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for

IAS EXAMINATION

From

23rd to 28th Feb 2026

INDEX

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POLITY & GOVERNANCE

1.1. RENAMING KERALA TO KERALAM

Context: Recently, the Union Cabinet chaired by Prime Minister Narendra Modi approved the proposal to rename the state of "Kerala" to **"Keralam."** This decision follows a unanimous resolution passed by the Kerala Legislative Assembly in June 2024, which urged the Central Government to align the official name with its Malayalam pronunciation and cultural heritage. The Union Cabinet has now set in motion the **Kerala (Alteration of Name) Bill, 2026**, which will be referred to the State Assembly by the President before being introduced in Parliament.

1. **Constitutional Provisions**

   The power to change the name of a state is exclusively vested in the **Parliament of India**.

   - **Article 3:** This article empowers Parliament to form new states and alter the areas, boundaries, or names of existing states.
   - **Procedure for Name Change:**
     - A Bill for renaming a state can be introduced in either House of Parliament only on the **prior recommendation of the President**.
     - Before recommending the Bill, the President **must refer** it to the concerned State Legislature for expressing its views within a specified time frame.
     - The views of the State Legislature are **not binding** on either the President or the Parliament; Parliament is free to accept or reject them.
   - **Article 4:** It specifies that laws made under Article 3 (for renaming or boundary changes) are **not considered amendments** to the Constitution under **Article 368**. Consequently, such a Bill can be passed by a **Simple Majority** (majority of members present and voting).

2. **Historical and Linguistic Roots**

   - **Etymology:** The word "Keralam" is believed to have originated from **"Cheram,"** referring to the Chera dynasty. In Malayalam, "alam" means region or land, making it the "land of the Cheras." Another theory suggests the root is "keram" (coconut), reflecting the state's dominant agricultural produce.
   - **Ancient References:** The earliest epigraphic record of the region is found in **Emperor Ashoka's Rock Edict II (257 BCE)**, where the local ruler is referred to as **"Keralaputra"** (Sanskrit for "son of Kerala").
   - **Linguistic Reorganisation:** During the 1956 reorganisation of states on a linguistic basis, the state was formed for Malayalam speakers. While the native population has always used "Keralam," the English spelling "Kerala" was an anglicized version that persisted in the **First Schedule** of the Constitution.

3. Comparison with Other States

- **Recent Precedents:** Several states have changed their names previously, including **United Provinces to Uttar Pradesh (1950)**, **Madras to Tamil Nadu (1969)**, **Mysore to Karnataka (1973)**, **Uttaranchal to Uttarakhand (2007)**, and **Orissa to Odisha (2011)**.
- **Pending Proposals:** The West Bengal government's proposal to rename the state as **"Bangla"** remains pending with the Centre, highlighting that the Union Government's "No Objection" and subsequent Cabinet approval are critical hurdles.

Q. Consider the following statements regarding the procedure for altering the name of a State in India:

1. A Bill for the alteration of the name of a state can be introduced in the Lok Sabha only after the President's recommendation.
2. The President is constitutionally mandated to obtain and follow the views of the concerned State Legislature before recommending such a Bill to Parliament.
3. Any law providing for the change of name of a state is not deemed to be an amendment of the Constitution for the purposes of Article 368.

How many of the statements given above are correct?

(a) Only one

(b) Only two

(c) All three

(d) None

Correct Answer: (a) Only one

Explanation:

Statement 1 is incorrect: A Bill for altering the name of a state can be introduced in **either House** of Parliament (Lok Sabha or Rajya Sabha), not just the Lok Sabha, provided it has the President's prior recommendation.

Statement 2 is incorrect: While the President must refer the Bill to the State Legislature for its views, those views are **consultative and not binding** on the Parliament or the President.

Statement 3 is correct: According to Article 4, laws made under Articles 2 and 3 (including name changes) are not considered amendments under Article 368 and require only a simple majority.

1.2. NCERT

Context: Recently, after a blanket and complete ban imposed by the Supreme Court of India, the National Council of Educational Research and Training (NCERT) withdrew a Class 8 Social Science textbook containing a section on "corruption in the judiciary" in the chapter titled "Role of Judiciary in Our Society."

The Court held that selective references to "corruption in judiciary" could instil institutional distrust in "impressionable minds", affecting long-term public confidence in constitutional governance.

1. **Key Aspects of NCERT**
   - The National Council of Educational Research and Training (NCERT), established in **1961** by the Government of India, is an **autonomous organization** under the **Ministry of Education.**
   - **The major objectives of NCERT:** To undertake, promote and coordinate research in areas related to school education; prepare and publish model textbooks, supplementary material, newsletters, journals and develops educational kits, multimedia digital materials, etc.
   - **Role:** Acts as the nodal agency for school education, supporting policies like the National Education Policy 2020 (NEP 2020).
   - **Cultural exchange**: NCERT is an implementation agency for bilateral cultural exchange programmes with other countries in the field of school education.
   - **Key Organizational Structure of NCERT:**
     - The council headquarter is located at **Sri Aurobindo Marg, New Delhi.**
     - **The Union Minister of Education** is the President (ex-officio) of the General Body of NCERT.
     - **Members:** Includes Education Ministers of all States and Union Territories.
2. **Educational Governance**
   - **Originally**, education was in the State List (prior to 1976), granting states exclusive, total control over curriculum, schools, and universities.
   - **The 42nd amendment, 1976** changed the status of education by putting it on the concurrent list.
   - While both Central and State governments can legislate on subjects mentioned under the Concurrent List, however, in case of any conflict, the law made by the Central Government prevails.
3. **Constitutional and Legal Dimensions**
   - **Judicial independence**: It is a component of the **Basic Structure doctrine**, as established in the Kesavananda Bharati (1973) judgment, making the protection of institutional credibility constitutionally essential.
   - **Freedom of Expression vs Institutional Integrity**: Article 19(1)(a) of the Indian Constitution guarantees freedom of speech and expression, enabling citizens to express views, publish, and circulate information. This right is **not absolute** and is balanced by **"reasonable restrictions" under Article 19(2),** which include protecting institutional integrity against contempt of court, defamation, and public order.
   - **Contempt of Court:** It is classified in India under the **Contempt of Courts Act, 1971**. It is categorized as either civil (willful disobedience of orders/undertakings) or criminal (scandalizing the court or interfering with justice).
   - **Article 129** declares the Supreme Court of India a Court of Record with the power to punish for its own contempt, while High Courts exercise a similar authority under **Article 215.**

Q. Consider the following statements with reference to Education governance in India:

I. Originally, education was in the State List, but the 44th Amendment in 1976 changed its status by placing it in the Concurrent List.

II. The Union Minister of Education is the President (ex-officio) of the General Body of NCERT.

Which of the following statements is/are correct?

(a) I only

(b) II only

(c) Both I and II

(d) Neither I nor II

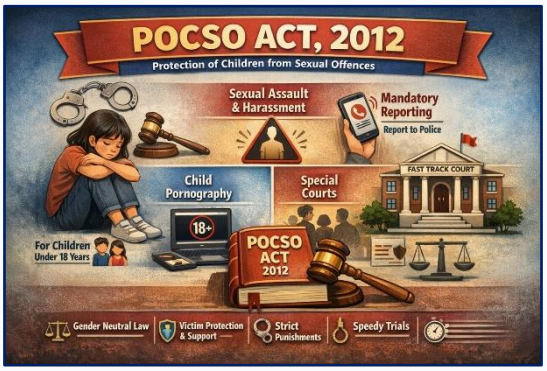
Answer: B

Explanation:

Statement I is Incorrect: While education was indeed originally a subject in the State List, it was transferred to the Concurrent List by the **42nd Amendment Act of 1976**, not the 44th Amendment.

Statement II is Correct: According to the rules of the National Council of Educational Research and Training (NCERT), the **Union Minister of Education** is the *ex-officio* President of the General Body of NCERT.

1.3. POCSO ACT AND ADOLESCENT CONSENT



Context: Recently, the Supreme Court of India highlighted concerns over the misuse of the Protection of Children from Sexual Offences (POCSO) Act in consensual adolescent relationships and urged the Centre to consider introducing a "Romeo–Juliet clause" to balance child protection with personal liberty.

Introducing a "Romeo–Juliet clause" aims to exempt genuine consensual adolescent relationships- where the age difference between the parties is minimal-from the strict application of the POCSO law.

Historical Background

- Rising child sexual abuse cases in the 1990s–2000s exposed gaps in **IPC provisions** and the lack of child-friendly procedures. India's ratification of the **UN Convention on the Rights of the Child** in 1992 created obligations to strengthen protection laws, leading to the enactment of the POCSO Act, 2012.
    - **United Nations Convention on the Rights of the Child (UNCRC)**The UN Convention on the Rights of the Child (UNCRC), adopted in 1989 (came into force in 1990), is **a legally binding** international treaty outlining the civil, political, economic, social, and health rights of everyone under 18. **India ratified the convention in 1992.**

About POCSO Act

1. **Enactment:** The POCSO Act was passed in **2012** to provide a comprehensive legal framework for protecting children (below 18 years) from sexual offences.
2. **Objective:** To safeguard children from **sexual assault, harassment, pornography**, and ensure child-friendly justice procedures.
3. **Gender-neutral law: Defines a child** as any person below 18 years and applies irrespective of the gender of the child or offender.
4. **Types of offences covered:**
   - Penetrative sexual assault
   - Aggravated assault
   - Sexual harassment
   - Use of children in pornography
5. **Not reporting abuse is an offence:** A key and widely debated feature of the POCSO Act is **mandatory reporting under Section 19**, which requires anyone who suspects or knows of a sexual offence against a child to report it to the local police or the Special Juvenile Police Unit.
6. **No time limit for reporting abuse:** A victim can report an offence at any time, even a number of years after the abuse has been committed.
7. **Maintaining confidentiality of the victim's identity:** Section 23 of the POCSO Act prohibits disclosure of the victim's identity in any form of media, except when permitted by the special courts established under the act.
8. **Special Courts:** They ensure speedy, in-camera trials-ideally **within one year**-protect children from exposure to the accused or hostile questioning, and provide for compensation and rehabilitation of child victims.
9. **The POCSO Amendment Act, 2019**:
   - It was enacted to strengthen the Protection of Children from Sexual Offences Act, 2012, introduced stricter punishments, including the death penalty, for aggravated sexual assault against children.
   - The Act defines **child pornography** as an offence and penalises storing **such material** for commercial purposes with up to three years' imprisonment, a fine, or both.

POCSO E-Courts and Fast-track Special Courts (FTSCs):

1. The Fast Track Special Courts (FTSCs) Scheme has been formulated exclusively for the expeditious trial of cases related to rape and offences under the POCSO Act and is funded through the Nirbhaya Fund, which is dedicated to initiatives aimed at enhancing the safety and security of women and children.
2. **Structure:** These courts are established under a **Centrally Sponsored Scheme** (initiated in 2019, extended to 2026) in districts with high pending cases.
3. **Time-Bound Trial Mandate under POCSO Act:** Investigation to be completed in 1 month and trial ideally within 1 year.

Q. Consider the following statements regarding the provisions of the Protection of Children from Sexual Offences (POCSO) Act:

I. The Act defines a child as any person below eighteen years of age.

II. It is a gender neutral law.

III. Section 23 of the POCSO Act prohibits disclosure of the victim's identity in any form of media.

Which of the statements given above is/are correct?

(a) I only

(b) II and III only

(c) I and II only

(d) I, II and III

Answer: D

Explanation:

Statement I is Correct: Section 2(1)(d) of the POCSO Act explicitly defines a "child" as any person below the age of **18 years**.

Statement II is Correct: The POCSO Act is a **gender-neutral** law, meaning it provides equal protection to both boy and girl children from sexual offences, unlike previous laws that were often gender-specific.

Statement III is Correct: **Section 23** of the Act strictly prohibits the disclosure of a victim's identity (including name, address, or photograph) in any form of media to protect the child's privacy and prevent further trauma.

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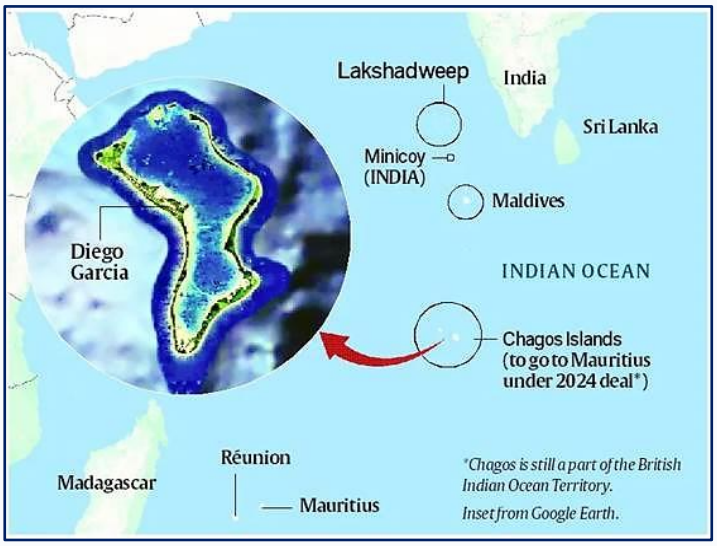
2.1. CHAGOS ARCHIPELAGO

Context: Recently, the sovereignty dispute over the **Chagos Archipelago** has returned to the spotlight following ongoing diplomatic negotiations between the **United Kingdom and Mauritius**, as reported in major dailies. The discussions center on the historic transfer of authority over the islands, specifically addressing the status of the strategic military base at **Diego Garcia** and the right of return for the displaced Chagosian people.



1. Geography and Location

- The Chagos Archipelago is a group of seven atolls comprising more than 60 individual tropical islands in the **Indian Ocean**.
- It is situated approximately 500 kilometers south of the **Maldives** archipelago.
- The largest and most southerly island is **Diego Garcia**, which hosts a vital strategic military base operated by the United States and the United Kingdom.

2. Historical and Political Background

- Originally, the Chagos Islands were part of the French colony of Mauritius, which was later ceded to the **United Kingdom** in 1814.
- In 1965, three years before Mauritius gained independence, the UK detached the Chagos Archipelago to create the **British Indian Ocean Territory (BIOT)**.
- Between 1968 and 1973, the local population (Chagosians) was forcibly relocated to Mauritius and the Seychelles to make way for the military base on Diego Garcia.

3. Legal and Diplomatic Developments

- **ICJ Advisory Opinion (2019):** The International Court of Justice ruled that the decolonization of Mauritius was not lawfully completed and that the UK is under an obligation to end its administration of the Chagos Archipelago as rapidly as possible.
- **UN General Assembly Resolution:** Following the ICJ ruling, the UNGA passed a resolution demanding that the UK withdraw its colonial administration.
- **Current Status:** The UK has agreed to hand over sovereignty to Mauritius, provided that the long-term operation of the Diego Garcia military base is secured through a treaty.

4. Strategic Significance

- The archipelago sits at the "crossroads" of the Indian Ocean, providing a surveillance and strike capability covering the **Middle East, Africa, and South Asia**.
- It is a critical node for maintaining **maritime security** and freedom of navigation in the Indo-Pacific region.

Q. With reference to the Chagos Archipelago, consider the following statements:

1. It is a group of islands located in the South Atlantic Ocean, south of the Saint Helena island.
2. The International Court of Justice (ICJ) ruled in 2019 that the UK's administration of the islands is unlawful.
3. Diego Garcia, the largest island in the archipelago, is currently under the sovereign control of Mauritius.

How many of the above statements are correct?

(a) Only one

(b) Only two

(c) All three

(d) None

Correct Answer: (a) Only one

Explanation:

- **Statement 1 is incorrect:** The Chagos Archipelago is located in the **central Indian Ocean**, not the South Atlantic. It lies south of the Maldives.
- **Statement 2 is correct:** In its 2019 advisory opinion, the **ICJ stated** that the process of decolonization of Mauritius was not lawfully completed and the UK must end its administration.
- **Statement 3 is incorrect:** While Mauritius claims sovereignty, Diego Garcia is currently still administered by the UK as part of the **British Indian Ocean Territory (BIOT)** and houses a joint UK-US military base.

2.2. ISRAEL MAPPING

Context: Recently, Prime Minister Narendra Modi's high-profile visit to Israel has brought the geography and strategic mapping of the Levant region back into sharp focus. The visit emphasized the "Special Strategic Partnership" between the two nations, highlighting key geographical corridors like the **India-Middle East-Europe Economic Corridor (IMEC)** and the strategic importance of the Port of Haifa.

1. **Political Geography & Borders**

   Israel is located at the eastern end of the **Mediterranean Sea** in West Asia, forming part of the **Levant** region.

   - **Northern Border:** Lebanon (separated by the Blue Line).
   - **Northeastern Border:** Syria (Golan Heights is the flashpoint).
   - **Eastern Border:** Jordan and the West Bank.
   - **Southwestern Border:** Egypt (Sinai Peninsula) and the Gaza Strip.
   - **Coastlines:** It has a long western coastline on the **Mediterranean Sea** and a small southern exit to the **Red Sea** via the **Gulf of Aqaba**.

2. **Disputed & Strategic Territories**
   - **West Bank:** A landlocked territory west of the Jordan River. It contains Judean **Hills** and key cities like Ramallah and Hebron.
   - **Gaza Strip:** A coastal enclave on the Mediterranean, bordering Egypt at the **Rafah Crossing**.
   - **Golan Heights:** A rocky plateau captured from Syria in 1967. It is strategically vital as it overlooks the Jordan River valley and provides a significant portion of Israel's freshwater.
   - **Shebaa Farms:** A small, disputed strip of land at the intersection of the Lebanese-Syrian border and the Israeli-occupied Golan Heights.
3. **Physical Features**
   - **The Negev Desert:** Occupies the southern half of the country; it is a triangular-shaped semi-desert region.
   - **The Dead Sea:** The lowest point on Earth (approx. 430m below sea level), shared with Jordan. It is hyper-saline.
   - **Sea of Galilee (Lake Tiberias):** The primary freshwater lake in the north, fed by the **Jordan River**.
   - **Mountain Ranges:** Includes **Mount Hermon** (highest point in the north), **Mount Carmel** (near Haifa), and the **Judean Mountains**.
4. **Important Cities and Ports**
   - **Jerusalem:** Located in the Judean Mountains; the seat of government.
   - **Tel Aviv:** The economic and technological hub on the Mediterranean coast.
   - **Haifa:** The largest northern port city, critical for the IMEC project.
   - **Eilat:** Israel's only port on the Red Sea, located at the southern tip.
   - **Ashkelon & Ashdod:** Major coastal cities and ports south of Tel Aviv.

Q. Consider the following pairs of geographical features and their locations:

Feature	Region/Bordering Body
1. Mount Hermon	Border between Israel and Lebanon/Syria
2. Gulf of Aqaba	Connects Israel to the Red Sea
3. Galilee	Located in the Southern Negev region
4. River Jordan	Flows into the Mediterranean Sea

How many of the above pairs are correctly matched?

(a) Only one pair

(b) Only two pairs

(c) Only three pairs

(d) All four pairs

Ans. (b)

- **Pair 1 correct:** Mount Hermon is located in the northernmost part of the Golan Heights, acting as a boundary marker between Israel, Syria, and Lebanon.

- **Pair 2 correct:** The Gulf of Aqaba is the eastern arm of the Red Sea, providing Israel with maritime access through the port of Eilat.
- **Pair 3 incorrect:** Galilee is a lush, mountainous region in **Northern Israel**, not the southern Negev.
- **Pair 4 incorrect:** The Jordan River flows south from the Sea of Galilee and terminates in the **Dead Sea**, which is a terminal lake with no outlet to the Mediterranean.

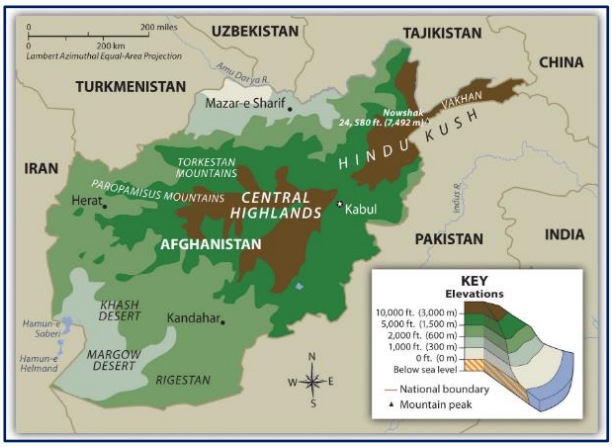
2.3. ESCALATING CONFLICT ON THE AFGHANISTAN-PAKISTAN BORDER

Context: Recently, the Afghan military forces attacked Pakistani forces along the border, citing retaliation for deadly air strikes that occurred days earlier.

A spokesperson for the Taliban regime, Zabiullah Mujahid, stated that large-scale offensive operations were launched against Pakistani military bases and installations in response to repeated violations by the Pakistani military.

Key Aspects of Afghanistan

- Afghanistan, officially the Islamic Emirate of Afghanistan, is a landlocked, mountainous nation in **South-Central Asia** with a population of 38–50 million and Kabul as its capital.
- **Political Features:** It is a landlocked, mountainous country in Southern Asia, often referred to as the **"Gateway to Asia."**
- **Demographics & Language**: Multiethnic population with Pashtun, Tajik, and Hazara as major groups. Official languages are **Pashto and Dari.**
- **Bordering Nations:** Turkmenistan, Uzbekistan, and Tajikistan to the north, Iran to west, Pakistan to the southeast, India and China to the northeast.
- **Geographical Features:**
  - Hindu Kush Mountains: Dominant range, acting as a barrier.
  - **Wakhan Corridor:** A narrow strip in the northeast connecting Afghanistan to China's Xinjiang.
  - **Rivers:** Amu Darya (North), Helmand River (Longest, Southwest), Kabul River (East).
  - **Passes:** Khyber Pass (connects to Pakistan/Indian subcontinent).
  - **Desert:** The Registan Desert, also called the **Sistan Desert**, is an extremely arid plateau in southeastern Afghanistan between Helmand Province and Kandahar Province.
  - **Highest Point:** Mt. Nowshak



- **Major Cities:** Kabul (capital), Kandahar, Herat, Mazar-i-Sharif
- **Climate & Extremes:** Mostly arid to semi-arid climate with cold winters and hot summers.
- **Key dams in Afghanistan:** These are critical for irrigation and hydroelectric power, include the **Salma Dam** (Afghan-India Friendship Dam), Kajaki Dam(Helmand river), Kamal Khan Dam, and Dahla Dam.

- **Economy & Resources:**
  - **Main industries:** textiles, carpets, cement, fertilizer.
  - **Agriculture:** wheat, fruits, nuts, wool, opium.
  - **Minerals:** Rich in natural resources like natural gas, lithium, copper, coal, iron ore, and precious stones.
  - **Major exports:** carpets, wool, fruits, gems.
  - **Major imports:** petroleum products, food, machinery.

Global Perspective

- **INSTC:** The International North–South Transport Corridor (INSTC) is a multi-modal trade route (ship–rail–road) connecting India with Central Asia, Russia, and Europe to reduce time and cost of transport.
  - **Regions involved:** India, Iran, Afghanistan, Azerbaijan, Russia, Central Asia and Europe.
- **BRI:** China is integrating Taliban-led Afghanistan into the Belt and Road Initiative (BRI) to secure regional stability, access mineral resources, and boost trade connectivity, particularly by extending the China-Pakistan Economic Corridor (CPEC).

Q. With reference to the Wakhan Corridor**, consider the following statements:**

I. It is a narrow strip of land located in northeastern Afghanistan.

II. It provides Afghanistan with a direct border with China.

Which of the statements given above is/are correct?

(a) I only

(b) II only

(c) Both I and II

(d) Neither I nor II.

Answer: C

Explanation:

Statement I is Correct: The **Wakhan Corridor** is explicitly identified as a narrow strip of land located in **northeastern Afghanistan**.

Statement II is Correct: The corridor acts as a "panhandle" that extends eastwards, providing Afghanistan with its only **direct border with China** at the Wakhjir Pass.

2.4. BRAZIL: MAPPING PERSPECTIVE

Context: Recently, India and Brazil signed a series of landmark agreements during the state visit of President Luiz Inácio Lula da Silva to New Delhi. These agreements focus on strategic cooperation in **critical minerals** (specifically rare earths and lithium), **steel mining**, and **digital public infrastructure**.

1. **Political Location and Borders**
   - **Vast Landmass:** Brazil is the **fifth-largest country** in the world and occupies nearly **47% of the South American continent**.
   - **Latitudinal Extent:** It is the only country in the world through which both the **Equator** and the **Tropic of Capricorn** pass.
   - **Neighboring Countries:** Brazil shares a border with every South American country except for **Chile and Ecuador**.
   - **Coastline:** It has an extensive coastline along the **Atlantic Ocean** to the east.
2. **Major Physical Features**
   - **The Amazon Basin (North):** This is the world's largest drainage basin, covered by the **Selvas** (equatorial rainforests). It is a major carbon sink and is often called the "Lungs of the Earth."
   - **The Brazilian Highlands (South-East):** This is an ancient plateau composed of old crystalline rocks. It includes sub-ranges like the **Serra do Mar** and the **Serra da Mantiqueira**.
   - **The Pantanal (West):** Located primarily in the state of Mato Grosso do Sul, the Pantanal is the **world's largest tropical wetland**. It is an internal delta where several rivers converge.
   - **Mato Grosso Plateau:** This is a central upland region that acts as a water divide between the Amazon and La Plata river systems.
3. **Drainage Systems**
   - **Amazon River:** It originates in the **Andes Mountains (Peru)** and flows into the Atlantic Ocean. Its major tributaries in Brazil include the **Rio Negro** (black water) and the **Madeira**.
   - **São Francisco River:** Known as the "river of national integration," it is the longest river that runs **entirely within Brazilian territory**.
   - **Paraná-Paraguay System:** These rivers flow southward and contribute to the **Itaipu Dam**, one of the world's largest hydroelectric power producers, shared with Paraguay.
4. **Economic Geography & Resources**
   - **The Iron Quadrangle (Quadrilátero Ferrífero):** Located in the state of **Minas Gerais**, this is one of the world's richest iron-ore mining regions.
   - **Carajás Mine:** Situated in the state of **Pará**, it is the world's largest iron ore mine.

- **Critical Minerals:** Brazil is a global leader in **Niobium** production and holds significant reserves of **Lithium** and **Graphite**, which are vital for India's EV battery supply chain.
- **Agriculture:** Brazil is the world's largest producer of **Coffee** (grown in "Fazendas") and a leading producer of **Soybeans** and **Sugar**.

Q. Consider the following statements regarding the geography of Brazil:

1. Brazil is the only South American country that shares its border with all other countries of the continent.
2. The São Francisco River is the longest river flowing entirely within the territory of Brazil.
3. The Pantanal, the world's largest tropical wetland, is located entirely within the Brazilian state of Mato Grosso.

How many of the above statements are correct?

(a) Only one

(b) Only two

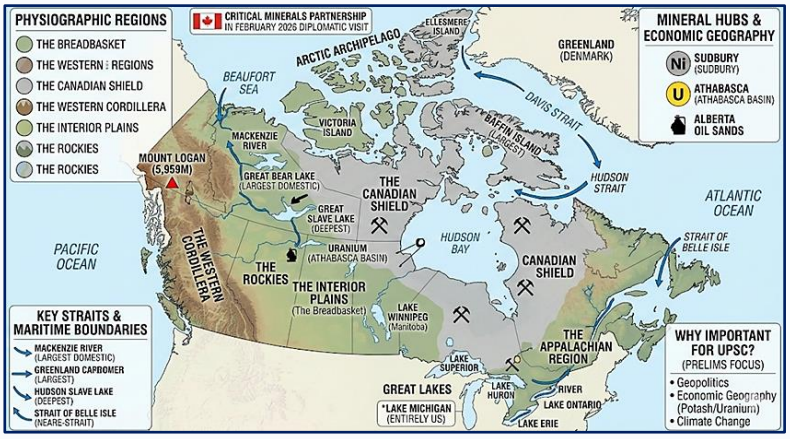
(c) All three

(d) None

Solution: (a) Only one

- **STATEMENT 1 INCORRECT:** While Brazil is vast, it does **not** share borders with **Chile and Ecuador**.
- **STATEMENT 2 CORRECT:** The **São Francisco River** is indeed the longest river that is entirely Brazilian, originating in Minas Gerais and flowing into the Atlantic.
- **STATEMENT 3 INCORRECT:** While the majority of the **Pantanal** is in Brazil (Mato Grosso and Mato Grosso do Sul), it also extends into portions of **Bolivia and Paraguay**.

2.5. MAPPING OF CANADA



Context: Recently, the visit of Canadian Prime Minister **Mark Carney** to India on February 27, 2026, has brought Canada's geographical and strategic assets into sharp focus. A central pillar of the bilateral talks involves the **India-Canada Critical Minerals Partnership**. Canada's geography is not merely a matter of topography but a repository of global resources; the Canadian Shield, often called the "Mineral House," is vital for India's transition to green energy, containing massive deposits of **uranium, potash, and nickel**.

1. Physiographic Regions

Canada is divided into seven distinct physiographic regions, each with unique geological features:

- **The Canadian Shield:** An ancient, horseshoe-shaped region of Precambrian rock surrounding **Hudson Bay**. It covers 50% of the country and is the primary source of metallic minerals (Iron, Nickel, Copper, Gold).
- **The Western Cordillera:** High, rugged mountains on the Pacific coast, including the Rockies and the Coast Mountains.
- **The Interior Plains:** The "Breadbasket of Canada," stretching between the Shield and the Cordillera, known for wheat and fossil fuels.
- **Appalachian Region:** Older, eroded mountains in the southeast (Atlantic provinces).
- **The Arctic Archipelago:** A vast group of thousands of islands in the far north.
- **St. Lawrence Lowlands:** The most densely populated region, featuring fertile land and the Great Lakes.
- **Hudson Bay Lowlands:** A flat, swampy region located on the southern shore of Hudson Bay.

2. **Mountain Systems and Ranges**
   - **Western Cordillera (Pacific Coast):**
   - **The Rockies:** Extend from the US through British Columbia and Alberta.
   - **Coast Mountains:** Run along the Pacific shore; they are heavily glaciated.
   - **Saint Elias Mountains:** Home to **Mount Logan** (5,959m), Canada's highest point.
   - **Eastern Systems:**
   - **Torngat Mountains:** Located in Labrador, part of the Canadian Shield.
   - **Appalachians:** Low, rolling mountains in Newfoundland, New Brunswick, and Nova Scotia.
3. **Hydrography: Rivers and Lakes**

   Canada contains 7% of the world's renewable freshwater.
   - **Major Rivers:**
   - **Mackenzie River:** Longest in Canada (4,241 km); flows from Great Slave Lake to the **Beaufort Sea**.
   - **St. Lawrence River:** Connects the Great Lakes to the Atlantic Ocean; a major commercial artery.
   - **Yukon River:** Flows through the Yukon Territory into Alaska.
   - **Nelson River:** Drains Lake Winnipeg into Hudson Bay.
   - **Key Lakes:**
   - **The Great Lakes:** Superior, Huron, Erie, and Ontario (Shared with the US). **Lake Michigan** is entirely in the US.
   - **Great Bear Lake:** Largest lake entirely within Canada (Northwest Territories).
   - **Great Slave Lake:** Deepest lake in North America (Northwest Territories).
   - **Lake Winnipeg:** Located in Manitoba; a remnant of the glacial Lake Agassiz.
4. **Strategic Islands and Straits**
   - **Arctic Archipelago Islands: Baffin Island** (largest), Victoria Island, and Ellesmere Island (northernmost).
   - **Strategic Straits:**
   - **Davis Strait:** Between Greenland and Baffin Island; connects Baffin Bay and the Labrador Sea.
   - **Hudson Strait:** Connects Hudson Bay to the Atlantic Ocean.
   - **Strait of Belle Isle:** Separates Newfoundland from the Labrador Peninsula.
   - **Juan de Fuca Strait:** Between Vancouver Island and Washington State (US).

5. Major Minerals Found in Canada

Metallic Minerals

- **Uranium:** A globally significant resource. Canada possesses one of the world's largest high-grade uranium reserves, primarily centered in the **Athabasca Basin** in northern Saskatchewan.
- **Nickel:** Extensive deposits are mined around **Sudbury** and **Timmins** in Ontario, making Canada a leading global producer.
- **Potash:** Essential for global agriculture. Canada is the world's largest producer of potash, with major mines located across Saskatchewan.
- **Iron Ore:** Heavily concentrated in the **Labrador Trough** (the border region of Quebec and Newfoundland and Labrador).
- **Copper, Gold, and Zinc:** Widely distributed, with notable production centers in Ontario (Sudbury, Timmins) and Quebec.

Energy Minerals

- **Crude Petroleum:** Concentrated in Western Canada, specifically the **Athabasca Oil Sands** in Alberta. The **Hibernia** oil field off the coast of Newfoundland is also a major offshore producer.
- **Natural Gas:** Found extensively in British Columbia, Alberta, and Saskatchewan.
- **Coal:** Mined primarily in British Columbia, Alberta, and Saskatchewan.

Q. Consider the following statements regarding the mapping of Canada:

1. The Canadian Shield is an ancient geological region that encircles the Hudson Bay and is rich in metallic mineral deposits.
2. The Mackenzie River flows southwards from the Canadian Rockies to drain into the Pacific Ocean near Vancouver.
3. Baffin Island is the largest island in the Canadian Arctic Archipelago and is separated from Greenland by the Davis Strait.

Which of the statements given above are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2, and 3

Solution: (c) 1 and 3 only

- **Statement 1 is correct:** The Canadian Shield (Laurentian Plateau) is a vast area of Precambrian rock surrounding **Hudson Bay** and is a primary source of minerals like gold, nickel, and copper.
- **Statement 2 is incorrect:** The Mackenzie River flows **northwards** from Great Slave Lake and drains into the **Beaufort Sea** (Arctic Ocean). The Fraser and Columbia rivers are the ones that flow toward the Pacific.
- **Statement 3 is correct:** Baffin Island is indeed Canada's largest island, and the **Davis Strait** (along with Baffin Bay) forms the maritime boundary between it and Greenland.

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ECONOMY

3.1. INDIA'S NEW GDP DATA

Context:

- Recently, the Ministry of Statistics and Programme Implementation (MoSPI) has officially transitioned the Indian economy to a new GDP series by shifting the base year from 2011–12 to 2022–23. This change aims to capture the structural transformations of the Indian economy, particularly the rapid growth of the digital economy, gig work, and updated consumption patterns.
- Along with the rebasing, the National Statistical Office (NSO) has released the Second Advance Estimates for FY 2025-26, projecting a real GDP growth rate of approximately 7.4-7.6%.

Key Highlights of India's New GDP Data

1. **Revision of Base Year (2022-23)**
    - The base year for Gross Domestic Product (GDP) and the Index of Industrial Production (IIP) has been updated to **2022–23** to replace the decade-old 2011–12 series.
    - The Consumer Price Index (CPI) base year is also being aligned to **2023–24** to better reflect the modern consumption basket of Indian households.
    - Rebasing is a standard statistical practice recommended by the United Nations System of National Accounts (SNA) to ensure that economic data remains relevant to current market realities.
2. **Methodological Upgrades**
    - **Double Deflation:** One of the most significant changes is the adoption of the "Double Deflation" method, where output and intermediate inputs are deflated separately to calculate Real Gross Value Added (GVA) more accurately.
    - **New Data Sources:** The NSO is now leveraging big data from the **Goods and Services Tax Network (GSTN)**, digital payment portals (though UPI value is used cautiously), and the **Vahan dashboard** for vehicle registrations.
    - **MCA-21 Database:** Enhanced use of the Ministry of Corporate Affairs' digital filings (MCA-21) allows for better coverage of the organized corporate sector compared to earlier survey-based methods.
3. **Macroeconomic Projections (FY 2025-26)**
    - **Real GDP Growth:** The economy is estimated to grow at **7.4% to 7.6%** in real terms, maintaining India's status as the fastest-growing major economy.
    - **Nominal GDP Growth:** Projected at approximately **8.0%**, reflecting a narrowing gap between real and nominal growth due to easing inflationary pressures (GDP Deflator).
    - **Sectoral Performance:**
    - **Services:** Expected to grow at a robust **9.1%**, driven by financial and professional services.

- **Manufacturing:** Estimated to rebound to **7.0%** growth from lower levels in previous years.
- **Agriculture:** Anticipated to see a moderate growth of **3.1%**.

4. **Impact on Fiscal Indicators**
   - **Denominator Effect:** A potential upward revision in the absolute size of the GDP due to rebasing often leads to a statistical reduction in the **Fiscal Deficit as a % of GDP** and the **Debt-to-GDP ratio**, even if the absolute debt remains the same.
   - **Investment Rates:** Indicators like Gross Fixed Capital Formation (GFCF) as a percentage of GDP may appear lower if the GDP base expands significantly.

Q. With reference to the recent revision of India's Gross Domestic Product (GDP) series, consider the following statements:

1. The Ministry of Statistics and Programme Implementation (MoSPI) has shifted the base year for GDP from 2011–12 to 2022–23.
2. The adoption of the "Double Deflation" method involves deflating the value of output and intermediate inputs using the same price index.
3. A higher revised absolute GDP figure typically leads to a statistical decrease in the country's Debt-to-GDP ratio.

How many of the statements given above are correct?

(a) Only one

(b) Only two

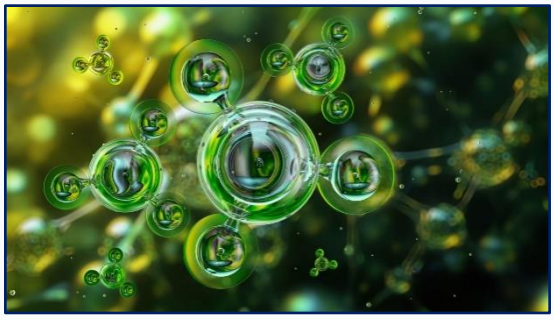
(c) All three

(d) None

Solution: (b) Only two

- **STATEMENT 1 IS CORRECT:** MoSPI has indeed updated the base year to 2022–23 to better reflect the current structure of the Indian economy.
- **STATEMENT 2 IS INCORRECT:** Double Deflation involves deflating the value of output and the value of intermediate inputs **separately** using their respective price indices (e.g., WPI for inputs and CPI/WPI for output) to arrive at a more accurate Real GVA.
- **STATEMENT 3 IS CORRECT:** Since the Debt-to-GDP ratio is a fraction, an increase in the denominator (GDP) while keeping the numerator (Debt) constant results in a lower overall ratio.

3.2. INDIA'S ENERGY SHIFT THROUGH THE GREEN AMMONIA



Context: At the inaugural session of India Energy Week (IEW) in January 2026, India announced a shift from **energy security to energy independence** and positioned **$500 billion investment opportunities** across the energy sector.

The strategy emphasizes clean energy transition, with **green hydrogen** as a key pillar and **green ammonia** identified as a critical derivative for decarbonizing **fertilizers, clean energy, and marine fuel**.

1. **About Green Ammonia**
   - Green ammonia, also known as **renewable ammonia**, is a form of ammonia that is produced using renewable energy sources and which is proposed as a **sustainable, emission-free alternative** with a multitude of applications in industry and other sectors.
   - Unlike traditional **"grey" ammonia** that uses fossil fuels, green ammonia **emits zero carbon**, offering a sustainable solution for environment.
2. **Production and Technology Process:**
   - **Green hydrogen** is first produced through **water electrolysis**, where water is split into **hydrogen and oxygen** using renewable electricity.
   - The process relies on clean energy sources like **solar or wind power to keep it carbon-free.**
   - The hydrogen is then combined with **atmospheric nitrogen** using the **Haber-Bosch process** under **high pressure, temperature, and a catalyst**.
   - This results in the production of green ammonia made **entirely from green hydrogen and nitrogen.**
3. **What are the main uses/importance of green ammonia?**
   - **Efficient Hydrogen Carrier:** Green ammonia is produced by combining nitrogen with green hydrogen. Ammonia has a much **higher volumetric energy density** than hydrogen gas, making it an excellent medium for storing and releasing hydrogen for various industrial applications.
   - **Power generation fuel:** Can be burned or co-fired in thermal power plants with low emissions.
   - **Marine fuel:** Emerging zero-carbon fuel option for ships and the shipping industry.
   - **Industrial decarbonization:** Used in chemicals, steel, and other hard-to-abate sectors.
   - **Ease of Storage and Transport:** Hydrogen gas is difficult to handle because it requires extremely high pressure or cryogenic temperatures. Ammonia, however, can be liquefied at much more modest pressures and temperatures, making it significantly easier to store and transport using existing infrastructure
4. **Comparison of Types: Blue Ammonia vs Green Ammonia**

Feature	**Blue Ammonia**	**Green Ammonia**
Hydrogen Source	Natural Gas (Fossil Fuel)	Water (Electrolysis)
Energy Source	Fossil Fuels + CCS	Renewable Energy (Solar/Wind)
Carbon Status	Low-Carbon (Carbon Captured)	**Zero-Carbon**
Cost	Lower cost than green, utilizes existing infrastructure	**Currently more expensive**

5. **India's Green Ammonia Auction Model**
   - **Implementing Agency:** Solar Energy Corporation of India (SECI) under the National Green Hydrogen Mission.
6. **Challenges**
   - **Costs:** Currently, green ammonia is more expensive to produce than conventional ammonia, though costs are decreasing with advancements.
   - **Energy-intensive process:** Electrolysis and Haber-Bosch synthesis require large amounts of energy.

- **Infrastructure gaps:** Limited facilities for storage, transport, and large-scale handling.
- **Safety concerns**: Ammonia is toxic and requires strict safety measures.

Q. Green ammonia is mainly considered important in the clean-energy transition because:

1. It can act as an efficient hydrogen carrier.
2. It can be used as a low-carbon marine fuel.
3. It is easier to store and transport than hydrogen gas.

Options:

a) 1 only

b) 1 and 2 only

c) 2 and 3 only

d) 1, 2 and 3

Answer: D

Explanation:

Statement 1 is correct: Efficient Hydrogen Carrier: Green ammonia is produced by combining nitrogen with green hydrogen. Ammonia has a much higher volumetric energy density than hydrogen gas, making it an excellent medium for storing and releasing hydrogen for various industrial applications.

Statement 2 is correct: Low-Carbon Marine Fuel: The article explicitly identifies marine fuel as one of the wide-ranging applications for green ammonia. Because it is produced without carbon-intensive fossil fuels, it serves as a critical tool for decarbonizing the global shipping industry.

Statement 3 is correct: Ease of Storage and Transport: Hydrogen gas is difficult to handle because it requires extremely high pressure or cryogenic temperatures. Ammonia, however, can be liquefied at much more modest pressures and temperatures, making it significantly easier to store and transport using existing infrastructure. This is why the article highlights that green ammonia procurement increases its appeal for scale-up in global markets.

3.3. BHARAT TAXI

Context: Recently, the Union Home Minister launched 'Bharat Taxi', **a cooperative-led** ride-hailing platform for auto drivers from Delhi-NCR and Gujarat, aimed at providing a more democratic and profitable alternative to private aggregators.

1. **Bharat Taxi: The "Amul Model" of Transportation**
   - **Operational Philosophy**: The platform follows the successful **'Amul model'**, which transformed India's dairy sector by returning maximum value to the primary producers (drivers).
   - **Profit Sharing**: Unlike private aggregators that retain high commissions, Bharat Taxi will distribute **80% of its profits to the drivers** based on the kilometers driven.

- **Cooperative Capital**: The remaining **20% of the profits** will be retained as cooperative capital to sustain and grow the organization.
- **Fixed Base Rate**: To ensure fair earnings, the platform guarantees a **minimum base rate per kilometer** for all its associated drivers.

2. **Ownership and Governance Structure**
   - **Representation**: As the membership grows, seats on **Bharat Taxi's Board of Directors** will be specifically reserved for driver representatives.
   - **Self-Governance**: This structure allows driver representatives to challenge policies that might be unfavorable to the workforce, ensuring the board remains accountable to the workers.
3. **'Saarathi Didi' and Safety Features**
   - **Women's Empowerment**: The app features a dedicated **'Saarathi Didi'** mode, which prioritizes **female drivers** for women passengers traveling alone.
   - **Safety and Livelihood**: This feature is a "collective responsibility" to ensure both the safety of female commuters and increased livelihood opportunities for women in the transport sector.

Q. With reference to 'Bharat Taxi', recently seen in the news, consider the following statements:

I. It is a cooperative-led ride-hailing platform.

II. It aims to provide a more profitable alternative to private aggregators.

III. It was launched by Ministry of Social justice.

Which of the statements given above is/are correct?

a) I only

b) I and II only

c) II and III only

d) I, II and III

Answer: B

Explanation:

Statement I is correct: Bharat Taxi is a newly launched **cooperative-led ride-hailing platform**. It follows the **'Amul model'**, which is a successful cooperative business structure in India.

Statement II is correct: The platform's primary goal is to provide a **more profitable alternative** to private aggregators. It achieves this by returning **80% of the profits** directly to the drivers based on the distance they drive, while the remaining 20% is retained as cooperative capital.

Statement III is incorrect: The platform was launched by **Union Home Minister Amit Shah**, not the Ministry of Social Justice. He announced the initiative while addressing a town hall interaction with cab and auto-rickshaw drivers in New Delhi.

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4.1. TOTAL APPLIED TOXICITY

Context: Recently, a high-profile study published in the journal *Science* has brought the concept of **Total Applied Toxicity (TAT)** to the forefront of environmental discourse. The research reveals a concerning global trend where, despite stable or slightly declining volumes of pesticide use in some regions, the actual ecological harm—measured as TAT—is rising. This is particularly significant as the **United Nations Biodiversity Conference (COP15)** set a target to reduce pesticide-related risks by **50% by 2030**, yet current TAT data suggests that most nations are moving in the opposite direction.

What is Total Applied Toxicity (TAT)?

Total Applied Toxicity (TAT) is a comprehensive environmental indicator used to assess the potential impact of pesticides on biodiversity. Unlike traditional metrics that merely track the **weight/volume** of pesticides applied, TAT integrates two critical factors:

1. **Pesticide Use Data:** The quantity (kilograms or tons) of specific active ingredients applied to crops.
2. **Toxicity Metrics:** The inherent toxicity of those chemicals to specific non-target species groups (e.g., honeybees, fish, aquatic invertebrates).

Why the Shift to TAT?

For decades, regulators focused on the **amount** of pesticides used. However, the industry has shifted toward high-potency chemicals. This means a farmer might use a smaller volume of a "new generation" pesticide, but that small amount could be thousands of times more toxic to the environment than the larger volume of an older chemical. **TAT captures this "decoupling" of volume and toxicity.**

Key Findings & Global Trends

- **Species-Specific Impact:** Recent data shows that while toxicity to vertebrates (like birds and mammals) has generally decreased due to stricter regulations, the TAT for **invertebrates** (like pollinators and aquatic insects) and **terrestrial plants** has increased significantly.
- **The Global Leaders:** Countries with the highest TAT intensities include **Brazil, China, Argentina, and the United States**, largely driven by intensive monoculture farming and the use of highly toxic herbicides and insecticides.
- **Pest Resistance:** As pests develop resistance, farmers often increase the frequency of application or use more toxic mixtures, further driving up the TAT.
- **The 50% Target:** The **Kunming-Montreal Global Biodiversity Framework (Target 7)** aims to reduce the risk of pesticides by half. Currently, TAT is the primary indicator proposed to track progress toward this goal.

India's Regulatory Framework: 1968 vs. 2025

India is currently overhauling its domestic laws to align with modern toxicity standards and farmer safety.

1. **The Insecticides Act, 1968 (Current)**
   - **Focus:** Regulating the import, manufacture, sale, and distribution of insecticides to prevent risk to human beings or animals.
   - **Limitation:** Enacted during the Green Revolution, it prioritizes "availability" and "efficacy" over environmental "toxicity" and long-term ecological health.
   - **Institutions:** Established by the **Central Insecticides Board (CIB)** and **Registration Committee (RC)**.
2. **The Pesticides Management Bill, 2025 (Proposed)**

   The 2025 Bill (replacing earlier 2020 and 2008 drafts) seeks to modernize the sector:
   - **Broader Scope:** Covers "Pesticides" (including biologicals) rather than just "Insecticides."
   - **Risk-Based Governance:** Introduces a formal definition of "risk" (aligning with TAT concepts), allowing regulators to ban substances based on environmental harm even if they are effective for crops.
   - **Farmer Welfare:** Includes provisions for **compensation** to farmers in case of poor-quality pesticides and establishes a **Pesticide Management Fund**.
   - **Stricter Penalties:** Heavy fines (up to ₹40 lakh) and imprisonment for selling spurious or unregistered pesticides.
   - **Digital Traceability:** Mandatory use of QR codes and digital portals to track pesticides from factory to farm.

Global Conventions & India's Obligations

Convention	Focus Area	India's Status
Stockholm Convention	Eliminating **Persistent Organic Pollutants (POPs)** like DDT and Endosulfan.	Party (Ratified). Recently banned 7 additional POPs.
Rotterdam Convention	**Prior Informed Consent (PIC)** procedure for trading hazardous chemicals.	Party. Helps India decide whether to allow the import of toxic chemicals.
Basel Convention	Regulating the transboundary movement of **hazardous waste** (including pesticide containers).	Party. Focuses on safe disposal of chemical waste.
Kunming-Montreal GBF	**Target 7:** Reduce pollution risk from pesticides by **50% by 2030**.	Committed. TAT is the indicator for this target.

Q. With reference to the 'Total Applied Toxicity' (TAT) recently seen in the news, consider the following statements:

1. It is a metric that measures the total volume of pesticides used in a country regardless of their chemical potency.
2. It is used as a headline indicator to monitor progress under the Kunming-Montreal Global Biodiversity Framework.

3. A rise in TAT suggests an increasing risk to non-target organisms even if the total quantity of pesticides applied remains constant.

How many of the above statements are correct?

(a) Only one

(b) Only two

(c) All three

(d) None

Correct Option: (b) Only two

- **STATEMENT 1 IS INCORRECT:** TAT does not just measure volume; it combines the volume of use with the specific toxicity (potency) of the active ingredient. Measuring only volume is the traditional method that TAT aims to improve upon.
- **STATEMENT 2 IS CORRECT:** TAT has been adopted/proposed as a key indicator for Target 7 of the Kunming-Montreal Global Biodiversity Framework to measure the reduction of risks from highly hazardous chemicals.
- **STATEMENT 3 IS CORRECT:** Because TAT accounts for potency, if a low-toxicity pesticide is replaced by a high-toxicity one (even in smaller amounts), the TAT value increases, indicating a higher risk to the environment.

4.2. EURASIAN DIVING DUCKS

Context: Recently, the seventh waterbird census at the **Kaziranga National Park and Tiger Reserve** in Assam spotlighted a rare avian guest—the **Smew** (*Mergellus albellus*), a striking **Eurasian diving duck**. This first-ever recorded sighting of the Smew in the Kaziranga landscape occurred at the **Rowmari-Donduwa beels** in the Laokhowa-Burhachapori Wildlife Sanctuaries. While the sighting is a testament to the health of Assam's wetlands, ornithologists have expressed concern that such sporadic sightings of "vagrant" species may be linked to **climate-driven range shifts** and the degradation of traditional wintering habitats.

1. **Biological Profile of the Smew (*Mergellus albellus*)**
   - **Appearance:** They are medium-sized ducks. Males are distinctively white with a "black mask" and fine black lines on the body, while females (often called 'redheads') have a chestnut-colored head and mottled grey body.
   - **Feeding Behavior:** As a diving duck, it specializes in catching small fish, aquatic insects, and crustaceans. Their presence typically indicates a **fish-rich, sheltered water body**.
   - **Breeding Grounds:** They primarily breed in the **Eurasian Taiga** (northern coniferous forests) and are rare winter visitors to the Indian subcontinent.
2. **Habitat and Distribution**
   - **Global Range:** They are found across the Palearctic region, from Scandinavia across Siberia.

- **In India:** They are considered **vagrants** or rare winter migrants. Previous sightings have been recorded in northern and central India, such as the **Haiderpur wetland** in Uttar Pradesh.
- **Recent Sighting:** The discovery in the **Rowmari-Donduwa beels** (floodplain lakes) within the Kaziranga landscape highlights the importance of the **Central Asian Flyway**.

3. **Conservation Status**
   - **IUCN Red List:** The Smew is currently categorized as **Least Concern** globally, but its population is declining due to habitat loss and human activities.
   - **Other Related Species:** The **Common Pochard** (another Eurasian diving duck found in India) is listed as **Vulnerable**, emphasizing the precarious state of migratory diving ducks.
4. **Ecological Indicators**
   - The arrival of rare diving ducks underscores the **resilience of floodplains**.
   - They serve as **bio-indicators**; their presence signals a healthy aquatic food chain and relatively low levels of human disturbance in the wetland.

Q. Consider the following statements regarding the Smew (*Mergellus albellus*), recently seen in the news:

1. It is a diving duck that primarily breeds in the Eurasian taiga regions.
2. In India, it is a common perennial resident found across the southern peninsular wetlands.
3. Its presence in a wetland is generally considered an indicator of a healthy fish-rich aquatic ecosystem.

How many of the above statements are correct?

(a) Only one

(b) Only two

(c) All three

(d) None

Correct Answer: (b) Only two

Explanation

Statement 1 is correct: The Smew is indeed a diving duck that breeds in the northern coniferous forest belt (taiga) of Europe and Asia.

Statement 2 is incorrect: The Smew is not a perennial resident of India; it is a **rare winter visitor (vagrant)**. Furthermore, it is primarily sighted in Northern and North-eastern India (like Assam and UP), not commonly across the southern peninsula.

Statement 3 is correct: Since the Smew specializes in feeding on small fish and aquatic invertebrates, its presence indicates a productive and balanced wetland environment.

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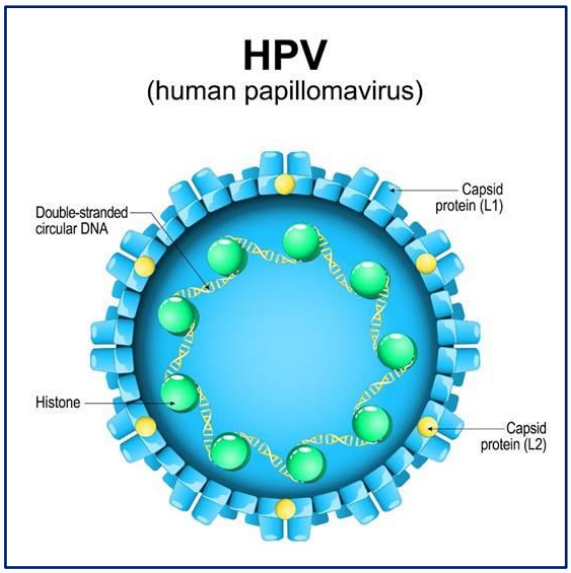
SCIENCE AND TECHNOLOGY

5.1. HPV AND VACCINATION



Context: Recently, the Union Ministry of Health and Family Welfare announced the launch of a nationwide, free Human Papillomavirus (HPV) vaccination campaign targeting adolescent girls aged **14 years** to combat cervical cancer. The government will initially utilize the quadrivalent **Gardasil** vaccine, secured through a partnership with **Gavi, the Vaccine Alliance**, and will track the rollout via the digital **U-WIN** platform.

1. **Understanding Human Papilloma virus (HPV)**
   - **Definition:** HPV is a group of more than 200 related viruses, primarily transmitted through skin-to-skin or sexual contact.
   - **Disease Burden:** While most infections are cleared by the immune system, persistent infection with "high-risk" types leads to cancers.
   - **High-Risk Strains: HPV types 16 and 18** are responsible for nearly 70-80% of cervical cancer cases globally and in India.
   - **Other Conditions:** Low-risk types like **HPV 6 and 11** cause genital warts and respiratory papillomatosis but are rarely oncogenic.
2. **National HPV Vaccination Drive (2026)**
   - **Target Group:** The campaign specifically targets girls aged **14 years** to provide maximum preventive benefit before potential exposure to the virus.
   - **Implementation:** The vaccination is **voluntary and free of cost** at government facilities, including Ayushman Arogya Mandirs (Health and Wellness Centers).
   - **The Single-Dose Regimen:** Based on recommendations from the **National Technical Advisory Group on Immunisation (NTAGI)** and the WHO, India has adopted a single-dose schedule, which scientific evidence shows provides robust and durable protection.
   - **Tracking:** The **U-WIN digital platform** (modeled after Co-WIN) will be used to register beneficiaries and track vaccination events.
3. **Types of HPV Vaccines**

Vaccine	Type	Strains Covered	Developer/Manufacturer
CERVAVAC	Quadrivalent	6, 11, 16, 18	**Serum Institute of India (SII)**
Gardasil	Quadrivalent	6, 11, 16, 18	MSD (Merck & Co.)
Gardasil 9	Nonavalent	6, 11, 16, 18, 31, 33, 45, 52, 58	MSD (Merck & Co.)
Cervarix	Bivalent	16, 18	GSK

- **Note: CERVAVAC** is India's first indigenous quadrivalent HPV vaccine, developed through a partnership between SII and the Department of Biotechnology (DBT).

4. WHO "90-70-90" Targets by 2030

India is aligning its health goals with the WHO Global Strategy to eliminate cervical cancer:

1. **90%** of girls fully vaccinated with the HPV vaccine by age 15.
2. **70%** of women screened with a high-performance test by age 35 and again by 45.
3. **90%** of women identified with cervical disease receive treatment.

Q. With reference to the Human Papillomavirus (HPV) and its vaccination in India, consider the following statements:

1. HPV is a DNA virus that is primarily responsible for cervical, anal, and oropharyngeal cancers.
2. CERVAVAC, India's first indigenous HPV vaccine, is a bivalent vaccine targeting only HPV types 16 and 18.
3. The U-WIN digital platform is utilized for the electronic registration and tracking of all vaccination events under the national program.

How many of the above statements are correct?

(a) Only one

(b) Only two

(c) All three

(d) None

Correct Answer: (b)

Explanation

- **Statement 1 is correct:** HPV is a double-stranded DNA virus. Persistent infection with high-risk strains (like 16 and 18) is the primary cause of cervical cancer and is also linked to anal, penile, and throat cancers.
- **Statement 2 is incorrect:** CERVAVAC is a **quadrivalent** vaccine (qHPV), meaning it protects against four strains: 6, 11, 16, and 18, not just two.
- **Statement 3 is correct:** The U-WIN platform has been launched by the Ministry of Health to digitize the entire vaccination ecosystem, enabling name-based tracking of beneficiaries including pregnant women and children.

5.2. INS ANJADIP

Context: Recently, the Indian Navy formally commissioned **INS Anjadip**, the fourth indigenously built **Anti-Submarine Warfare Shallow Water Crafts (ASW-SWC)**, at the Chennai Port. This vessel is designed specifically to detect and neutralize underwater threats in the littoral (shallow) waters of the Indian Ocean Region, marking a major milestone in India's quest for **Aatmanirbharta** (self-reliance) in defense manufacturing.

Classification of Naval Ships in India

The Indian Navy operates a diverse fleet designed for "Blue Water" (deep sea) and "Brown Water" (coastal) operations.

1. **Aircraft Carriers (The Capital Ships)**

   These are seagoing airbases that allow a nation to project power far beyond its shores.

   - **Role:** Command and control of the fleet, providing air cover, and conducting long-range strikes.
   - **Examples:**
   - **INS Vikramaditya:** A modified Kiev-class carrier of Russian origin.
   - **INS Vikrant:** India's first indigenous aircraft carrier (IAC-1).

2. **Destroyers (The Frontline Escorts)**

   Large, fast, and heavily armed with missiles to protect the fleet from surface and air attacks.

   - **Role:** Escorting larger vessels (like carriers), offensive anti-surface warfare, and area air defense.
   - **Examples:**
   - **Visakhapatnam Class (Project 15B):** Most advanced stealth destroyers (e.g., **INS Visakhapatnam**, **INS Mormugao**).
   - **Kolkata Class (Project 15A):** Features advanced AESA radars and BrahMos missiles (e.g., **INS Chennai**).
   - **Rajput Class:** Older Soviet-era destroyers primarily used for escort duties.

3. **Frigates (Multi-Role Workhorses)**

   Slightly smaller than destroyers, they are optimized for versatility in anti-submarine and air-defense roles.

   - **Role:** General-purpose combat, protecting merchant convoys, and specialized anti-submarine warfare.
   - **Examples:**
   - **Nilgiri Class (Project 17A):** Next-gen stealth frigates (e.g., **INS Himgiri**, **INS Udaygiri**).
   - **Shivalik Class (Project 17):** India's first stealth frigates (e.g., **INS Satpura**).
   - **Talwar Class:** Multi-role stealth frigates used for long-range patrols.

4. **Corvettes (Coastal Guardians)**

   Small, maneuverable warships for coastal defense. **INS Anjadip** is a specialized variant of this class.

   - **Role:** Coastal surveillance, shallow-water anti-submarine warfare, and search and rescue (SAR).
   - **Examples:**
   - **Kamorta Class:** Specialized ASW stealth corvettes (e.g., **INS Kiltan**).
   - **Arnala Class (ASW-SWC):** The new "Shallow Water" specialists, including **INS Arnala** and **INS Anjadip**.
   - **Kora & Khukri Classes:** Primarily focused on surface-to-surface missile warfare.

5. **Submarines (The Silent Killers)**

   - **Nuclear-Powered (SSBN/SSN):**
   - **Role:** Strategic deterrence (second-strike capability) and long-endurance underwater combat.
   - **Examples: INS Arihant**, **INS Arighaat**.
   - **Conventional (SSK):**

- **Role:** Infiltrating enemy waters and destroying surface ships and submarines.
- **Examples: Kalvari Class** (Scorpene design), **Sindhughosh Class** (Kilo-class).

6. Amphibious Warfare & Support Ships

- **Role:** Transporting troops/tanks for beach landings and providing fuel/supplies to the fleet.
- **Examples: INS Jalashwa** (Amphibious Transport Dock), **INS Deepak** (Fleet Tanker), and **INS Nistar** (Diving Support Vessel).

INS Anjadip: The "Dolphin Hunter"

Technical & Strategic Details

- Role: Known as the "Dolphin Hunter," it is optimized for the detection and neutralization of enemy submarines in shallow, coastal waters where larger ships struggle to operate.
- Propulsion: Utilizes a high-speed Water-Jet Propulsion system, enabling a top speed of 25 knots.
- Sensors: Equipped with the indigenous Sonar Abhay and sophisticated combat management systems.
- Construction: Built by Garden Reach Shipbuilders & Engineers (GRSE) in collaboration with L&T Shipyard, utilizing high-grade steel from SAIL.

Q. Consider the following pairs regarding Indian Naval vessels and their primary roles:

1.	**INS Arighaat**	Nuclear-powered ballistic missile submarine for strategic deterrence
2	**INS Anjadip**	Stealth destroyer designed for long-range deep-sea surface strikes
3	**INS Nistar**	Diving support vessel for submarine rescue and deep-sea operations
4	**INS Vikramaditya**	Indigenous aircraft carrier commissioned under Project 17A

How many of the above pairs are correctly matched?

(a) Only one

(b) Only two

(c) Only three

(d) All four

Solution: (b) Only two

- **PAIR 1 IS CORRECT:** INS Arighaat is an Arihant-class nuclear ballistic missile submarine (SSBN).
- **PAIR 2 IS INCORRECT:** INS Anjadip is an **ASW-SWC (Shallow Water Craft)** designed for coastal submarine hunting, not a deep-sea destroyer.
- **PAIR 3 IS CORRECT:** INS Nistar is a specialized diving support vessel (DSV) used for rescue and underwater work.
- **PAIR 4 IS INCORRECT:** INS Vikramaditya is a modified Kiev-class carrier of Russian origin; the indigenous carrier is INS Vikrant.

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