Today's Prelims Topics

Asian Development Bank

Context

Pakistan took a **$350 million loan** from the **Asian Development Bank** to support **women's financial inclusion**. Its **total debt has reached PRs 76,000 billion** in nine months.

Asian Development Bank (ADB)

- Established on **19th December 1966**.
- A **multilateral development bank** for the **Asia-Pacific** region.
- Aims for a **prosperous, inclusive, resilient, and sustainable** Asia and the Pacific.
- Committed to **eradicating extreme poverty** in the region.
- **Headquarters**: Manila, Philippines.
- **Membership:** Started with **31 members**, now has **69 members**:
    - **49 regional members** (Asia & Pacific): India, China, Japan, South Korea, Australia, etc.
    - **20 non-regional members**: Europe, North America, and others.
    - Open to **UNESCAP members**, other **regional** and **non-regional UN members**.
- **Functions:** Provides support via– Loans, Grants, Technical Assistance, Equity Investments.
    - **Supports**: Governments, Private Sector, Public-Private Partnerships
    - **Promotes**: Social and economic development
- **Governance:**
    - Governed by a **Board of Governors** (one per member country)
    - Board elects **12-member Board of Directors**:
        - **8 from regional** members (Asia-Pacific)
        - **4 from non-regional** members
    - **President** is elected for a **5-year term**, chairs the Board, and runs the Bank.
    - **All ADB Presidents have been Japanese** (Japan is founding and largest shareholder).
- **Voting Power:** Uses a **weighted voting system** (like the World Bank)
    - Voting power is based on **capital subscriptions**
    - **Top 5 Shareholders**:
        - **Japan** – 15.6%
        - **USA** – 15.6%
        - **China** – 6.4%
        - **India** – 6.3%
        - **Australia** – 5.8%
- **Source of Funding:** Raises capital via **international bond markets**
    - Also funded by:
        - Member contributions
        - Loan repayments
        - Retained earnings

Source: TheHindu

NAVYA Initiative

Context

The Government of India has launched the **NAVYA initiative** under the **Viksit Bharat@2047 vision** to skill and empower **adolescent girls** for a future-ready workforce.

About NAVYA Initiative

- **Full Form**: Nurturing Aspirations through Vocational Training for Young Adolescent.
- It is a **joint pilot initiative** by:
  - **Ministry of Women and Child Development (MWCD)**
  - **Ministry of Skill Development and Entrepreneurship (MSDE)**
- **Key Features:**
  - **Target Group**: Adolescent girls aged **16–18 years** with a **minimum qualification of Class 10**.
  - **Focus**: Provide **vocational training**, especially in **non-traditional job roles** to break gender stereotypes.
  - **Coverage**: To be implemented in **27 districts across 19 states**, including:
    - **Aspirational districts**
    - **Districts from North-Eastern States**
  - Emphasizes **inclusion and regional balance** by reaching vulnerable and underserved populations.
- **Implementation Strategy:** The initiative will:
  - **Formalize collaboration** between MWCD and MSDE.
  - **Institutionalize convergence** on skilling efforts for adolescent girls.
  - Will draw support from:
    - **Pradhan Mantri Kaushal Vikas Yojana (PMKVY)**
    - Other flagship **skill development schemes**.
- **Significance:** Aims to **empower young girls** with:
  - **Skills**
  - **Confidence**
  - **Opportunities**
  - Ensures adolescent girls become **key contributors** to India's vision of a:
    - **Developed**
    - **Self-reliant**
    - **Inclusive** nation under **Viksit Bharat@2047**

Source: PIB

News in Shorts

Gene Variant to Delay Onset of Alzheimer

News? A **rare gene variant** that **delays the onset of Alzheimer's disease** has been identified, making headlines for its ability to **curb brain inflammation**—a key factor in neurodegenerative disorders.

About the Gene Variant – APOE3-R136S

- Offers **delayed onset** of **Alzheimer's disease**.
- Works by **reducing brain inflammation**, which is a key cause of neurodegeneration.
- Specifically **blocks the cGAS-STING pathway**, a part of the brain's **innate immune system** that can become overactive in diseases like Alzheimer's.

About Alzheimer's Disease

- A **progressive neurodegenerative disorder** affecting **memory, thinking, and reasoning**.
- It is the **most common cause of dementia**, responsible for **60–80% of all cases worldwide**.
- Leads to the **disruption of communication between brain cells**, resulting in a decline in **cognitive and daily functioning abilities**.

What is Early-Onset Alzheimer's Disease (EOAD)?

- Most Alzheimer's cases occur in people aged **65 or older**.
- However, **5–10% of cases occur earlier**, known as **Early-Onset Alzheimer's Disease**.
- EOAD typically:
  - Progresses **more rapidly**.
  - Affects individuals in their **prime working years**.
  - Has a **strong genetic link**.

Source: IndianExpress

Rhone Glacier

News? Swiss glaciers, like the Rhone Glacier, are developing holes that resemble Swiss cheese due to accelerated melting caused by climate change.

About Rhone Glacier

- Located in the **Swiss Alps**.
- It is the **largest glacier in the Urner Alps**.
- Serves as the **source of the River Rhone**.
- A primary contributor to **Lake Geneva**, situated in the far eastern end of the Swiss canton of **Valais**.
- The **Dammastock** (3,630 meters) is the **highest peak above the glacier**.

Source: TheHindu

Editorial Summary

What Axiom 4 means for India's space program

Context

The Axiom-4 mission recently docked to the International Space Station.

About Axiom 4 Mission

- It is the 4th **private astronaut** mission to the **International Space Station.**
- **Duration** of the mission: **14 days**.
- **Launch Site:** Kennedy Space Center in Florida
- **Launch Vehicle: SpaceX's Falcon 9 rocket.**
- This mission is organised in collaboration with **NASA.**

Mission Objectives

- **Scientific Research:** Conduct microgravity experiments in various fields, including medicine, materials science and technology development.
- **Commercial Development:** Axiom Space is testing technology and procedures for its future commercial space station.
- **International Collaboration:** It includes international astronauts, sponsored by their home countries or private institutions. This will boost International collaboration.
- **Space Tourism & Training:** To provide training and flight opportunities for private individuals interested in space travel.

About International Space Station

- The ISS is the **largest man-made structure in space**, launched on **November 20, 1998**, and has served as a continuous habitat for astronauts since 2011.
- It is a joint project involving multiple international space agencies including:
  - **NASA**: National Aeronautics and Space Administration
  - **Roscosmos**: Russian Federal Space Agency
  - **ESA**: European Space Agency
  - **JAXA**: Japan Aerospace Exploration Agency
  - **CSA**: Canadian Space Agency
- The ISS orbits Earth at an Altitude of 400 kilometres.
- It travels at a speed of around 28,000 kilometres per hour, completing an orbit around Earth approximately every 90 minutes.
- The primary objectives of the ISS are to enhance our understanding of space and microgravity conditions, facilitate scientific research, and exemplify international collaboration in space exploration.

Significance of Axiom 4 Mission

- **Pioneering Indian Human Spaceflight:** Participation in Ax-4 marks the return of an Indian to human spaceflight after Rakesh Sharma in 1984, symbolizing India's renewed presence in global human space exploration.
- **Cutting-edge Research:** The mission carries **seven Indian-led experiments in space biology and bioengineering**. These are crucial for developing life support systems and future deep-space missions.

- **Supports Gaganyaan & BAS Roadmap:** The Ax-4 mission acts as a technological and experiential bridge to the Gaganyaan human spaceflight program and the planned Bharatiya Antariksh Station (BAS) by 2035, providing vital hands-on exposure.
- **Capacity Building:** Provides Indian scientists, engineers, and mission planners with **direct experience in managing complex space missions**, space medicine, orbital operations, and bioastronautics—vital for future indigenous human spaceflight programs.
- **Science Diplomacy:** Enhances India's role in international scientific collaborations, fostering partnerships with agencies and other global research institutions.
- **STEM Inspiration:** It will inspire a new generation of Indians to pursue careers in STEM, space research, and innovation.
- **Boosts Indigenous R&D:** Accelerates domestic capabilities in microgravity research, bioengineering, and human spaceflight technologies, contributing to self-reliance and future exports of space technologies.

What are the 7 Indian-led experiments on the Ax-4 mission?

- **Microalgae Growth under Space Radiation:**
  - **Led by:** International Centre for Genetic Engineering & Biotechnology (ICGEB) and National Institute of Plant Genome Research (NIPGR)
  - **Objective:** To study how microalgae respond and adapt to space radiation and microgravity.
  - **Significance:**
    - Microalgae are promising for bioregenerative life support—they can produce oxygen and serve as food.
    - Understanding their growth and mutation patterns in space can help design closed-loop ecosystems for long-duration missions.
    - Insights into DNA repair mechanisms in algae may aid biotechnology and space farming.
- **Seed Sprouting in Microgravity:**
  - **Led by:** University of Agricultural Sciences, Dharwad, and IIT Dharwad
  - **Objective:** To observe the germination and initial growth of green gram (moong) and fenugreek (methi) seeds in microgravity.
  - **Significance:**
    - Seeds are a primary food resource for future space settlers.
    - Studying how seeds sprout and grow in microgravity informs us about plant physiology in space.
    - Results will guide efforts for cultivating edible crops aboard space stations and lunar bases.
- **Gene Expression Studies on Tardigrades in Space:**
  - **Led by:** Indian Institute of Science (IISc), Bangalore
  - **Objective:** To analyze survival, adaptation, and gene expression in tardigrades (water bears) exposed to space radiation and microgravity.
  - **Significance:**
    - Tardigrades are famous for their extreme resilience—they can survive radiation, vacuum, and temperature extremes.
    - This experiment may uncover genes and molecular pathways responsible for such endurance.
    - Findings could contribute to human space health, aging research, and biotechnology.
- **Muscle Regeneration under Microgravity (Myogenesis-ISRO):**
  - **Led by:** Institute for Stem Cell Science and Regenerative Medicine (inStem)

- **Objective:** To investigate how metabolic supplements affect muscle repair and regeneration in microgravity.
- **Significance:**
  - Astronauts typically suffer from muscle loss in space due to weightlessness.
  - Studying muscle cell growth and metabolism could reveal ways to prevent or treat muscle atrophy.
  - Insights may help develop therapies for muscle degeneration on Earth (e.g., in elderly or bedridden patients).

- **Human Interaction with Electronic Displays in Orbital Environments:**
  - **Led by:** Indian Institute of Science (IISc)
  - **Objective:** To understand how astronauts interact with touchscreens and electronic displays in microgravity.
  - **Significance:**
    - Microgravity affects hand-eye coordination, perception, and fine motor skills.
    - The findings will improve the design of space-friendly interfaces and control devices.
    - Results can also inform safer cockpit or instrument design for aviation and other sectors on Earth.
- **Nutrient Utilisation in Cyanobacteria under Microgravity**
  - **Led by:** ICGEB
  - **Objective:** To compare how cyanobacteria utilize different nitrogen sources (urea vs. nitrate) for growth and metabolism in microgravity.
  - **Significance:**
    - Cyanobacteria are vital for closed-loop bioregenerative systems—capable of fixing nitrogen and producing oxygen.
    - Studying nutrient uptake in space helps optimize bioengineered systems for space habitats.
    - This experiment may also have implications for sustainable agriculture and waste recycling.
- **Impact of Microgravity on Crop Growth and Yield:**
  - **Led by:** Indian Institute of Space Science and Technology (IIST) and Kerala Agricultural University (KAU)
  - **Objective:** To evaluate overall crop growth and yield responses to prolonged microgravity conditions.
  - **Significance:**
    - Comprehensive data on crop physiology in space is essential for planning future food production off-Earth.
    - Helps select crop varieties and growth techniques best suited for life-support modules on stations and interplanetary missions.
    - Builds foundational knowledge for lunar or Martian greenhouses.

Source: Economic Times

Turning Point in Eurasia

Context

The **2025 NATO summit** in **The Hague** is portrayed as a critical moment, with NATO's relevance and cohesion being questioned due to persistent transatlantic tensions, the Russian invasion of Ukraine, and Trump's skepticism about the alliance.

About NATO

- **Headquarters**: Brussels, Belgium.
- **Headquarters of Allied Command Operations**: Mons, Belgium
- It is an intergovernmental military alliance.
- **Origin:** Founded in the **aftermath of World War II** to counter the threat posed by the Soviet Union and to promote democracy and stability in Europe.
    - The founding treaty of NATO, the **North Atlantic Treaty**, was signed in Washington, D.C. on **April 4, 1949.**
- **Members:** The original 12 members of NATO were Belgium, Canada, Denmark, France, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, the United Kingdom, and the United States.
    - Currently it has **32 member countries** (Sweden joined in 2024).

> - Article 10 of the North Atlantic Treaty sets out how countries can join the Alliance. It states that membership is open to any "European State in a position to further the principles of this Treaty and to contribute to the security of the North Atlantic area".
> - Any decision to invite a country to join the Alliance is taken by the North Atlantic Council, NATO's principal political decision-making body, on the basis of consensus among all Allies.

Why Eurasian Powers Must Find Political Answers to Security Problems

- **Changing US Commitments:** As the US questions its role in defending Europe and the Middle East, traditional reliance on American military support is no longer assured.
- **Limits of Military Spending:** Raising defence budgets (now 5% of their GDP) on defence alone cannot address complex security dilemmas rooted in regional rivalries, historical grievances, and shifting alliances (such as Russian aggression in Ukraine or the Armenia-Azerbaijan conflict.)
- **Geopolitical Shifts:** The Russian invasion of Ukraine and realignments in the Middle East highlight the need for homegrown political solutions, including dialogue and regional cooperation.
- **Strategic Autonomy:** Germany's "Zeitenwende" policy is transforming it into a security provider for Europe, rather than relying solely on US protection.
    - In Asia, Japan has begun revising its pacifist constitution to enable a more active defence role, and India has invested in its own defence industry and security partnerships beyond the US, such as with France and the Quad (Japan, Australia, US, India).

Key Features of the Zeitenwende Policy

- **Major Increase in Defence Spending:** Germany committed €100 billion (about $110 billion) in special funds to modernize its military (Bundeswehr).
    - Pledged to meet and exceed NATO's target of spending at least 2% of GDP on defence.
- **Supplying Lethal Weapons:** Broke from longstanding policy by supplying weapons directly to Ukraine, reversing decades of reluctance to export arms to conflict zones.
- **Reducing Dependence on Russia:.**Accelerated moves to end German reliance on Russian energy (gas, oil, coal), seeking alternatives and investing in energy security.

- **Regional Reconciliation:** Efforts like the normalization of ties between Saudi Arabia and Iran—facilitated by China—demonstrate the power of political negotiation in reducing tensions, even where military confrontation has failed for decades.
    - In Central Asia, countries like Uzbekistan and Kazakhstan are building regional security and economic partnerships to reduce dependence on outside powers.
- **Birth of a New Order:** The rise of China, renewed Russian assertiveness, a more independent Europe, and India's growing global profile signal a shift to a multipolar world.
    - This demands coalitions (like BRICS or the Shanghai Cooperation Organisation) and new diplomatic approaches, rather than relying solely on the old US-centric alliances or military pacts.

Implications for India

- India's unique geography and strategic position, straddling Europe, the Middle East, and the Indo-Pacific, offer both challenges and opportunities.
- India is actively:
    - Deepening strategic ties with Europe.
    - Engaging all major actors in the Middle East.
    - Stabilizing ties with China and bolstering relations with ASEAN, Australia, Japan, and South Korea.
    - Maintaining robust engagement with the US, regardless of its inward turn.
- These moves are aimed at ensuring India's ability to navigate a world of "diminished certainties" and maximize its strategic autonomy.

Source: Indian Express