agriculture, water resource management, forestry, urban planning, and environmental conservation through geospatial technologies.



- It supports planning and implementation of developmental projects in the Northeastern States by providing geospatial decision-support systems.
- Space-based data also aid in improving connectivity, infrastructure development, and climate resilience in the region.
- The initiative reflects India's growing use of space technology for governance and sustainable development.
- NESAC's work aligns with the vision of leveraging space technology for **national security, regional development**, and **Atmanirbhar Bharat**.

BACKGROUND / CONTEXT

North Eastern Space Applications Centre (NESAC)

- **Established: 2000.**
- **Location: Shillong, Meghalaya.**
- A **joint initiative** of the **Indian Space Research Organisation (ISRO)** and the **North Eastern Council (NEC)**.
- Functions as a regional centre for the application of space technology in the Northeastern States.

Major Areas of Work

- Remote sensing.
- Geographic Information Systems (GIS).
- Satellite communication.
- Disaster risk reduction.
- Agriculture and horticulture.
- Forestry and biodiversity.
- Water resources.
- Infrastructure planning.
- Border area management.
- Climate and environmental monitoring.

Key Technologies

- **Remote Sensing:** Collection of information about Earth's surface using satellite or airborne sensors.
- **GIS (Geographic Information System):** Computer-based system for capturing, storing, analyzing, and displaying spatial data.
- **GNSS (Global Navigation Satellite System):** Satellite-based navigation systems such as **NavIC**, GPS, Galileo, and GLONASS.

KEY HIGHLIGHTS

- **Institution:** North Eastern Space Applications Centre (NESAC).
- **Established:** 2000.
- **Location:** Shillong, Meghalaya.
- **Parent Organisations:** ISRO and North Eastern Council (NEC).
- **Primary Objective:** Apply space technology for governance, border management, disaster management, and sustainable development in Northeast India.
- **Strategic Significance:** Strengthens border surveillance, infrastructure planning, and national security.
- **Developmental Significance:** Supports agriculture, water management, urban planning, and environmental conservation.
- **Challenges:** Difficult terrain, extreme weather conditions, data integration, and last-mile implementation.
- **Way Forward:** Expand high-resolution geospatial mapping, strengthen AI-enabled geospatial analytics, integrate **NavIC**-based services, enhance inter-agency coordination, and promote capacity building in geospatial technologies.

PRELIMS BOOSTER BOX

- **NESAC:** North Eastern Space Applications Centre.
- **Established: 2000.**



- **Location: Shillong, Meghalaya.**
- **Joint Initiative: Indian Space Research Organisation (ISRO) and North Eastern Council (NEC).**
- **Remote Sensing:** Acquisition of information about Earth's surface without physical contact, primarily through satellites or aircraft.
- **GIS (Geographic Information System):** Technology used for collection, analysis, and visualization of spatial and geographic data.
- **GNSS:** Global Navigation Satellite System.
- **NavIC (Navigation with Indian Constellation):** India's indigenous regional satellite navigation system developed by **ISRO**, providing positioning, navigation, and timing services over India and surrounding regions.
- **North Eastern Council (NEC):** A statutory regional planning body established under the **North Eastern Council Act, 1971**, functioning under the **Ministry of Development of North Eastern Region (MDoNER)**.
- **Geospatial Technology:** Technologies such as remote sensing, GIS, and satellite navigation used for mapping, planning, monitoring, and decision-making.

PadhAI-GENERATED UPSC MCQ

Consider the following statements:

1. The **North Eastern Space Applications Centre (NESAC)** is a joint initiative of **ISRO** and the **North Eastern Council (NEC)**.
2. **NavIC** is India's indigenous regional satellite navigation system.
3. **Remote sensing** involves collecting information about the Earth's surface without making physical contact with it.

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: (d)

4. MINISTRY OF MINES TO LAUNCH EIGHTH TRANCHE OF AUCTION OF CRITICAL AND STRATEGIC MINERAL BLOCKS



- I. The **8th Tranche** includes **20 mineral blocks**, comprising **13 newly identified blocks** and **7 blocks re-auctioned** after previous attempts.
- II. The mineral portfolio includes:
 - A. **Lithium**
 - B. **Rare Earth Elements (REEs)**
 - C. **Graphite**
 - D. **Molybdenum**
 - E. **Vanadium**
 - F. **Gallium**
 - G. **Titanium**
 - H. **Tungsten**
 - I. **Phosphorite**
 - J. **Potash**
 - K. **Cesium**
 - L. **Rubidium**
 - M. **Glaucanite**
- III. These minerals are essential for:
 - A. Electric vehicles (EVs)
 - B. Renewable energy technologies
 - C. Battery manufacturing
 - D. Defence systems
 - E. Electronics and semiconductors
 - F. Fertilizer production



- G. Aerospace and advanced manufacturing.
- IV. With the completion of seven auction tranches, **56 out of 88** critical and strategic mineral blocks offered have been successfully auctioned, reflecting growing investor confidence.
- V. During **FY 2025–26**, the Ministry achieved a record by auctioning **212 mineral blocks**, including **22 critical and strategic mineral blocks**—the highest in any financial year since the auction regime began.
- VI. Recent amendments to the **Mineral (Auction) Rules, 2026** simplify timelines, improve flexibility in lease execution, and provide faster refunds where auctions are annulled, thereby improving ease of doing business.

BACKGROUND / CONTEXT

Critical Minerals

Critical minerals are minerals that are:

- Essential for economic development and national security.
- Vulnerable to supply chain disruptions.
- Difficult to substitute.

National Critical Mineral Mission (NCMM)

- I. Aims to:
 - A. Secure domestic availability of critical minerals.
 - B. Promote exploration and mining.
 - C. Reduce import dependence.
 - D. Strengthen mineral processing and recycling.
 - E. Support clean energy and strategic industries.

Auction of Mineral Blocks

- Conducted under the **Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act)**.

- Auctions are undertaken through a **transparent online competitive bidding process**.
- Intended to ensure efficient allocation of mineral resources while maximizing revenue and promoting private investment.

KEY HIGHLIGHTS

- **Event:** Eighth Tranche of Critical and Strategic Mineral Block Auctions.
- **Implementing Ministry:** Ministry of Mines.
- **Blocks Offered:** 20 across **nine States**.
- **Minerals Covered:** Lithium, REEs, Graphite, Tungsten, Gallium, Titanium, Vanadium, Potash, Phosphorite, Cesium, Rubidium, Molybdenum, and Glauconite.
- **Strategic Significance:** Strengthens India's critical mineral security and supply chains.
- **Economic Significance:** Supports EVs, renewable energy, semiconductors, defence manufacturing, and industrial growth.
- **Environmental Significance:** Facilitates the clean energy transition through secure access to battery and renewable energy minerals.
- **Challenges:** Exploration risks, environmental clearances, technology gaps, and dependence on imported processing technologies.
- **Way Forward:** Accelerate exploration, strengthen domestic mineral processing and recycling, encourage private investment, diversify global supply chains, and deepen international partnerships for critical minerals.

PRELIMS BOOSTER BOX

- **Critical Minerals:** Minerals essential for economic security, strategic industries, and clean energy with high supply risk.
- **National Critical Mineral Mission (NCMM):** Aims to secure India's critical mineral value chain through exploration, mining, processing, recycling, and overseas partnerships.
- **MMDR Act, 1957:** Governs regulation and development of mines and minerals in India.



- **Mineral (Auction) Rules, 2026:** Streamline auction procedures and improve ease of doing business.
- **Lithium:** Key mineral for rechargeable batteries used in EVs and energy storage systems.
- **Rare Earth Elements (REEs):** A group of **17 elements** essential for electronics, magnets, defence equipment, and renewable energy technologies.
- **Graphite:** Critical anode material in lithium-ion batteries.
- **Gallium:** Used in semiconductors, LEDs, and advanced electronics.
- **Tungsten:** High-strength metal used in defence, aerospace, and industrial tools.
- **Vanadium:** Used in high-strength steel alloys and vanadium redox flow batteries.

PadhAI-GENERATED UPSC MCQ

Consider the following statements:

1. Critical minerals are those that are essential for economic security and are vulnerable to supply disruptions.
2. The auction of mineral blocks in India is conducted under the **Mines and Minerals (Development and Regulation) Act, 1957**.
3. Lithium, Graphite, and Rare Earth Elements are considered important for electric vehicle batteries and clean energy technologies.

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: (d)

5. 'SCALING URBAN CLIMATE RESILIENCE: THE CAPACITIES LEGACY AND WAY FORWARD'



- The **CapaCITIES Programme** focused on enhancing the institutional and technical capacities of urban local bodies (ULBs) to address climate change challenges.
- It supported cities in preparing climate-resilient urban plans through improved planning, risk assessment, and data-driven decision-making.
- The programme promoted sustainable urban development by encouraging climate-resilient infrastructure, green mobility, and nature-based solutions.
- Capacity-building initiatives included training of urban officials, knowledge sharing, and adoption of best practices in climate governance.
- It emphasized integrating climate considerations into city master plans and development projects.
- The programme contributed to strengthening disaster preparedness, reducing climate risks, and improving urban resilience.
- The event also discussed the future roadmap for scaling climate resilience across Indian cities.

- These efforts align with India's commitments under the **Paris Agreement** and the **Sustainable Development Goals (SDGs)**.

BACKGROUND / CONTEXT

Urban Climate Resilience

Urban climate resilience refers to the ability of cities to:

- Prepare for climate-related risks.
- Absorb and recover from climate shocks.
- Adapt to long-term climate change.
- Sustain essential services and infrastructure.

CapaCITIES Programme

- I. A capacity-building initiative aimed at integrating climate resilience into urban governance and planning.
- II. Focuses on:
 - A. Institutional strengthening.
 - B. Climate-sensitive urban planning.
 - C. Knowledge sharing.
 - D. Capacity development of Urban Local Bodies (ULBs).

Related Government Initiatives

National Mission on Sustainable Habitat (NMSH)

- I. One of the **eight missions** under the **National Action Plan on Climate Change (NAPCC)**.
- II. Promotes:
 - A. Sustainable urban planning.
 - B. Energy-efficient buildings.
 - C. Public transport.
 - D. Waste management.

Smart Cities Mission

- Promotes sustainable, technology-driven, and citizen-centric urban development.

AMRUT 2.0

- Focuses on universal water supply, sewerage, and urban infrastructure with an emphasis on sustainability.

KEY HIGHLIGHTS

- **Event:** Scaling Urban Climate Resilience: The CapaCITIES Legacy and Way Forward.
- **Focus:** Strengthening climate resilience in Indian cities.
- **Primary Objective:** Build institutional capacity for climate-responsive urban governance.
- **Environmental Significance:** Improves climate adaptation, disaster resilience, and sustainable urban ecosystems.
- **Governance Significance:** Enhances planning, inter-agency coordination, and evidence-based decision-making.
- **Economic Significance:** Reduces climate-related losses and supports sustainable urban growth.
- **Challenges:** Rapid urbanization, financing gaps, limited technical capacity, and increasing climate risks.
- **Way Forward:** Mainstream climate resilience into urban planning, expand capacity-building programmes, promote nature-based solutions, leverage climate finance, and strengthen data-driven governance.

PRELIMS BOOSTER BOX

- **Urban Climate Resilience:** The ability of cities to anticipate, prepare for, adapt to, and recover from climate-related shocks and stresses.
- **Urban Local Bodies (ULBs):** Institutions of urban self-government constituted under the **74th Constitutional Amendment Act, 1992**.
- **74th Constitutional Amendment Act, 1992:** Granted constitutional status to municipalities and strengthened urban local governance.
- **National Mission on Sustainable Habitat (NMSH):** One of the **eight missions** under the **National Action Plan on Climate Change (NAPCC)**.
- **National Action Plan on Climate Change (NAPCC):** Launched in **2008**, comprising eight national missions to address climate change.



- **Smart Cities Mission:** Launched in **2015** to promote sustainable and smart urban development.
- **AMRUT 2.0:** Focuses on water security, sewerage, and sustainable urban infrastructure.
- **Nature-based Solutions (Nbs):** Actions that protect, restore, or sustainably manage ecosystems to address societal challenges such as climate change while benefiting biodiversity and human well-being.
- **Paris Agreement (2015):** International treaty under the **UNFCCC** aimed at limiting global warming and strengthening climate resilience.
- **SDG 11: Sustainable Cities and Communities**—promotes inclusive, safe, resilient, and sustainable urban development.

PadhAI-GENERATED UPSC MCQ

Consider the following statements:

1. The **National Mission on Sustainable Habitat (NMSH)** is one of the **eight missions** under the **National Action Plan on Climate Change (NAPCC)**.
2. The **74th Constitutional Amendment Act, 1992** provides the constitutional framework for **Urban Local Bodies (ULBs)**.
3. **Nature-based Solutions (Nbs)** involve protecting, restoring, or sustainably managing ecosystems to address challenges such as climate change.

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: (d)