

# MANTHAN

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# 1. Sunita Williams's unscheduled nine months long space stay

- American astronauts Sunita Williams and Butch Wilmore will return to Earth after the longest-ever unscheduled stay in space.
- The astronauts had travelled to the International Space Station (ISS) in June last year and were supposed to return in a week.
- However, the space vehicle that had taken them there, a Boeing spacecraft called Starliner, developed problems after which it was considered unsafe for the astronauts' return.
- While Starliner itself returned safely to Earth in September 2024, the two astronauts were stranded on the ISS, waiting for an alternative travel arrangement.
- Now, a SpaceX Dragon spacecraft, which carried four astronauts to the ISS on a routine assignment, is bringing back Williams and Wilmore on its return journey.
- Two other astronauts, Nick Hague and Aleksandr Gorbunov, who have completed their time on the ISS, are also returning with Williams and Wilmore.

## Nine months in space

- Williams and Wilmore will come back after more than nine months — 286 days — in space.
- Their stay is not the longest — several astronauts, both from the US and Russia, have remained in space for longer.
- Soviet cosmonaut Valeri Polyakov holds the record — he spent 438 days at the Mir space station between January 1994 and March 1995.
- Mir predated the ISS, and had been operational for 15 years between 1986 and 2001 before it was brought down.
- Between September 2022 and September 2023, US astronaut Frank Rubio completed 371 days at the ISS.
- Others have spent even more time in space cumulatively over multiple missions. Russia's Oleg Kononenko has made five trips to space, spending a total of 1,111 days.
- On his last journey, which was completed last year, he returned to Earth after 374 days.
- Peggy Whitson of the US has gone three times, and spent 675 days in all, the longest stay in space for a woman astronaut.
- This is the third time for both Williams and Wilmore as well.
- Williams, 59, spent 196 days on her first visit in 2006-2007, and then another 127 days in 2012.
- Wilmore, 62, spent a total of 178 days at the ISS during his two previous visits in 2014 and 2015.

## Boeing's test mission

- Williams and Wilmore were on a very short visit to the ISS this time.
- The main aim of their travel was to validate the capability of Boeing Starliner in taking crewed missions to the ISS.
- The Starliner CST-100 is a new spacecraft developed specifically for the National Aeronautics and Space Administration's (NASA's) Commercial Crew Program, which seeks to enable private aerospace companies to transport astronauts to and from the ISS.

- With space travel expected to expand greatly in the coming years, this program is intended to free up NASA to focus on building spacecraft and rockets for deep space missions.
- SpaceX was the first company to be certified to carry astronauts to the ISS under this program. Boeing came next.
- The flight that took Williams and Wilmore to the space station was Starliner's first attempt to carry humans in space.
- The spacecraft developed problems even before the launch — there was a helium leak in its propulsion system.
- It was not a serious enough problem for NASA to abandon the journey, but on its way to the ISS, the spacecraft developed more problems.
- However, it was able to reach its destination safely.
- The ISS, which is used primarily by the US and Russia, has never been without an astronaut since November 2000.
- Astronauts usually spend a few weeks to a few months carrying out experiments and studies before being replaced by another set.
- Missions to the ISS are planned well in advance, and spacecraft and rockets are built to meet the schedule.
- That is why an alternative space vehicle to bring back Williams and Wilmore could not be arranged immediately.
- The next spacecraft was scheduled to go to the ISS only by February 2025.
- Williams and Wilmore are experienced astronauts, and were in no discernible discomfort.
- Thus, NASA did not rush to bring them back either.
- The ISS is large enough to accommodate 10-12 astronauts at any given time. It usually has fewer people — it is only during times of changeover that it is occupied to near-full capacity.

### **Blessing in disguise**

- Williams and Wilmore could be very useful in NASA's ongoing study to assess the response of human bodies to long stays in space.
- They had not trained to spend so much time at the ISS and their bodies might have reacted differently compared to others who prepare sufficiently for extended stays.
- NASA and other space agencies are preparing to set up a permanent science facility on the Moon that will require humans to remain in space for extended periods.
- As such, it has been running a program to study the health impacts of long-period stays in space. US astronauts flying to the ISS can now volunteer to be part of such experiments.
- Past studies have shown that bone density and muscle quality deteriorate faster in space than on Earth.
- Low gravity impacts brain fluids, and extended stays can potentially alter brain structure.
- Extended stays can also increase the risk of heart disease.
- Williams and Wilmore can provide the opportunity for researchers to also study the mental and psychological impacts of being stranded in space, with their return to Earth uncertain.

### **International Space Station (ISS)**

- The International Space Station (ISS) is a large, habitable spacecraft that orbits Earth at an altitude of approximately 400 km (250 miles).
- It serves as a multinational research laboratory and is a collaboration between space agencies, including NASA (USA), Roscosmos (Russia), JAXA (Japan), ESA (Europe), and CSA (Canada).

## About the ISS

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- **Launch & Assembly:** First module, Zarya, launched in 1998.
- **Size:** Roughly the size of a football field, with a mass of 420,000 kg (925,000 lbs).
- **Speed:** Orbits Earth at ~28,000 km/h (17,500 mph), completing one orbit every 90 minutes.
- **Crew Capacity:** Usually hosts 3–6 astronauts at a time.
- **Scientific Research:** Conducts experiments in microgravity, biology, medicine, materials science, and Earth observation.
- **Partnerships:** 15+ countries have contributed to its construction and operation.
- **End of Mission:** Planned retirement around 2030, with discussions on replacing it with commercial space stations.

## SpaceX

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- SpaceX, founded in 2002 by Elon Musk, is an American aerospace manufacturer and space transportation company.
- The company designs, manufactures, and launches advanced rockets and spacecraft, with the goal of reducing space transportation costs and enabling the colonization of Mars.
- Recently, SpaceX achieved a significant milestone by successfully returning NASA astronauts Butch Wilmore and Suni Williams from the International Space Station (ISS).
- The astronauts had been on the ISS for nearly nine months due to technical issues with Boeing's Starliner capsule, which delayed their planned one-week mission.
- SpaceX's Crew Dragon capsule safely brought them back to Earth, highlighting the company's growing reliability in crewed space missions.
- Elon Musk praised both SpaceX and NASA teams for their excellent work in ensuring the astronauts' safe return.
- This mission underscores SpaceX's critical role in current U.S. space initiatives and its capability to handle complex spaceflight operations.

## Boeing Starliner

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- The Boeing Starliner, officially known as the CST-100 Starliner, is a spacecraft developed to transport crew to and from the International Space Station (ISS) and other low-Earth orbit destinations.
- Designed under NASA's Commercial Crew Program, the Starliner consists of a reusable crew capsule and an expendable service module.
- It can accommodate up to seven passengers or a mix of crew and cargo.
- Recently, NASA astronauts Butch Wilmore and Suni Williams returned to Earth after an extended nine-month stay aboard the ISS.
- Initially launched on June 5, 2024, for an eight-day mission aboard the Starliner, their mission was prolonged due to technical issues with the spacecraft's thrusters.
- Consequently, NASA decided to bring them back using SpaceX's Crew-9 mission.
- They safely splashed down off the coast of Florida, accompanied by fellow astronauts Nick Hague and Russian cosmonaut Aleksandr Gorbunov.
- This incident underscores the challenges Boeing has faced with the Starliner program, leading NASA to increasingly rely on SpaceX's Crew Dragon capsules for astronaut transport.
- The situation highlights the importance of having multiple reliable options for crewed space missions.

## QUESTIONS

**Solve the multiple choice questions:**

1. Why do astronauts float in the space station even though Earth's gravity still affects them?
  - A. Because there is no gravity in space
  - B. Because they are outside Earth's gravitational field
  - C. Because they are in a constant free-fall around Earth
  - D. Because their mass is reduced in space
2. Consider the following:
  1. NASA
  2. Roscosmos
  3. ISRO
  4. JAXA
  5. China Space Agency
  6. ESA

International Space Station (ISS) is collaboration between which of the above space agencies?

- A. 1, 2, 3 and 5 only
- B. 1, 3, 4 and 6 only
- C. 1, 2, 4, 5 and 6 only
- D. 1, 2, 3, 4, 5 and 6

## 2. Chhatrapati Shivaji Maharaj temple in Maharashtra

- Maharashtra Chief Minister Devendra Fadnavis inaugurated the state's first-ever temple dedicated to Chhatrapati Shivaji Maharaj in Thane district's Bhiwandi taluka.
- Built by the trust Shivkranti Pratishthan, this is the first temple dedicated to the great Maratha warrior in Maharashtra, but the second in India.
- The first temple dedicated to Chhatrapati Shivaji Maharaj is in Srisailem, Telangana.
- The temple was inaugurated by Fadnavis on the occasion of Chhatrapati Shivaji Maharaj's birth anniversary, as per the Hindu calendar.
- Its foundation was laid in 2017, and actual construction began in March 2018 following a bhoomipujan ceremony by Eknath Shinde, now the deputy CM of the state.
- Inspired by the architecture of Chhatrapati Shivaji Maharaj's forts, the temple is spread over an area of 2,500 sq feet, with a fort-like boundary wall covering an additional 5,000 square feet.
- The Shivkranti Pratishthan, which built the temple, was founded by a local construction magnate and Chhatrapati Shivaji Maharaj devotee named Raju Chaudhary. It was Chaudhary who gifted this land to the trust.



- The temple's central attraction is the 6.5-foot krishnashila (blackstone) statue of Chhatrapati Shivaji Maharaj, which was sculpted by renowned Mysore-based artist Arun Yogiraj.
- This is the same man who sculpted the 22-foot statue of Netaji Subhas Chandra Bose at India Gate, the 12-foot high statue of Aadi Shankaracharya in Kedarnath, and the idol of Ram Lalla at the Ram Janmabhoomi temple in Ayodhya.
- Designed by architect Vishal Vijaykumar Patil, the temple borrows from Chhatrapati Shivaji Maharaj's forts — it comprises a boundary wall, fort-like bastions, and a grand-entrance.
- The pillars of the mandir sabha mandapam fortifications are finely carved, and with attractive mahirap arches.
- The main entrance is 42 feet high, with a teakwood gate that is 27 feet high and 17 feet wide.
- The structure has been built using reinforced concrete, brickwork, as well as real stone.
- The lower part of the fort has 36 sections which contain murals measuring 9x6 feet.
- Key moments of the life of Chhatrapati Shivaji Maharaj are shown in these murals.
- Besides this, there is also a museum of historical weapons and armour in the complex. A garden surrounds the temple.
- The temple trust is hopeful that the Chhatrapati Shivaji Maharaj temple will attract pilgrims and tourists from all over Maharashtra and elsewhere in the country.
- This they believe will provide much needed employment for locals.
- The trust currently seeks the government's help in developing the area as a tourist destination, including building a hostel facility around the temple and erecting a police chowki next to it.
- Fadnavis has said that the temple will soon be granted the status of a pilgrimage site.

## Chhatrapati Shivaji Maharaj

- Chhatrapati Shivaji Maharaj (1630–1680) was the founder of the Maratha Empire in western India and one of the greatest warriors and rulers in Indian history.
- He is known for his military strategies, guerrilla warfare tactics, administrative reforms, and strong naval presence.
- His leadership laid the foundation for a powerful Maratha state that challenged the Mughal Empire.

## Highlights of Shivaji Maharaj's Life

### Early Life & Coronation

- Born on February 19, 1630, at Shivneri Fort, Maharashtra.
- Son of Shahaji Bhosale and Jijabai, who instilled in him strong values of self-rule (Swarajya).
- Formally crowned as Chhatrapati (Emperor) on June 6, 1674, at Raigad Fort.

### Military Achievements

- Established a strong Maratha kingdom by defeating Adilshahi, Mughal, and Siddis' forces.
- Captured Fort Torna at the age of 16, marking the beginning of his conquests.
- **Battle of Pratapgad (1659)** – Defeated Afzal Khan, a general of the Adilshahi Sultanate.
- Used Guerrilla warfare tactics (Ganimi Kava) to challenge larger armies.

### Conflict with the Mughals

- **Escape from Agra (1666)** – After being imprisoned by Aurangzeb, he and his son Sambhaji escaped using a brilliant disguise strategy.

- **Battle of Purandar (1665)** – Signed the Treaty of Purandar with the Mughals but later reasserted his independence.

### Naval Power & Administration

- Built a strong navy, fortifying Sindhudurg and Vijaydurg to protect the Konkan coast.
- Promoted religious tolerance, efficient taxation, and an Ashtapradhan Mandal (eight-minister council).

### Legacy

- Passed away on April 3, 1680, at Raigad Fort.
- His ideals of Swarajya (self-rule), discipline, and administration influenced later Maratha rulers, including Peshwa Bajirao and Madhavrao.
- Remembered as a symbol of valour, justice, and Hindu resurgence.

### Maratha Empire

- The Maratha Empire (1674–1818) was a powerful Indian state that dominated large parts of the Indian subcontinent.
- It was founded by Chhatrapati Shivaji Maharaj in 1674 when he was crowned king of the independent Maratha Swarajya.
- Over time, the empire expanded under successive rulers and became a major force in India, challenging the Mughal Empire and later the British East India Company.

### Key Phases of the Maratha Empire

#### 1. Foundation and Rise (1674–1707)

- **Shivaji Maharaj (1674–1680):** Established the Maratha kingdom with forts, guerrilla warfare, and a strong administrative system.
- **Sambhaji (1681–1689):** Continued the fight against the Mughals but was captured and executed by Aurangzeb.
- **Rajaram and Tarabai (1689–1707):** Resisted Mughal expansion with guerrilla tactics.

#### 2. Expansion under the Peshwas (1713–1761)

- The Peshwas (Prime Ministers) became the de facto rulers, expanding Maratha influence across India.
- **Baji Rao I (1720–1740):** Extended Maratha rule to Delhi, Malwa, Gujarat, and the Deccan.
- **Balaji Baji Rao (1740–1761):** Led the Marathas to their peak but suffered a major defeat against Ahmad Shah Abdali in the Third Battle of Panipat (1761).

#### 3. Confederation and Decline (1761–1818)

- The empire was divided among powerful regional leaders (Gaekwads of Baroda, Holkars of Indore, Scindias of Gwalior, and Bhonsles of Nagpur).
- The Marathas fought three Anglo-Maratha wars (1775–1818) against the British.
- Defeat in the Third Anglo-Maratha War (1817–1818) led to British control over India.

### Significance of the Maratha Empire

- Introduced an efficient revenue system (Chauth and Sardeshmukhi).
- Played a crucial role in weakening the Mughal Empire.
- Promoted regional autonomy and military innovation



## QUESTIONS

**Solve the multiple choice questions:**

3. What was the outcome of the Treaty of Purandar (1665)?
  - A. Shivaji surrendered all his forts to the Mughals
  - B. Shivaji retained 12 forts and surrendered 23 to the Mughals
  - C. The Mughals were defeated and forced to retreat
  - D. Shivaji refused to negotiate with the Mughals
4. Which of the following battles marked Shivaji's significant victory over Afzal Khan?
  - A. Battle of Purandar
  - B. Battle of Panipat
  - C. Battle of Pratapgad
  - D. Battle of Sinhagad

## 3. India and New Zealand

- At the invitation of Prime Minister Narendra Modi, New Zealand's Prime Minister Christopher Luxon is on an official visit to India from March 16-20, 2025.
- This is his first visit in his current capacity, covering New Delhi and Mumbai, accompanied by key ministers and a high-level delegation of officials, business representatives, and cultural groups.
- Prime Minister Luxon received a warm welcome in New Delhi, where he held bilateral talks with Prime Minister Modi.
- He also laid a wreath at Raj Ghat and met with President Droupadi Murmu.
- On March 17, he will deliver the Inaugural Keynote Address at the 10<sup>th</sup> Raisina Dialogue in New Delhi, where Prime Minister Modi will inaugurate the event.
- Both leaders reaffirmed their commitment to strengthening India-New Zealand relations, based on shared democratic values and strong people-to-people ties.
- They agreed to enhance cooperation in trade, investment, defence, education, agri-tech, space, mobility, and sports.
- Discussions also covered regional and global issues, emphasizing the importance of a stable Indo-Pacific region and upholding international law, particularly the United Nations Convention on the Law of the Sea (UNCLOS).
- The leaders acknowledged the strong presence of the Indian diaspora in New Zealand, comprising nearly six percent of its population, and their vital role in fostering bilateral relations.
- They also highlighted the importance of ensuring the safety and security of Indian-origin people in New Zealand, as well as New Zealanders in India.
- The visit underscored a commitment to deepening diplomatic, economic, and cultural ties between the two nations.

## Cooperation in trade, investment and financial matters

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- India and New Zealand's Prime Ministers reaffirmed their commitment to enhancing trade and investment ties, recognizing the potential for expanding bilateral trade.
- They encouraged businesses to explore economic and investment opportunities, aiming to build on their economies' complementarities.
- The leaders called for increased two-way investment to sustain the strong momentum in cooperation.
- A key highlight was the launch of Free Trade Agreement (FTA) negotiations for a balanced and comprehensive trade pact, fostering economic integration.
- They acknowledged that such an agreement would address challenges, leverage strengths, and ensure equitable gains.
- Senior representatives will be designated to expedite negotiations, with early cooperation in the digital payments sector under discussion.
- The Prime Ministers welcomed the signing of the Authorized Economic Operators Mutual Recognition Arrangement (AEO-MRA) under the 2024 Customs Cooperation Arrangement (CCA), facilitating smoother movement of goods between trusted traders.
- New cooperation in horticulture and forestry was highlighted through the signing of a Memorandum of Cooperation on Horticulture and a Letter of Intent on Forestry Cooperation, focusing on research, infrastructure development, and policy exchanges.
- Recognizing tourism's vital role in economic growth and people-to-people ties, the leaders noted the increasing flow of tourists and appreciated the update to the India-New Zealand Air Services Agreement.
- They agreed to encourage direct flight operations between the two countries to further boost connectivity and business engagements.

## Political, defence and security cooperation

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- The Prime Ministers of India and New Zealand reaffirmed their commitment to strengthening bilateral relations, emphasizing the importance of parliamentary exchanges.
- They encouraged regular visits of parliamentary delegations to foster mutual understanding and cooperation.
- Recognizing their shared history of military cooperation, both leaders acknowledged the sacrifices of Indian and New Zealand service personnel who fought alongside each other over the past century.
- They welcomed the sustained progress in defence engagements, including joint military exercises, staff college exchanges, port visits by naval ships, and high-level defence delegations.
- The leaders recalled the Indian Naval sailing vessel Tarini's port call at Lyttelton, Christchurch, in December 2024 and the upcoming visit of the Royal New Zealand Navy Ship HMNZS Te Kaha to Mumbai.
- A significant milestone in defence collaboration was the signing of the India-New Zealand Memorandum of Understanding (MoU) for Defence Cooperation, aimed at enhancing regular bilateral defence engagement.
- Both sides stressed the importance of maritime security and agreed to hold regular dialogues to enhance cooperation in ensuring the safety of sea lanes of communication.
- New Zealand welcomed India's participation in the Combined Maritime Forces, and both leaders commended advancements in defence ties, particularly during New Zealand's command of Command Task Force 150.

- They also appreciated the ongoing reciprocal officer training programs at defence colleges.
- Prime Minister Luxon expressed New Zealand's interest in joining the Indo-Pacific Oceans Initiative (IPOI), which Prime Minister Modi warmly welcomed.
- Additionally, both nations explored further maritime collaboration, including discussions on India's National Maritime Heritage Complex (NMHC) at Lothal, Gujarat.

### **Cooperation in science & technology and disaster management**

- India and New Zealand reaffirmed their commitment to strengthening their bilateral partnership through research, scientific collaboration, technology partnerships, and innovation.
- Both leaders emphasized the importance of fostering closer ties between businesses and industries to develop and commercialize technologies in mutually beneficial areas.
- Recognizing the economic challenges posed by climate change, both sides underscored the need for a transition to low-emission, climate-resilient economies. New Zealand's Prime Minister Christopher Luxon acknowledged India's leadership in the International Solar Alliance (ISA) and reiterated New Zealand's strong support as a member since 2024.
- In return, Prime Minister Narendra Modi welcomed New Zealand's decision to join the Coalition for Disaster Resilient Infrastructure (CDRI), which aims to build resilient infrastructure aligned with the Sustainable Development Goals (SDGs), the Paris Climate Agreement, and the Sendai Framework for Disaster Risk Reduction.
- Additionally, both leaders welcomed progress toward a Memorandum of Cooperation on earthquake mitigation.
- This agreement would facilitate collaboration between relevant authorities in India and New Zealand, focusing on sharing expertise in earthquake preparedness, emergency response mechanisms, and capacity building.
- The discussions reflected a shared commitment to enhancing cooperation in technology, climate resilience, and disaster preparedness, strengthening ties between the two nations for mutual growth and sustainability.

### **Education, mobility, sports and people to people ties**

- India and New Zealand's Prime Ministers emphasized the potential for strengthening education and community ties between the two nations.
- They encouraged academic institutions to develop future-oriented partnerships in science, innovation, and emerging technologies.
- Both leaders supported creating more opportunities for Indian students in New Zealand and recognized the importance of skill development and mobility for professionals.
- In line with their trade agreement discussions, they agreed to negotiate an arrangement facilitating the movement of skilled workers while addressing irregular migration.
- They welcomed the signing of the refreshed Education Cooperation Arrangement between the Indian and New Zealand Ministries of Education, which aims to enhance bilateral educational exchange and collaboration.
- The leaders also acknowledged their strong sporting ties, particularly in cricket, hockey, and Olympic sports, and welcomed the Memorandum of Cooperation on Sports.
- They looked forward to the "Sporting Unity" events in 2026, celebrating a century of sporting engagement.
- Additionally, they recognized the significance of traditional medicine and encouraged discussions between experts to explore collaboration.

- The leaders noted the growing interest in Yoga, Indian music, and dance in New Zealand and promoted deeper cultural ties through festivals, theatre, and cinema.
- Overall, the meeting reaffirmed the commitment of both nations to strengthening partnerships in education, trade, sports, medicine, and culture, fostering closer bilateral relations.

### Cooperation in regional and multilateral fora

- India and New Zealand reaffirmed their commitment to an open, inclusive, stable, and prosperous Indo-Pacific, emphasizing respect for sovereignty and territorial integrity.
- Both leaders acknowledged their cooperation in regional fora such as ASEAN-led bodies and stressed ASEAN centrality in ensuring security and prosperity in the Indo-Pacific.
- The leaders underscored the importance of an effective multilateral system, advocating for UN reforms, including the expansion of the Security Council. New Zealand endorsed India's bid for permanent membership in a reformed UN Security Council.
- They also agreed to explore mutual support for candidatures in multilateral fora.
- On global security, both leaders emphasized nuclear disarmament and non-proliferation, recognizing India's role in the Nuclear Suppliers Group for its clean energy goals.
- They expressed support for peace in the Middle East, welcomed the January 2025 ceasefire agreement, and advocated for a two-state solution to the Israeli-Palestinian conflict.
- They also called for a just and lasting peace in Ukraine, respecting international law and territorial sovereignty.
- Both nations strongly condemned terrorism in all forms, emphasizing the need for immediate and concrete actions against UN-proscribed terrorist organizations.
- They called for dismantling terrorist infrastructure, combating terror financing, and bringing perpetrators to justice.
- The leaders expressed satisfaction with the progress in bilateral cooperation and committed to further strengthening their partnership, exploring new areas of collaboration such as green and agricultural technologies, for mutual and regional benefit.

### United Nations Convention on the Law of the Sea (UNCLOS)

- United Nations Convention on the Law of the Sea (UNCLOS) is an international treaty that establishes a legal framework for the use of the world's oceans and their resources.
- It was adopted on December 10, 1982, and came into force on November 16, 1994.
- UNCLOS is often referred to as the "Constitution of the Oceans."

### Features of UNCLOS

- **Maritime Zones:** UNCLOS defines various maritime zones and the rights of coastal and other states within these zones.
- **Territorial Sea:** Up to 12 nautical miles from the baseline, where a coastal state has full sovereignty.
- **Contiguous Zone:** Between 12 and 24 nautical miles, where states can enforce laws related to customs, taxation, and immigration.
- **Exclusive Economic Zone (EEZ):** Extends up to 200 nautical miles, where a coastal state has sovereign rights over natural resources.
- **Continental Shelf:** Extends beyond the EEZ (up to 350 nautical miles) if the continental margin extends beyond 200 nautical miles.

- **High Seas:** Beyond national jurisdiction, governed by international law.
- **Freedom of Navigation:** Ensures the right of innocent passage through territorial seas and freedom of navigation on the high seas.
- **Deep-Sea Mining:** Establishes the International Seabed Authority (ISA) to regulate the exploration and exploitation of mineral resources in the deep seabed (beyond national jurisdictions).
- **Dispute Resolution:** Provides mechanisms for resolving maritime disputes, including the International Tribunal for the Law of the Sea (ITLOS), arbitration, and conciliation.
- **Marine Environmental Protection:** Imposes obligations on states to protect and preserve the marine environment.

### Significance of UNCLOS

- Helps prevent conflicts over maritime boundaries.
- Protects the rights of landlocked countries by ensuring access to the sea.
- Regulates marine resource management and conservation efforts.
- Establishes legal norms for freedom of navigation, crucial for global trade.

### India and UNCLOS

- India ratified UNCLOS in 1995.
- The Indian Navy and Coast Guard operate in accordance with UNCLOS principles.
- India has secured approval for an extended continental shelf in the Bay of Bengal.
- India actively participates in the International Seabed Authority and deep-sea mining projects.

### QUESTIONS

#### Solve the multiple choice questions:

- Under UNCLOS, a coastal state can claim an extended continental shelf beyond 200 nautical miles if:
  - It has historical control over the seabed beyond the EEZ
  - The continental margin naturally extends beyond 200 nautical miles
  - The coastal state has military presence in the area
  - The waters are rich in mineral resources
- A foreign warship is passing through a coastal state's Territorial Sea under "innocent passage." Under UNCLOS, which of the following actions is NOT permitted for the warship?
  - Conducting intelligence gathering activities
  - Moving through the waters without delay
  - Complying with the coastal state's maritime regulations
  - Temporarily stopping due to force majeure (unavoidable emergency)

## 4. Digitization of Cultural Heritage in India

- India is one of the largest repositories of tangible heritage, with monuments, sites, and antiquities spanning from prehistoric times to the colonial era.



- While various organizations like the ASI, State Archaeology Departments, and INTACH have documented parts of this heritage, much remains scattered or undocumented.
- The absence of a unified database makes research, conservation, and management challenging.
- To address this, the National Mission on Monuments and Antiquities (NMMA) was launched to systematically document and digitize built heritage, sites, and antiquities.
- Through standardized documentation, training programs, and public awareness, NMMA aims to create a comprehensive national database, ensuring the preservation of India's rich cultural legacy.

### National Mission on Monuments and Antiquities (NMMA)

- Established in 2007, the NMMA is responsible for the digitization and documentation of India's built heritage and antiquities.
- It has made significant progress in compiling national registers for monuments and antiquities.

### Achievements of NMMA

- **Digitization of Antiquities:** 12,34,937 antiquities have been digitized, including 4,46,068 from ASI Museums/Circles/Branches and 7,88,869 from other institutions.
- **Built Heritage & Sites:** 11,406 sites and monuments have been documented.
- **Budget Allocation:** Rs. 20 lakh were allocated for NMMA in the FY 2024-25.

### Objectives of NMMA

- Documenting and creating a national database of built heritage, monuments, and antiquities for better management and research.
- Ensuring uniform documentation of antiquities across central, state, private institutions, and universities.
- Raising awareness about cultural heritage preservation.
- Providing training and capacity building for state departments, local bodies, museums, NGOs, and universities.
- Enhancing collaboration between the Archaeological Survey of India (ASI), state departments, and other stakeholders.

### Publication and Research

- The Ancient Monuments and Archaeological Sites and Remains Act 1958 (AMASR Act 1958) was enacted by the Parliament with an aim "to provide for the preservation of ancient and historical monuments and archaeological sites and remains of national importance, for the regulation of archaeological excavations and for the protection of sculptures, carvings, and other like objects.

### As per the AMASR Act 1958, the following are the definitions of ancient monuments

- "Ancient monument" means any structure, erection, or monument, or any tumulus or place of interment, or any cave, rock sculpture, inscription, or monolith, which is of historical, archaeological, or artistic interest and which has been in existence for not less than one hundred years, and includes:
  - The remains of an ancient monument
  - The site of an ancient monument
  - Such portion of land adjoining the site of an ancient monument as may be required for fencing, covering, or otherwise preserving such monument
  - The means of access to, and convenient inspection of, an ancient monument
- The scope of documentation of Built Heritage by the National Mission on Monuments and Antiquities (NMMA) has been enhanced by defining any structure that belongs to the pre-independence period, and the year 1950 has been considered as the cut-off date keeping in view of historical importance.



## Antiquity & Art treasure

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- As per the Antiquities and Art Treasures Act, 1972, the following are the definitions of antiquity and art treasure:
  - **“antiquity” includes**
    - (i) Any coin, sculpture, painting, epigraph, or artistic/craftsmanship work.
    - (ii) Any object detached from a building or cave.
    - (iii) Any item reflecting science, art, literature, religion, customs, or politics of bygone eras.
    - (iv) Any historically significant object.
    - (v) Any item declared an antiquity by the Central Government, existing for at least 100 years.
  - any manuscript, record, or other document which is of scientific, historical, literary, or aesthetic value and which has been in existence for not less than seventy-five years;
  - “art treasure” means any human work of art, not being an antiquity, declared by the Central Government by notification in the Official Gazette, to be an art treasure for the purposes of this Act having regard to its artistic or aesthetic value.

## Digitization Guidelines

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- To create a national digital database, NMMA has set standards for uniform documentation:
- Photographs of built heritage/sites (from secondary sources) should be in uncompressed TIFF format (300 dpi resolution).
- Antiquities should be photographed in uncompressed TIFF (300 dpi). If taken in NEF/RAW format, they must be converted to TIFF without alterations.
- Miniature paintings can be either photographed or scanned in TIFF (300 dpi) with a suitable background.
- All documentation should be stored in MS Excel format with separate sheets for each antiquity, heritage site, or built structure.
- Photographs should be included in the documentation sheet and also stored separately as master images.

## Indian Heritage in Digital Space (IHDS) Research

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- The IHDS initiative focuses on utilizing modern digital technologies to preserve and share India's heritage beyond mere documentation. It aims to create immersive experiences and analytical tools for scholars and the general public.

## Objectives of IHDS

- Promoting research in digital heritage technologies with an emphasis on Indian cultural assets.
- Developing a crowdsourcing framework to engage the public in building digital heritage collections.
- Establishing a storage, curation, and distribution mechanism for multimedia heritage resources to support interdisciplinary research.

## The Role of Digital Technologies in Heritage Preservation

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- Digital tools such as 3D scanning, virtual reality, computer vision, and artificial intelligence have transformed heritage preservation. These technologies allow for:
  - The creation of high-resolution digital archives of manuscripts, monuments, and artifacts.
  - Virtual reconstructions of lost or damaged heritage structures.
  - Interactive experiences for education and tourism.
  - Enhanced research capabilities for historians, architects, and scientists.

Solve the multiple choice questions:

7. The National Mission on Monuments and Antiquities (NMMA) primarily aims to address which of the following challenges in heritage preservation?
  - A. Legal ownership disputes over antiquities
  - B. Lack of a unified and standardized database for cultural heritage
  - C. Depletion of natural resources near heritage sites
  - D. Restricting public access to historical records
8. Which of the following statements about NMMA's achievements is INCORRECT?
  - A. Over 12 lakh antiquities have been digitized under NMMA.
  - B. The mission has documented more than 50,000 built heritage sites and monuments.
  - C. A major portion of the digitized antiquities comes from non-ASI institutions.
  - D. NMMA has been allocated Rs. 20 lakh for the financial year 2024-25.

## 5. Vigyan Dhara: A Catalyst for India's Scientific Progress

- The Government of India has significantly increased the allocation for the Vigyan Dhara scheme, reinforcing its commitment to enhancing the country's scientific research, innovation, and technological development ecosystem.
- The budget has witnessed a substantial rise from Rs. 330.75 crore in 2024-25 to Rs. 1425.00 crore in 2025-26.
- The proposed outlay for the implementation of the unified scheme 'Vigyan Dhara' is Rs.10,579.84 crore for the period of 2021-22 to 2025-26, aligning with the 15<sup>th</sup> Finance Commission.
- This increased investment underscores the government's dedication to fostering science and technology as a foundation for national progress.

### The Birth of Vigyan Dhara

- The Vigyan Dhara scheme came into force with effect from 16.01.2025. It merges three key umbrella schemes into one, focusing on:
  - **Science and Technology (S&T) Institutional and Human Capacity Building:** This component focuses on strengthening India's scientific infrastructure and human resource pool. It aims to build and enhance research and development (R&D) labs across academic institutions, creating a robust environment for scientific research.
  - **Research and Development (R&D):** Vigyan Dhara emphasises research in various critical areas, including basic research, translational research in sustainable energy and water, and access to international mega facilities. This component also fosters collaborative research through international bilateral and multilateral cooperation.

- **Innovation, Technology Development, and Deployment:** This segment of the scheme aims to drive innovation at all levels, from schools to higher education and the industry. It seeks to promote technology development and deployment, with a particular focus on increasing collaboration between academia, government, and industry, as well as supporting startups.
- This strategic integration enhances efficiency in fund utilization and establishes synchronization among the sub-schemes and programs, ensuring a more streamlined approach to achieving scientific progress in India.

## Focus Areas of Vigyan Dhara

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### 1. Capacity Building

- Establishing advanced research laboratories in academic institutions
- Supporting faculty development and student research
- Promoting international scientific collaborations

### 2. Research and Development

- Encouraging basic research with access to international mega facilities
- Supporting translational research in areas such as sustainable energy, water, etc.
- Fostering collaborative research through international bilateral and multilateral cooperation
- Contributing to building a critical human resource pool to expand the nation's R&D base and improve the Full-Time Equivalent (FTE) researcher count.

### 3. Innovation and Technology Development

- Supporting startups and entrepreneurs in science and technology
- Facilitating technology transfer and commercialization
- Promoting the development of indigenous technologies
- Reinforcing innovation efforts from school-level education to higher education, industries, and startups through targeted interventions

### 4. Promoting Gender Parity in Science and Technology

- Implementing focused programs to increase the participation of women in S&T fields
- Ensuring gender equality in Science, Technology, and Innovation (STI) through strategic interventions

### 5. International Collaboration

- Promoting joint research projects
- Facilitating knowledge exchange with international researchers
- Strengthening India's position as a global scientific leader.

## Key Impacts

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- Enhanced collaboration between academia, government, and industry
- Increased participation of women in S&T fields.
- Strengthened R&D capabilities, aligned with global standards and national priorities.
- All the programs under the Vigyan Dhara scheme are aligned with the 5-year goals of the Department of Science and Technology (DST), contributing towards the vision of Viksit Bharat 2047.
- Furthermore, the Research and Development (R&D) component of the scheme is structured to align with the Anusandhan National Research Foundation (ANRF), ensuring that India's scientific research follows globally prevailing standards while adhering to national priorities.

## Fostering a Culture of Innovation

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- As of March 2025, 57,869 individual beneficiaries have availed the scheme.
- The beneficiaries include young students in the age group of 10-15 years and studying in class VI to X availing the benefits under INSPIRE-MANAK (Million Minds Augmenting National Aspiration and Knowledge) program.
- This initiative nurtures a scientific mindset, encourages research careers, and fosters innovation among students.
- In Telangana alone, 4002 beneficiaries have availed of the scheme, with Rs. 3.3 crore utilized as of 10.03.2025.
- The increased budget allocation will further strengthen state-level scientific initiatives, enabling more individuals and institutions to benefit.

## Nationwide Implementation: Spreading Scientific Awareness

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Vigyan Dhara operates as a central sector scheme, implemented across the country. The Department of Science and Technology (DST) has taken proactive measures to raise awareness through:

- Extensive media coverage across print, social, and digital platforms
- A dedicated web portal providing comprehensive information on various programs
- Active engagement with stakeholders to disseminate knowledge about the scheme's benefits.

## Rising Scientific Publications

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- As per the latest Science & Engineering Indicators report from the National Science Foundation, USA, India has shown a consistent rise in scientific publications.
- The government has taken several steps to strengthen the research ecosystem and encourage researchers for scientific publications, including:
  - Successive increases in budget allocations for scientific research
  - Establishment of Anusandhan National Research Foundation (ANRF) through the ANRF Act 2023
  - Creation of Centres of Excellence
  - Instituting research fellowships and research programs
  - Encouraging industry participation in R&D
  - Providing extramural project funding and fellowship schemes through DST, DBT, and CSIR
- Research funding supports areas such as clean energy, water, nano and advanced materials, cyber-physical systems, quantum science, geospatial technology, biotechnology, and industrial technologies.
- The outcomes of these initiatives include scientific publications, intellectual property creation (patents), technology transfers, and industrial designs.
- Additionally, researchers are encouraged to conduct research publications and generate intellectual property, as these are key performance indicators for career progression.

## A Transformative Vision for India's Future

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- Vigyan Dhara is set to revolutionize India's scientific landscape by fostering innovation, strengthening research capabilities, and promoting technological advancements.
- The government's increased budget allocation signifies a clear commitment to advancing India's position as a global leader in science and technology while ensuring inclusive participation and alignment with the nation's long-term development goals.

Solve the multiple choice questions:

9. What is the primary purpose of integrating three umbrella schemes under Vigyan Dhara?
  - A. To focus solely on basic scientific research
  - B. To ensure a more synchronized and efficient utilization of funds
  - C. To create a separate department for managing research grants
  - D. To limit international collaborations in scientific research
10. How does Vigyan Dhara aim to promote awareness and engagement in science and technology?
  - A. By making participation in science fairs mandatory for students
  - B. Through print, social, and digital media campaigns, a dedicated web portal, and stakeholder engagement
  - C. By providing direct financial incentives to researchers for public outreach
  - D. By restricting access to scientific research only to government institutions

## 6. Indore to set up India's First PPP Green Waste Processing Plant

- Indore is poised to set a national precedent in sustainable waste management with the inauguration of India's first Public-Private Partnership (PPP) model-based green waste processing plant under the Swachh Bharat Mission-Urban.
- This pioneering initiative aims to transform the city's green waste into valuable resources, underscoring Indore's commitment to environmental sustainability and innovative urban waste solutions.

### Facility Overview

- Situated on a 55,000 square feet plot in Bicholi Hapsi, the plant is designed to recycle wood and branches into wooden pellets, offering an eco-friendly alternative to coal and promoting energy conservation.
- The Indore Municipal Corporation (IMC) anticipates earning approximately Rs. 3,000 per tonne in royalty for supplying these materials to the facility.

### Green Waste Management Strategy

- Indore generates about 30 tons of green waste daily, comprising wood, branches, leaves, and flowers.
- This volume can escalate to 60-70 tons during autumn.
- To manage this, large tree branches will be directed to the Green Waste Processing Plant at City Forest for repurposing.
- Additionally, green waste from major institutions will be collected and sent to the facility under a fixed fee structure.

### Public-Private Collaboration

- The project is a collaborative effort between the IMC and Astronomical Industries Private Limited.



- The IMC provides land and transports green waste to the plant, while the private partner is responsible for establishing infrastructure, including sheds, electricity, and water facilities, and overseeing the plant's installation and operation.

### Processing Methodology

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- The green waste undergoes a drying process over three to four months, reducing its moisture content by 90%.
- Advanced machinery then converts the dried waste into fine sawdust, which can be utilized across various industries, contributing to a sustainable, circular economy.

### Applications of Processed Materials

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- The resultant sawdust and wooden pellets have diverse applications:
  - **Eco-friendly Fuel:** Serving as a cleaner alternative to traditional fossil fuels.
  - **Biodegradable Packaging:** Reducing reliance on plastic materials.
  - **Furniture Manufacturing:** Used as a composite material in products like chairs and tables.
  - **Fertilizers:** Enhancing soil quality for agriculture.
  - **Disposable Plates:** Offering biodegradable options in the food industry.

### Environmental and Economic Benefits

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- This initiative is expected to improve air quality by reducing pollution and curbing the unnecessary burning of waste.
- It also provides a sustainable energy source, aligning with the vision of Garbage-Free Cities under the Swachh Bharat Mission-Urban, and generates additional revenue streams for the municipal corporation.

### Swachh Bharat Mission-Urban

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- The Swachh Bharat Mission-Urban (SBM-U) is an initiative by the Government of India aimed at achieving a clean and garbage-free urban India.
- Launched on October 2, 2014, by Prime Minister Narendra Modi, the mission focuses on sanitation, waste management, and sustainable cleanliness in urban areas.

#### SBM-U 1.0 (2014–2021)

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- Aimed to eliminate open defecation and improve solid waste management.
- Focused on building toilets, especially for urban poor communities.
- By 2019, India was declared Open Defecation Free (ODF) in urban areas.

#### SBM-U 2.0 (2021–2026)

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- Focuses on making urban India “Garbage-Free” through 100% source segregation of waste.
- Promotes sustainable sanitation with the ODF+, ODF++, and Water+ certifications.
- Encourages the adoption of circular economy principles in waste management.
- Aims to remediate legacy waste dumpsites to reclaim urban land.

### Key Components of SBM-U 2.0

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- Door-to-door waste collection and segregation at source.
- Sustainable solid waste management, including waste-to-energy and composting.
- Reduction in plastic waste and increased recycling.
- Fecal sludge and used water management to ensure urban sanitation.



- Encouraging behavioral change through awareness campaigns like Swachh Survekshan.

### Achievements & Impact

- Over 70 lakh individual and community toilets built.
- More than 4,500 cities certified as ODF+ and ODF++.
- Significant reduction in manual scavenging through mechanized cleaning.
- Promoted startups and innovations in waste management and sanitation technology.

### Swachh Survekshan

- An annual cleanliness survey that ranks Indian cities based on their sanitation and waste management efforts. Indore has consistently ranked as the cleanest city in India.

### QUESTIONS

Solve the multiple choice questions:

11. What is the primary focus of SBM-U 2.0 that differentiates it from SBM-U 1.0?
  - A. Construction of household and community toilets
  - B. Eliminating open defecation in urban areas
  - C. Achieving 100% waste segregation and making urban India garbage-free
  - D. Providing subsidies for private sanitation infrastructure
12. Which of the following measures is **NOT** a component of SBM-U 2.0?
  - A. Encouraging a circular economy in waste management
  - B. Implementing ODF+, ODF++, and Water+ certifications
  - C. Reducing manual scavenging through mechanized cleaning
  - D. Extending the mission to rural areas for sanitation improvement

## 7. Factors influencing women's political participation

- The participation of women in Indian politics presents a paradox: while India has produced several influential women leaders, overall political engagement among women remains low.
- Unlike many countries where the gender gap in political participation narrowed in the 1990s, India saw this shift only in the 2010s.
- Discussions often focus on social and cultural biases hindering women's electoral success but overlook how everyday women engage with the electoral process.
- Their voting patterns, choices, and agency in shaping election outcomes remain underexplored.
- Despite political parties celebrating women voters during elections, they often view them as a homogeneous group, ignoring intersections of caste, class, religion, and region that influence their political behavior.

- Global examples, such as women's support for Donald Trump in the 2016 U.S. elections and their participation in India's 1990s riots, demonstrate the complexity of women's political engagement.
- In this context, Rajeshwari Deshpande's study, *Shaping of the Woman Constituency in Indian Elections: Evidence from the NES Data*, is significant.
- By analyzing National Election Studies (NES) data, she examines rising women voter turnout and whether gender or other identities shape their choices.
- Her findings provide critical insights into the gendered dimensions of Indian elections, offering a nuanced understanding of women's evolving political agency.

### **Mere beneficiaries**

- The significant rise in women's voter turnout since 2010 and how political parties have responded by introducing policies targeting women.
- However, these policies often portray women as passive beneficiaries rather than active political agents.
- Welfare schemes such as Ujjwala and Pradhan Mantri Awas Yojana were crucial to the BJP's success in the 2019 Lok Sabha elections, while initiatives like 'Ladli Behna' and 'Ladli Laxmi' contributed to electoral victories in Madhya Pradesh.
- These programs reinforce the perception of women as dependents, with political leaders assuming the role of providers rather than acknowledging women as independent decision-makers.
- Deshpande argues that high voter turnout does not necessarily translate into genuine political empowerment.
- Historically, women were viewed as marginal political participants, with efforts focused on creating a 'non-political' constituency for them.
- Even as their participation in elections increases, political parties and media continue to frame their votes as being influenced primarily by welfare benefits rather than political agency.
- Analysing National Election Studies (NES) data is essential to determine whether the increase in women voters represents a deeper shift in political power or remains a superficial inclusion in the electoral process without meaningful influence.

### **Beyond voting**

- The increasing turnout of women voters in the 2024 Lok Sabha elections is a significant development, but political participation extends beyond voting. Women continue to lag behind men in rallies, campaigns, political affiliations, and policy advocacy.
- Although only 14% of women report seeking advice from their spouses on voting decisions—suggesting growing political agency—this figure remains significantly higher than that of men.
- This indicates that despite higher voter participation, deeper political engagement is hindered by social and structural barriers.
- One explanation for increased women voter turnout is the self-empowerment hypothesis, which attributes the trend to rising literacy rates and employment opportunities that enable independent voting.
- Additionally, efforts by the Election Commission to improve women's voter registration have contributed to this increase.
- However, the author challenges this hypothesis, pointing out two contradictions.
- First, women's workforce participation remains low, weakening the argument that economic independence is the primary driver of voter turnout.
- Second, the proportion of registered female voters is still lower than that of male voters, indicating that fewer women are being added to electoral rolls.

- An alternative explanation for increased women voter turnout is the large-scale migration of men, especially in socially and economically backward states.
- This shift could have resulted in a higher proportion of women voters casting their ballots in the absence of male family members.
- These trends suggest that while women's electoral participation has improved, their broader political engagement remains restricted due to deep-rooted social and economic constraints.

### Other identities

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- Women's voting behavior in India is influenced by multiple intersecting factors, including regional, caste, and class identities, rather than being driven solely by gender.
- The National Election Study (NES) data reveal that state-specific political and social contexts significantly shape electoral choices, challenging the notion of a unified woman's voting bloc.
- Instead, women's voting preferences align closely with their community identities.
- State-level variations further illustrate this complexity. In Tamil Nadu, Kerala, and West Bengal, where strong regional parties dominate, women's voting patterns tend to reflect regional political movements rather than national gender-based trends.
- Additionally, caste and class divisions play a crucial role in shaping electoral choices.
- The BJP has historically received greater support from urban, upper-class, and upper-caste groups, whereas Congress has traditionally drawn backing from the urban poor and marginalized communities.
- However, these patterns are not rigid, as many women, particularly from lower socioeconomic backgrounds, continue to vote based on the interests of their communities rather than on a pan-Indian gender identity.
- Thus, women's voting behavior in India is best understood within the broader socio-political and community framework, highlighting the influence of regional, caste, and class dynamics over a singular gender-based voting trend.

### Women's support for different parties

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- The NES data reveal that Congress has historically enjoyed a gender advantage, receiving more female than male support.
- This trend persisted in 2024, except in 2014, when the party faced a nationwide decline.
- Left parties also had a gender advantage, but their weakening influence has diminished this effect.
- In contrast, the BJP has traditionally faced a gender disadvantage, with fewer women voting for the party compared to men.
- However, this gap has narrowed significantly from over 20% in previous years to around 7% in 2024.
- The BJP's targeted outreach to women has contributed to this shift, though much of its female support comes from welfare beneficiaries.
- Despite these efforts, men within this group still support the BJP more than women.
- Women's support for the BJP varies across regions.
- In some non-BJP-ruled States, more women than men voted for the party, despite no increase in female voter turnout.
- In other States, women preferred opposition parties, leading to an inconsistent gender gap.
- This highlights that women's electoral choices are influenced by factors beyond gender, including caste, class, and regional contexts.
- Three key trends in women's political participation emerge.
- First, while women's voter turnout has increased, their political engagement beyond voting remains low.
- Second, their voting patterns are shaped by multiple intersecting identities.

- Third, despite focused outreach, the BJP still faces a gender disadvantage.
- These findings suggest that Indian women do not yet form a distinct electoral constituency, as their political choices are shaped by broader socio-political factors.

## Women in Indian politics

- Women have played a crucial role in Indian politics, shaping the country's governance and policy-making.
- While India has had significant female political leaders, representation in politics remains a challenge due to social and structural barriers.

## Historical Contributions

- **Sarojini Naidu** – One of the first women to play an active role in the Indian independence movement; also became the first female governor of an Indian state (Uttar Pradesh).
- **Vijaya Lakshmi Pandit** – First woman to hold a cabinet position in pre-independent India and the first female president of the UN General Assembly.
- **Indira Gandhi** – India's first and only female Prime Minister (1966-1977, 1980-1984). She played a major role in shaping India's modern political landscape.

## Key Developments in Women's Political Representation

- **Women's Reservation Bill (1996-2023):** The Nari Shakti Vandan Adhiniyam (2023) was passed to reserve 33% of seats for women in the Lok Sabha and state assemblies.
- **Panchayati Raj (1992):** The 73<sup>rd</sup> and 74<sup>th</sup> Constitutional Amendments reserved one-third of local government seats for women, increasing grassroots participation.

## Prominent Women Leaders Today

- **Sonia Gandhi** – Former Congress President, influential in shaping Indian politics.
- **Mamata Banerjee** – Chief Minister of West Bengal, first woman to hold this position.
- **Nirmala Sitharaman** – India's first full-time woman Finance Minister.
- **Droupadi Murmu** – India's first tribal woman President.

## QUESTIONS

Solve the multiple choice questions:

- Which of the following is a major challenge in increasing women's political representation in India?
  - Lack of female voter turnout in elections
  - Social and structural barriers limiting women's participation
  - Overrepresentation of women in political leadership roles
  - Absence of any reservation policies for women in politics
- What was a significant impact of the 73<sup>rd</sup> and 74<sup>th</sup> Constitutional Amendments on women's political participation?
  - Women were granted the right to vote in Indian elections
  - One-third of local government seats were reserved for women
  - Women were given direct entry into the Union Cabinet
  - The Prime Minister was required to appoint a female deputy

## 8. World's First 'Supersolid' Created From Light

- In a groundbreaking scientific achievement, researchers have successfully transformed light into a “supersolid” for the first time.
- This pioneering discovery marks a significant step forward in physics, as light, traditionally understood as a form of energy, has been converted into a solid-state material exhibiting extraordinary properties.
- The study introduces a novel phase of matter that integrates characteristics of both solids and superfluids, which could lead to transformative applications in quantum computing, materials science, and energy storage.
- The experiment, carried out by an international team of scientists, has resulted in the formation of a supersolid state in a photonic platform.
- This means that light has been arranged in a unique way, where coherent quantum droplets form a periodic structure in space.
- Unlike traditional solids, this supersolid can flow through obstacles without being disturbed while still maintaining its spatial arrangement, much like a crystalline solid.
- According to Iacopo Carusotto, co-author of the study and researcher at the National Institute of Optics (CNR-INO), the supersolid consists of a fluid composed of regularly arranged quantum droplets that remain intact even when interacting with external forces.
- This breakthrough in manipulating light represents a significant advance in material science, opening new possibilities for understanding and utilizing energy in innovative ways.
- The researchers highlight that this development is not merely an imitation of atomic supersolids but a fundamentally new approach to achieving supersolidity.
- Dimitrios Trypogeorgos, senior researcher at CNR-Nanotec and coordinator of the study, emphasizes the novelty of the work, explaining that it goes beyond previous photonic analogies of atomic systems.
- The study paves the way for exploring new quantum phases of matter in non-equilibrium systems, which could have broad implications for future technologies.
- Daniele Sanvitto, research director and head of the advanced photonics group at CNR-Nanotec in Lecce, underscores the significance of the research.
- He states that this achievement is crucial as it bridges the gap between fundamental science and practical applications.
- The potential applications of this supersolid state of light range from next-generation quantum computing to advanced optical technologies, offering a promising avenue for future innovation.
- Dario Gerace, co-author and full professor at the University of Pavia, highlights that realizing this exotic state of condensed matter in a fluid of light within a semiconductor nanostructure provides researchers with a new and controlled method for investigating its physical properties.
- This advancement may lead to the development of novel light-emitting devices that leverage the unique characteristics of supersolidity in photonic systems.



- Although the discovery is still in its early stages, it represents a significant milestone in understanding the fundamental properties of light and matter.
- By demonstrating the existence of a supersolid phase in a photonic system, the researchers have opened the door to future studies that could lead to revolutionary applications in science and technology.
- This study sets the foundation for further exploration into non-equilibrium quantum phases of matter, potentially redefining how light is manipulated and utilized in various fields.

### National Institute of Optics (CNR-INO)

- The National Institute of Optics (CNR-INO) is a research institute under the National Research Council of Italy (Consiglio Nazionale delle Ricerche - CNR).
- It specializes in optics and photonics research, focusing on fundamental and applied science in areas like quantum optics, optical imaging, laser technology, and optical metrology.

### Facts about CNR-INO

- **Established:** Originally founded in 1927 as the National Institute of Optics and later integrated into CNR.
- **Headquarters:** Florence, Italy.

### Research Areas

- Quantum optics and quantum technologies
- Optical spectroscopy and imaging
- Laser physics and ultrafast optics
- Biomedical optics and photonics
- Optical sensors and metrology

### Collaborations

- Works with universities, industries, and international research organizations.
- CNR-INO plays a significant role in advancing cutting-edge optical and photonic technologies, contributing to fields like quantum computing, environmental sensing, and biomedical diagnostics.

## QUESTIONS

**Solve the multiple choice questions:**

15. What is unique about the newly created 'supersolid' state of light?
  - A. It combines properties of both solids and superfluids
  - B. It completely absorbs all light without reflection
  - C. It exists only at extremely high temperatures
  - D. It cannot interact with any external forces
16. Which research institute played a key role in this discovery of the supersolid state of light?
  - A. MIT (Massachusetts Institute of Technology)
  - B. CERN (European Organization for Nuclear Research)
  - C. National Institute of Optics (CNR-INO)
  - D. Indian Institute of Science (IISc)



17. What are some potential applications of the supersolid state of light?
- A. Enhancing fossil fuel efficiency
  - B. Developing next-generation quantum computing and optical technologies
  - C. Creating stronger metallic alloys
  - D. Improving nuclear reactor stability

## 9. IndusInd Bank's derivative losses unfolded

- IndusInd Bank reported derivative losses of Rs. 2,100 crore on March 10, which pulled down its share price by 23%.
- The bank sought to put the blame on a change of rules by the Reserve Bank of India relating to the derivative portfolio.
- However, the loss from the derivative book remained unresolved for a long time, leading to the accumulation of losses.
- Amid the turmoil, the exit of the bank's Chief Financial Officer (CFO) Gobind Jain, and the decision of CEO Sumant Kathpalia and Deputy CEO Arun Khurana to sell shares worth Rs. 157 crore over the last two years, have been spotlighted.
- The stock has revived from levels of Rs. 655 on March 11 to levels of Rs. 692 around midday on March 19.
- Over the last six months, the IndusInd Bank share price has declined more than 53%.

### What happened on March 10?

- IndusInd Bank disclosed that an internal review of its derivative portfolio had revealed a potential 2.35% adverse impact on its net worth, which would have an impact of approximately Rs. 2,100 crore on the bank.
- As per directives on investments issued by the RBI in September 2023, banks are prohibited from conducting internal trades/hedging and, accordingly, IndusInd Bank ceased internal trades from April 1 2024.
- However, during an internal review, the bank identified certain discrepancies, wherein the accounting of losses on forex derivatives/swap transactions executed prior to April 2024 (over the past 5-7 years) to hedge forex deposits/debt were not recognised through NII (net interest income), while the corresponding treasury gains were recognised in the profit and loss (P&L) statement.
- Derivatives are used by the treasury department to convert forex deposits/ borrowings into rupees.

### Was the disclosure by the bank prompted by the RBI?

- Banking sources said it was probable that IndusInd Bank was aware of the scale of the problem long before they claimed to have discovered it, and that the disclosure was ultimately prompted by the RBI.
- The bank's handling of internal trades and accrued interest differential has raised questions, as it appears that these transactions were not fully unwound on a daily basis.

- As a result, the loss accumulated over time, instead of being adjusted gradually. This is a likely breach of accounting norms.
- The fact that a significant gap in the balance sheet went unnoticed for an extended period is surprising, given that all foreign exchange trades and positions are fully recorded on a central system by the treasury and finance department.
- The bank seems to have been unaware of holding a risky position at any given time, even though this information is readily available on the central system.

### And when and why did the CFO leave?

- CFO Jain suddenly left on January 17 this year, and his departure ahead of the bank's disclosure on the losses, has given rise to questions about the serious lapses in its derivatives book.
- Jain had put in his papers "to pursue other professional opportunities", the bank said in an exchange filing.
- On March 7, three days before the derivatives losses were disclosed, IndusInd Bank received the RBI's approval to reappoint Kathpalia as its MD and CEO – but just for one year, from March 24, 2025, to March 23, 2026.
- In September last year, IndusInd Bank's board of directors had recommended a three-year term for its MD & CEO.

### What has RBI said about the bank's health?

- Allaying the fears of depositors, the RBI last week said that IndusInd Bank depositors need not worry since the bank's financial health remains stable.
- "There is no need for depositors to react to the speculative reports at this juncture.
- The bank's financial health remains stable and is being monitored closely by Reserve Bank,".
- The bank's deposits grew by 11% year-on-year to Rs. 4,09,438 crore as of December 2024.
- The bank is well-capitalised and the financial position of the bank remains satisfactory, the RBI said.
- "As per auditor-reviewed financial results of the bank for the quarter ended December 31, 2024, the bank has maintained a comfortable capital adequacy ratio of 16.46 per cent and provision coverage ratio of 70.20 per cent," the RBI said.
- The liquidity coverage ratio (LCR) of the bank was at 113% as on March 9, 2025, as against regulatory requirement of 100%.

### IndusInd Bank

- IndusInd Bank is a prominent private sector bank in India, established in April 1994 and headquartered in Mumbai.
- It offers a wide range of banking products and services, including personal and business banking, loans, accounts, cards, and NRI banking services.

### Reserve Bank of India (RBI) reports

- The Reserve Bank of India (RBI) regularly publishes reports that provide comprehensive insights into the country's banking sector and economic trends.
- One of its key publications is the Report on Trend and Progress of Banking in India, released annually under the Banking Regulation Act, 1949.
- This report evaluates the performance and developments within the Indian banking sector.

- **Decline in Non-Performing Assets (NPAs):** Gross NPAs reached a 13-year low of 2.7% in March 2024, further decreasing to 2.5% by September 2024.
- The retail loan segment had the lowest GNPA ratio at 1.2%, while agriculture loans had the highest at 6.2%.
- **Increase in Bank Frauds:** The first half of the fiscal year saw a significant rise in bank frauds, with 18,461 cases reported, amounting to Rs. 21,367 crore.
- **Growth in Non-Banking Financial Companies (NBFCs):** Loans and advances by NBFCs grew by 18.5% in FY24, surpassing the previous year's growth of 17.4%.

## India and recent Financial Frauds

India has experienced several significant financial frauds in recent times, impacting various sectors and highlighting vulnerabilities in the financial system.

### 1. Surge in Cyber Financial Frauds (2024)

- The rapid adoption of digital transactions has led to a significant increase in cyber financial crimes.
- In the fiscal year 2024, high-value cyber fraud cases in India escalated over fourfold, resulting in losses totaling approximately \$20 million.
- Scammers have employed advanced techniques, including impersonation of officials and the use of artificial intelligence, to deceive individuals.
- The finance ministry reported a substantial rise in cases where the amount involved exceeded 100,000 rupees, jumping from 6,699 cases in the previous fiscal year to 29,082 in 2024.

### 2. IndusInd Bank Accounting Discrepancy (2025)

- IndusInd Bank, India's fifth-largest private bank, uncovered a significant accounting discrepancy in its currency derivatives portfolio, amounting to approximately Rs16 billion (\$184 million).
- This discrepancy, dating back eight years, was discovered following a Reserve Bank of India (RBI) directive prompting a portfolio review.
- The revelation led to a sharp decline in the bank's stock, which plummeted by 27% on the day of the announcement. The bank has initiated an external review to investigate the matter further.

### 3. Gautam Adani Bribery Allegations (2024)

- In November 2024, U.S. authorities charged Indian tycoon Gautam Adani and his associates with securities fraud and conspiracy.
- The allegations involve concealing a \$265 million bribery scheme to secure lucrative solar energy contracts with the Indian government, misleading investors into investing billions.
- The indictment has led to significant stock declines for the Adani Group, which has faced previous fraud allegations.

### 4. Diverse Financial Scams Targeting Citizens (2024)

The year 2024 witnessed a variety of scams directly targeting the general public:

- **Digital Arrest Scams:** Fraudsters impersonated law enforcement officers, falsely accusing individuals of serious crimes and threatening arrest to extort money.
- **Online Investment Scams:** Scammers lured victims through social media platforms, promising high returns on investments, leading to significant financial losses.
- **Dating Frauds:** Perpetrators created fake profiles on dating apps to extract compromising information and money from victims.
- **Foreign Employment Scams:** Individuals were deceived with promises of high-paying jobs abroad, only to be exploited or held captive upon arrival.

## QUESTIONS

**Solve the multiple choice questions:**

18. Which loan segment had the highest Gross Non-Performing Asset (GNPA) ratio as per RBI's 2024 report?
  - A. Retail loans
  - B. Agricultural loans
  - C. Corporate loans
  - D. MSME loans
19. What was the primary method used in the surge of cyber financial frauds in India in 2024?
  - A. ATM card cloning
  - B. AI-driven impersonation scams
  - C. Fake lottery schemes
  - D. Unauthorized mobile banking transactions
20. What is the primary focus of the "Report on Trend and Progress of Banking in India" published by RBI?
  - A. Stock market trends in India
  - B. Foreign exchange reserves and trade policies
  - C. Performance and developments in the Indian banking sector
  - D. Annual GDP growth and fiscal policies

## ANSWER KEY AND EXPLANATION

1. **C** Astronauts and their spacecraft are in free-fall, meaning they are falling toward but around Earth at the same rate. This makes them appear weightless relative to the spacecraft. Microgravity refers to a condition where the force of gravity appears very small, causing astronauts and objects to float in space.
2. **C** The International Space Station (ISS) is a large spacecraft that orbits Earth, serving as a home for astronauts and a science laboratory. It's a collaboration between five space agencies: NASA (United States), Roscosmos (Russia), ESA (Europe), JAXA (Japan), and CSA (Canada).
3. **B** As per the Treaty of Purandar, signed on 11 June 1665, Shivaji agreed to surrender 23 forts, while keeping 12 forts under his control. Additionally, he agreed to pay compensation of 400,000 gold hun and serve as a vassal of the Mughal Empire.
4. **C** The Battle of Pratapgad (1659) was a turning point where Shivaji Maharaj defeated Afzal Khan, a general of the Adilshahi Sultanate. Using clever tactics and guerrilla warfare, he lured Afzal Khan into a trap and killed him.
5. **B** UNCLOS allows a coastal state to extend its continental shelf up to 350 nautical miles from its baseline only if scientific data prove that the natural continental margin extends beyond the 200-nautical-mile EEZ. The claim must be submitted to the Commission on the Limits of the Continental Shelf (CLCS) for approval. A state's military presence or economic interest in resources does not grant it legal rights beyond 200 nautical miles.
6. **A** Under UNCLOS, foreign warships have the right of "innocent passage" through a state's territorial sea (up to 12 nautical miles), provided the passage is continuous, expeditious, and does not threaten the peace, security, or order of the coastal state. Intelligence gathering, military exercises, or any activity that disrupts the security of the coastal state is prohibited. However, stopping due to force majeure (e.g., mechanical failure or weather conditions) is allowed.
7. **B** One of the biggest challenges in India's heritage preservation is the scattered and undocumented nature of monuments, sites, and antiquities. While various organizations have documented parts of India's cultural heritage, there was no single, standardized database for conservation and research. The NMMA was launched in 2007 to systematically digitize and create a national register for built heritage, monuments, and antiquities, ensuring better documentation and management.
8. **B** As per official data, NMMA has documented only 11,406 sites and monuments, not 50,000+. However, it has made significant progress in antiquities digitization, recording over 12,34,937 antiquities, with 7,88,869 antiquities coming from non-ASI institutions. The mission has also received a budget allocation of Rs. 20 lakh for FY 2024-25.
9. **B** Vigyan Dhara integrates three major umbrella schemes—S&T Institutional and Human Capacity Building, R&D, and Innovation & Technology Development—to create a unified, streamlined approach for scientific progress. This integration eliminates redundancy, improves coordination, and enhances efficiency in fund utilization. The scheme also promotes international collaborations rather than limiting them, making option D incorrect.



- 10. B** Vigyan Dhara operates as a central sector scheme and is implemented nationwide. To raise awareness, the Department of Science and Technology (DST) actively promotes the scheme via print, social, and digital media, maintains a dedicated web portal, and engages with stakeholders to disseminate knowledge about its benefits. The scheme focuses on accessibility rather than restriction, making option D incorrect.
- 11. C** SBM-U 1.0 (2014–2021) mainly focused on eliminating open defecation and constructing toilets, leading to India’s declaration as ODF in urban areas by 2019. In contrast, SBM-U 2.0 (2021–2026) focuses on making urban India garbage-free, with a strong emphasis on 100% waste segregation, sustainable sanitation, and legacy waste remediation. This makes option C correct.
- 12. D** SBM-U is specifically an urban-focused initiative, whereas rural sanitation is covered under the Swachh Bharat Mission-Gramin (SBM-G). SBM-U 2.0 focuses on sustainable urban sanitation, solid waste management, and legacy waste remediation, but does not include rural sanitation improvements, making option D incorrect.
- 13. B** While India has seen rising female voter turnout, women still face social, cultural, and structural barriers in achieving political representation. Challenges include patriarchal norms, lack of financial resources, and male-dominated party structures. Although the Women’s Reservation Bill (2023) reserves 33% of Lok Sabha and state assembly seats for women, representation in national politics remains relatively low. Option B is correct.
- 14. B** The 73<sup>rd</sup> and 74<sup>th</sup> Amendments (1992) introduced one-third reservation for women in Panchayati Raj Institutions (PRIs) and urban local bodies. This significantly increased grassroots participation of women in governance, paving the way for more female leaders at the local level. Option B is correct.
- 15. A** The supersolid state of light is unique because it integrates solid-like spatial arrangement with fluid-like ability to flow without resistance. Unlike traditional solids, it maintains a periodic structure of quantum droplets while still exhibiting superfluidity. Option A is correct.
- 16. C** The National Institute of Optics (CNR-INO), part of the National Research Council of Italy (CNR), was instrumental in this discovery. It specializes in optics and photonics research, contributing to quantum technologies, optical imaging, and laser physics.
- 17. B** The discovery of the supersolid phase in a photonic system could revolutionize quantum computing, advanced optical technologies, and material science. It opens possibilities for new light-emitting devices, energy-efficient technologies, and novel quantum phases of matter. Option B is correct.
- 18. B** As per RBI’s 2024 report, the agriculture loan segment had the highest GNPA ratio at 6.2%, while the retail loan segment had the lowest GNPA ratio at 1.2%. This indicates higher stress in the agricultural lending sector compared to retail loans.
- 19. B** In 2024, India saw a fourfold increase in high-value cyber fraud cases, with scammers using AI-driven impersonation of officials to deceive victims. These scams led to \$20 million in losses. The finance ministry also reported a surge in fraud cases involving amounts over ₹1 lakh.
- 20. C** The “Report on Trend and Progress of Banking in India” provides insights into the banking sector, analyzing non-performing assets (NPAs), financial frauds, banking regulations, and credit growth. It helps policymakers and stakeholders understand the overall health of the banking system.