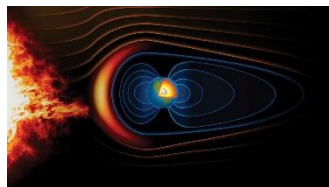


### MAGNETIC FLIP-FLOP



- The Earth's magnetic field acts as an invisible shield that protects the planet from harmful cosmic and solar radiation.

- It is generated 2,900 km below the surface in the liquid outer core through electric currents arising from the movement of molten iron, powered by heat from the inner core and Earth's rotation.
- This field forms a protective bubble that extends into space, shielding the atmosphere and biosphere.

### Magnetic Reversals vs. Excursions

- A magnetic reversal occurs when the magnetic north and south poles swap places and retain that position for over 100,000 years (e.g., Brunhes-Matuyama reversal 780,000 years ago).
- A geomagnetic excursion is a temporary flip in polarity lasting a shorter time and is 10 times more frequent than reversals (e.g., Laschamps excursion 41,000 years ago, where strength dropped to 5%).
- Over the last 83 million years, Earth has witnessed 183 magnetic reversals.
- Causes of Magnetic Fluctuations: Driven by turbulent fluid dynamics in the outer core, influenced by Earth's rotation and heat from the inner core. Clockwise flow maintains normal polarity; anticlockwise shifts trigger reversals.

### Research Methodologies

- Satellites and Observatories: Provide real-time data (e.g., ESA's soundtracks converting magnetic signals into audio).
- Historical data: Ship logs (since 1590) and archaeological artifacts (e.g., ancient pottery) preserve geomagnetic signatures.
- Geological samples: Lava rocks, lake/ocean sediments (e.g., Bagwalipokar excursions in Uttarakhand) reveal past field behavior.

## Current Affairs - 12 May 2025

### ASTEROID YR4



On April 2, 2025, NASA announced that asteroid 2024 YR4 has a 3.8% probability of colliding with the Moon on December 22, 2032.

- **YR4** is a **Near-Earth Asteroid (NEA)** discovered in **December 2024** using the **ATLAS** telescope in **Chile**.
- Its orbit brings it **within 1.3 times the Earth-Sun distance**, making it a **Near-Earth Object (NEO)**.
- Initially, YR4 triggered the **highest-ever NASA asteroid impact alert** in February 2025.
- New **infrared data from the James Webb Space Telescope** estimates its **size at ~65 metres**, comparable to a **10-storey building**, which is **below the 140-meter threshold** for classification as a "**Potentially Hazardous Asteroid**".
- Earlier, YR4 had a **1% chance of hitting Earth**, but the **latest trajectory analysis** shows a **negligible risk** to Earth.

### What are Asteroids?

- Asteroids, also known as **minor planets**, are **rocky remnants from the early solar system**, dating back **6 billion years**.
- They exhibit **irregular shapes**, though a few are nearly **spherical**, and some host **small companion moons** or even exist as **binary or triple systems**.

### Classification of Asteroids

- **Main Asteroid Belt**: Located between **Mars and Jupiter**, this is where the majority of known asteroids are found.
- **Trojans**: These share an orbit with a planet and remain stable due to the **Lagrange Points (L4 and L5)**, where **gravitational forces from the Sun and the planet balance**.
- **Near-Earth Asteroids (NEAs)**: These are asteroids whose **orbits pass close to Earth's orbit**. Those that cross Earth's orbital path are known as **Earth-crossers**.

## Current Affairs - 12 May 2025

### RIGHT TO KNOW



#### Supreme Court's Observations

- The ruling reaffirmed that the “**Right to Know**” is a **basic right** under **Article 19(1)(a)** (Freedom of Speech and Expression) and **Article 21** (Right to Life and Personal Liberty).

#### Significance of the “Right to Know”

- The **Right to Know** is essential to enable citizens to:
  - **Participate in public discourse and democratic processes,**
  - **Access justice** effectively, and
  - Hold public authorities **accountable.**
- The judgment reinforced that **public discussion and criticism of courts** is a **legitimate aspect of democracy** and must not be equated with contempt without careful consideration.

#### Constitutional Significance of the Right to Know

- **Under Article 19(1)(a) – Freedom of Speech and Expression:** This article ensures the **right to express opinions** through speech, writing, and other media. As per the **Supreme Court**, this includes the **Right to Know** about:
  - **Government activities**
  - **Public decision-making**
  - **Court proceedings**
- The Court reiterated that **freedom of expression** covers the **right to receive information**, which is vital for **democracy**.
- **Under Article 21 – Right to Life and Personal Liberty:** The **Right to Know** is also implicit in **Article 21**, as it enables citizens to:
  - **Access justice**
  - **Participate in governance**
  - **Live with dignity** through informed decision-making

## Current Affairs - 12 May 2025



### GREAT NICOBAR ISLAND

- It is the southernmost island of the Nicobar Islands
- It is separated from the Andaman Islands by the Ten Degree Channel.
- It covers an area of 1044 sq.km.
- It remains sparsely populated, with dense tropical rainforests covering more than 85% of its area.
- Its coastline features over 100 kilometers of untouched beaches, renowned for their stunning coral reefs and crystal-clear waters.
- It is also home to Indira Point, India's southernmost point, located less than 150 km from Indonesia.
- Mount Thullier, which is about 2,105 ft high, is the highest peak.
- Galathea, Alexandra, and Dagmar are the major rivers.
- The major tribes in Great Nicobar Island are the Shompens and the Nicobarese.
- It is home to the Great Nicobar Biosphere Reserve, a UNESCO-designated site.
- Biodiversity:
  - It houses 650 species of angiosperms, ferns, gymnosperms, bryophytes, and lichens, among others.
  - The tract is rich in plant diversity and fosters a number of rare and endemic species, including *Cyathea albosetacea* (tree fern) and *Phalaenopsis speciosa* (orchid).
  - The region also harbours a large number of endemic and endangered species of fauna. To date, 11 species of mammals, 32 species of birds, 7 species of reptiles and 4 species of amphibians have been found to be endemic.
  - Of these, the well-known Crab-eating Macaque, Nicobar Tree Shrew, Dugong, Nicobar Megapode, Serpent Eagle, saltwater crocodile, marine turtles and Reticulated Python are endemic and/or endangered.

# CROSS & CLIMB ROHTAK

## Institute of Research Based Learning & Competition

### Current Affairs - 12 May 2025

#### WHY DIGITAL BANKING UNITS NEVER PICKED UP IN INDIA

- DBUs, as defined by the Reserve Bank of India (RBI), are specialized fixed-location hubs equipped with essential digital infrastructure to deliver and service banking products digitally.
- **Benefits of DBUs for Customers**
  - **Convenience:** Offers paperless, cost-effective, and secure banking.
  - **Accessibility:** Self-service available with manual help for rural and less tech-savvy users.
  - **Financial Inclusion:** Expands digital banking awareness and services to underserved regions.
  - **Efficiency:** Reduces the need for physical branches, lowering operational costs while improving service reach in remote areas.

#### **Digital Banking Units (DBUs) in India**

- **Inauguration of DBUs**
  - In October 2022, to commemorate India's 75th year of Independence, PM Modi launched 75 DBUs across 75 remote districts.
  - The initiative aimed to bring banking services to the last mile, moving away from the old expectation that the poor should visit banks.
- **Limited Expansion Post-Launch**
  - Despite the initial enthusiasm, over two years later, there has been little to no expansion of DBUs.
- **Challenges in Implementation**
  - Banks were given only 45 days to set up DBUs and instructed on specific locations.
  - Experts highlighted that in tier-III cities and smaller towns, just installing a digital-looking branch does not ensure increased deposits. Building trust and visibility remains essential in such areas.

## Current Affairs - 12 May 2025

- **Strict RBI Guidelines for DBUs**
  - RBI mandates that DBUs must:
    - Be housed separately from existing branches.
    - Have distinct entry and exit points.
    - Be designed appropriately for digital users.
    - Use smart equipment like Interactive Teller Machines, Service Terminals, and Cash Recyclers.
    - Each DBU must be integrated into the bank's overall digital strategy and led by a senior, experienced executive.
- **Operational and Logistical Hurdles**
  - While DBUs can enhance financial inclusion in remote areas, high setup and operational costs remain a significant deterrent for banks, making expansion difficult.

### KEY FACTS ABOUT CHENAB RIVER



- The Chenab River literally means "Moon" (Chan) and "River" (aab) is a **tributary of the Indus**
- **Course:**
  - **Origin:** It is formed by the **confluence of two streams, Chandra and Bhaga**, at Tandi in the upper Himalayas in the Lahaul and Spiti Districts of **Himachal Pradesh**.
  - In its upper reaches, it is also known as the
  - It **flows west through Jammu and Kashmir** union territory, **between** the steep cliffs of the **Siwalik Range (south) and the Lesser Himalayas (north)**.
  - **Turning southwest, it continues into Pakistan**, descending from the uplands into the broad alluvial lowlands of Punjab province.
  - After **receiving the Jhelum River near Trimmu**, the Chenab **empties into the Sutlej River**, a tributary of the Indus River.

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- Its total length is about 605 miles (974 km), and it feeds several irrigation canals.
- It is the **largest river of Himachal Pradesh** in terms of volume of waters.
- **Tributaries:** The tributaries of the Chenab River include **Miyar Nalla, Sohal, Thiroth, Bhut Nalla, Marusudar, and Lidrari.**
- The **waters** of the Chenab are **shared by India and Pakistan** as per the terms of the **Indus Water Treaty.**

### RUSSIAN SPACECRAFT CRASHES BACK TO EARTH AFTER 50 YEAR

#### Kosmos 482 Mission

- Kosmos 482 was part of the Soviet Union's Cold War-era effort to explore Venus and showcase scientific dominance.
- The mission aimed to study Venus's surface and atmosphere.
- **Mission Details**
  - Kosmos 482 lifted off on March 31, 1972, just days after its twin mission, Venera 8, which landed on Venus 117 days later.
  - Kosmos 482 carried instruments to measure temperature, pressure, wind speed, visibility, atmospheric gases, and rock composition, and was designed to transmit data back to Earth.
- **Outcome**
  - The mission failed to leave Earth orbit due to a malfunction, preventing it from reaching Venus.
- **Cause of Malfunction**
  - A critical error occurred shortly after launch when the upper rocket stage shut off prematurely due to an incorrectly set timer.
  - This stage was responsible for propelling the spacecraft out of Earth's orbit.
- **Immediate Consequence**
  - The spacecraft failed to escape Earth's orbit and became stranded. The lander module separated from the main body of the spacecraft as a result.

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- The main spacecraft, being large and heavy, eventually burned up upon re-entering Earth's atmosphere.
- The smaller lander module remained in orbit for decades.
- **Current Status**
  - The lander module is now gradually being pulled toward Earth by atmospheric drag.

### Kosmos 482's Uncontrolled Re-entry

- The lander module's return to Earth was uncontrolled.
- After 53 years in space, it lacked systems like aerobraking, parachutes, or internal cooling, making it reliant solely on atmospheric friction to slow down.
- **Material and Speed Concerns**
  - The module was made of titanium, which melts at around  $1,700^{\circ}\text{C}$ —hotter than typical re-entry temperatures ( $\sim 1,600^{\circ}\text{C}$ ).
  - Therefore, it was unlikely to burn up completely and may survive re-entry.
  - It was traveling at over 17,000 miles per hour.
- **Potential Impact Zone**
  - Its orbit covers a wide area between  $52^{\circ}\text{N}$  and  $52^{\circ}\text{S}$  latitudes, including regions in Africa, Australia, the Americas, and large parts of Europe and Asia.

### Frequency of Space Debris Re-entry

- The crash of Kosmos 482 is not unusual.
  - According to the European Space Agency, over 2,400 man-made objects re-entered Earth's atmosphere in 2022 alone—a record high.
  - Most of these objects either burned up or landed in the ocean.
  - **Why Scientists Are Not Alarmed**
    - Because such re-entries are common and typically harmless, scientists were not particularly concerned about Kosmos 482's lander module crashing.
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### ANAMALAI TIGER RESERVE



- It is located at an altitude of 1400 m in the Anamalai Hills of Pollachi and Coimbatore District of **Tamil Nadu**.
- It is located on the southern side of the **South Western Ghat landscape**.
- It covers 1,479.87 sq. km., including 958.59 sq.km. of core area.
- It is **surrounded by Parambikulam Tiger Reserve** on the East, **Chinnar Wildlife Sanctuary** and **Eravikulam National Park** on the South Western side.
- The reserve is also surrounded by Nenmara, Vazhachal, Malayattur and Marayur reserved forests of Kerala.
- The **Kariyan shola, Grass hills and Manjampatti of Anamalai Tiger Reserve** has been identified as a **world heritage site** by UNESCO.
- It is home to several indigenous **tribal communities** such as the **Kadars, Muduvars, Malasars, Malai malasars, Eravalars and Pulayars**.
- **Vegetation:**
  - It ranges from wild **wet evergreen forests and semi-evergreen** forests to moist deciduous and dry deciduous forests.
  - Some part of the reserve boundary also includes the **shola forests** in the Anamalai Hills and rarer **Montane Grasslands, Savannahs** and Marshy Grasslands.
- **Flora:**
  - Around 2500 species of angiosperms are found in the Anamalai Tiger Reserve, with several species of **Balsam, Crotalaria, Orchids, and Kurinchi**.
  - The reserve is rich in **wild relatives of cultivated species** like mango, jackfruit, wild plantain, ginger (*Zingiber officinale*), turmeric, pepper (*Piper longum*), cardamom, etc.
- **Fauna:** The important wild animals of the reserve include: **Tiger, Asiatic elephant, Sambar, Spotted deer, Barking deer, Jackal, Leopard, Jungle cat, etc.**