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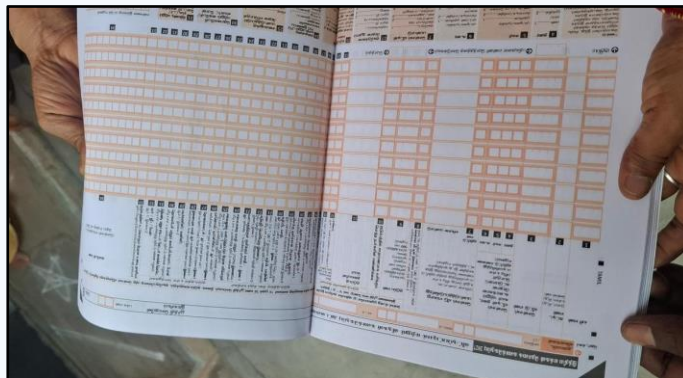
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POLITY & GOVERNANCE

1.1. LADAKH TO LEAD INDIA'S FIRST CASTE CENSUS

Context

- Ladakh will become the first place in independent India to enumerate caste as part of a regular Census in the Census 2027.
- Ladakh and other snow-bound areas will conduct population enumeration earlier, in **September 2026**, due to climatic constraints.



What is Census?

- A **Census** is the official, periodic enumeration of a country's population, collecting demographic, social and economic information for planning and policymaking.
- The **Census of India** is the **official population enumeration of India**, conducted by the **Office of the Registrar General and Census Commissioner, India**, under the **Ministry of Home Affairs**.
- **Key Points**
 - **First Census in India: 1872** — conducted during the colonial period, but it was not conducted simultaneously throughout India.
 - **First synchronous Census: 1881** — conducted simultaneously across India.
 - **Frequency:** Traditionally conducted **every 10 years**.
 - **Last completed Census: 2011**.
 - **Next Census:** The **2021 Census was postponed**; the Government has announced that the next population census will be conducted as **Census 2027**.
 - **Legal basis: Census Act, 1948**.
 - **Authority:** Registrar General & Census Commissioner, India.

Why will Ladakh conduct Census earlier?

- Severe winter conditions make enumeration difficult during the normal census period.
- Therefore, Ladakh and specified snow-bound areas of **Jammu & Kashmir, Himachal Pradesh and Uttarakhand** follow a **non-synchronous schedule**.
- This will also be the **first Census of Ladakh as a Union Territory**.

Caste-Based Census

- **Meaning:** A caste-based census involves collecting information on the **caste composition of the population** during a population census. Such data can help assess the **socio-economic conditions, inequalities and representation** of different caste groups and support evidence-based policymaking and affirmative action.
- **Background:** In **2011**, the Government conducted the **Socio-Economic and Caste Census (SECC)**. However, the caste-related data were **not officially published**, partly due to concerns over data quality and inconsistencies arising from variations in how people reported their caste identities.

- **Census 2027:** The upcoming **Census 2027** is significant because it is expected to include **caste enumeration as part of the regular Census**, making it the first regular Census after Independence to collect caste-wise population data.
- **Constitutional Framework:** The Constitution provides a framework for addressing the socio-economic backwardness of disadvantaged groups, particularly through **Articles 16(4) and 340**. However, the absence of comprehensive caste-wise population data has often posed challenges for evidence-based assessment of backwardness and representation.
- **Bihar Caste Survey:** In **2023, Bihar conducted a caste-based survey**, providing state-level data on the caste composition and socio-economic conditions of its population.

Legal & Constitutional Anchors

- **Census Act, 1948** – statutory basis.
- **Census Rules, 1990** – operational framework.
- Conducted by **Registrar General & Census Commissioner of India**, under the **Ministry of Home Affairs**.
- **Constitution:** Census is a **Union subject** under **Entry 69, Union List, Seventh Schedule**.

1.2. PRESIDENT'S COLOUR CONFERRED ON PUDUCHERRY POLICE

Context

- Union Home Minister **Amit Shah** presented the **President's Colour** to **Puducherry Police**, the highest honour for a police force, for its **dedication to internal security and public service**. It highlights the importance of **policing, national security and constitutional governance in Union Territories**.



Key Facts of the Puducherry Presentation

- With this conferment, **Puducherry Police** becomes the **18th State/Union Territory police force** in the country to receive the honour, joining earlier recipients such as the **Indian Navy** and the **Indian Coast Guard**; the force, numbering fewer than **5,000 personnel**, secures a Union Territory whose jurisdiction spans non-contiguous enclaves in **Tamil Nadu, Andhra Pradesh (Yanam) and Kerala (Mahe)**.
- **Approval Date:** Conferment approved by **President Droupadi Murmu** on **8 May 2026**.
- **Venue:** **Puducherry Armed Police Ground, Gorimedu**.
- **Recipient:** Colour handed over to the **Ensign Officer, Puducherry Police**, in the presence of **DGP Shalini Singh**.
- **Dignitaries Present:** Lt Governor **K. Kailashnathan**, Chief Minister **N. Rangasamy**, and Home Minister **A. Namassivayam**.

Related Announcements During the Visit

- **New Criminal Laws:** Described as resting on three pillars -- **technology, timeline and trust**.

- **Har Ghar Tiranga Yatra:** Flagged off at **Murugaa Theatre Signal**; this year's edition focuses on **150 years of Vande Mataram**.

Significance

- **Puducherry** becomes the **18th State/Union Territory** police force to receive the President's Colour.
- Reinforces cooperative federalism in the recognition of internal security institutions.
- Underscores India's shift toward a technology-driven, time-bound criminal justice framework.

About the President's Colour

- **Origin:** First conferred on the **Indian Navy** on **27 May 1951** by President **Rajendra Prasad**.
- **Eligibility:** A minimum of **25 years** of exemplary, meritorious service in peace and war.
- **Also Known as:** The **Nishaan**; recipient-unit officers wear a special emblem on the left uniform sleeve.
- **Approving Authority:** Conferred by the **President of India** as Supreme Commander, on recommendation of the **Ministry of Home Affairs**.

1.3. CANCER AS A NOTIFIABLE DISEASE IN INDIA

Context

- The **Supreme Court** has asked **19 States/Union Territories** that have not yet notified cancer to take steps towards declaring it a **"notifiable disease"**, following a PIL seeking uniform and mandatory reporting of cancer cases across India. The issue arises from the absence of a **nationwide mandatory cancer-reporting mechanism**.



What is a Notifiable Disease?

- A **notifiable disease** is a disease whose occurrence must be **reported to designated public-health authorities by law**.
- Notification enables the government to **collect systematic data, monitor disease trends, identify high-burden areas and formulate targeted interventions**.
- **Important:** *Notifiable does not necessarily mean communicable*. Cancer is a **non-communicable disease (NCD)**, but mandatory reporting can still be used for surveillance and planning.

Why is Cancer Notification Important?

- **Early detection:** Helps identify disease patterns and high-risk populations.
- **Disease surveillance:** Provides more comprehensive data on incidence, mortality and geographical distribution.
- **Resource allocation:** Helps governments plan cancer hospitals, diagnostic facilities, specialists and medicines.
- **Targeted prevention:** Allows identification of regional risk factors such as **tobacco use, pollution and occupational exposures**.
- **Policy formulation:** Enables evidence-based cancer-control strategies.

Current Status in India

- **Cancer is NOT a nationally notifiable disease** in India.
- However, several States/UTs have independently made cancer notifiable.
- **Telangana became the latest state in April 2026**, joining the existing group and bringing the total to **17 States/UTs**.
- Therefore, the absence of a **uniform national mechanism** creates gaps in cancer reporting.
- **Why is this a problem?**
 - India's cancer surveillance relies significantly on the **National Cancer Registry Programme (NCRP)**, but registry coverage is limited and does not provide a complete real-time picture of the country's cancer burden.

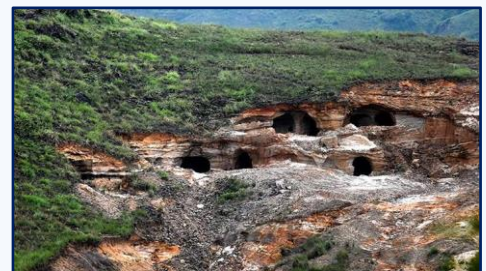
About National Cancer Registry Programme (NCRP)

- **Established:** 1981
- **Implemented by:** ICMR – National Centre for Disease Informatics and Research (ICMR-NCDIR).
- **Purpose:** Collection and analysis of data on **cancer incidence, mortality and patterns**.
- Uses **Population-Based Cancer Registries (PBCRs)** and **Hospital-Based Cancer Registries (HBCRs)**.
- A major limitation is that registry-based coverage does not encompass the entire Indian population.

1.4. ENVIRONMENTAL GOVERNANCE AND THE LEGAL FRAMEWORK

Context:

- A **High Court-constituted committee headed by retired Justice B.P. Katakey** has criticised the Meghalaya Government for failing to adopt a comprehensive policy for **closing and securing abandoned rat-hole coal mines**.
- The committee has highlighted the risks posed by thousands of abandoned mine openings to **human beings, livestock and the environment**, and has stressed the need for immediate preventive measures.



What is Rat-Hole Mining?

- **Rat-hole mining** is an unscientific and hazardous method of extracting coal through **very narrow horizontal tunnels** dug into coal seams.
- The tunnels are often so narrow that workers have to **crawl through them**.
- It became particularly prevalent in **Meghalaya**, where coal seams are often thin and shallow.
- Mining has traditionally taken place on **privately or community-owned tribal land**, creating a complex relationship between customary land rights and statutory mining regulation.

Why is it called “Rat-Hole”?

- The narrow tunnels resemble the **small burrows of rats**, through which miners enter the coal seams.

Why is Rat-Hole Mining Dangerous?

1. Human Safety

- Narrow and unstable tunnels increase the risk of **collapse, flooding and entrapment**.

- Abandoned shafts remain dangerous even after mining operations stop.

2. Environmental Damage

- Unscientific coal extraction causes **land degradation and soil instability**.
- Acidic mine drainage can contaminate **streams, rivers and groundwater**.
- It can adversely affect **forests, biodiversity and aquatic ecosystems**.

3. Abandoned Mine Openings

- Open mine shafts can become death traps for **people and livestock**.
- Therefore, merely stopping mining is insufficient; **mine closure and land restoration** are also necessary.

NGT Ban – 2014

- The **National Green Tribunal (NGT)** ordered the Meghalaya Government in **April 2014** to stop **rat-hole mining and illegal coal mining throughout the State**.

Supreme Court Judgment – 2019

- In **State of Meghalaya v. All Dimas Students Union**, the Supreme Court upheld the NGT's action against **unscientific rat-hole mining**.

What is the Katakey Committee Highlighting?

- **Absence of a comprehensive mine-closure policy.**
- Large numbers of **abandoned mine openings** that remain unsecured.
- Need for **fencing and immediate preventive measures**.
- Need for **land restoration and rehabilitation**.
- Delays in implementing proposals for mine closure and restoration.
- The committee has also highlighted restoration projects prepared by the **Central Mine Planning and Design Institute (CMPDI)** for Meghalaya.

Major Laws Relevant to Mining

- Mines and Minerals (Development and Regulation) Act, 1957 (MMDR Act)
- Mines Act, 1952
- Environment (Protection) Act, 1986
- Water (Prevention and Control of Pollution) Act, 1974
- Air (Prevention and Control of Pollution) Act, 1981

1.5. EX-AGNIVEERS TO GET 50% RESERVATION IN CAPFs & ASSAM RIFLES

Context

- The Government has created a separate “**Ex-Agniveer**” **recruitment category** for **Constable (General Duty) in CAPFs** and **Rifleman in Assam Rifles**, with **50% reservation of vacancies**. The move addresses post-service employment opportunities for Agniveers completing their four-year tenure.



Key Provisions

- **Reservation:** 50% of vacancies for Ex-Agniveers in the specified posts.
- **Age Relaxation:** 3 years beyond the prescribed upper age limit; **5 additional years** for the first batch.
- **Recruitment Exemptions:** Ex-Agniveers are exempted from the **written examination, Physical Standards Test (PST) and Physical Efficiency Test (PET)**.
- **Dedicated Wing:** An **Ex-Agniveer Wing** has been established under the Ministry of Home Affairs to coordinate their further progression.

About Agnipath Scheme

- Under **Agnipath**, Agniveers serve in the Armed Forces for **four years**.
- After four years, **up to 25%** of a batch may be retained for regular military service, subject to selection.
- The remaining personnel transition out as **Ex-Agniveers**, for whom post-service employment mechanisms are important.

1.6. NAMASTE SCHEME: MECHANISING SANITATION WORK

Context:

- Recently, the Union Government has proposed expanding the **National Action for Mechanised Sanitation Ecosystem (NAMASTE) scheme** from **urban to rural areas**. The proposed expansion will also cover drain cleaners and workers engaged in Sewage Treatment Plants (STPs) and Faecal Sludge Treatment Plants (FSTPs).



About NAMASTE

- **NAMASTE** stands for **National Action for Mechanised Sanitation Ecosystem**.
- **Launched:** 2023–24
- **Objective:** To promote the **mechanisation of sanitation work** and ensure the **safety and dignity of sanitation workers**.
- **Nodal Ministry:** Ministry of Social Justice and Empowerment, in convergence with the **Ministry of Housing and Urban Affairs (MoHUA)**.
- **Initial Focus:** Sewer and Septic Tank Workers (SSWs).
- **Later Expanded to Include:** Waste Pickers.
- To eliminate hazardous and unsafe sanitation practices and move towards zero fatalities in sewer and septic tank cleaning.

Key Components of NAMASTE

1. Identification & Profiling

- Identifies and profiles sanitation workers for welfare and safety support.
- **90,915 SSWs** and **1.3 lakh Waste Pickers** profiled so far.

2. Mechanisation & Safety

- Promotes mechanised cleaning, **PPE**, training and skill development.

3. Emergency Response

- Supports **Emergency Response Sanitation Units (ERSUs)** in **Urban Local Bodies (ULBs)**.

4. Livelihood Support

- Promotes self-employment and sanitation enterprises.
- Provides **capital subsidy of up to 50%** of the project cost.
- Also supports **Private Sanitation Service Organisations (PSSOs)**.

Proposed Expansion

The Ministry of Social Justice and Empowerment has proposed expanding NAMASTE to:

- **Rural areas**
- **Drain cleaners**
- Workers engaged in **Sewage Treatment Plants (STPs)**
- Workers engaged in **Faecal Sludge Treatment Plants (FSTPs)**

Proposed Outlay

- **₹498.73 crore**
- Proposed implementation period: **up to 2030–31**

1.7. JOJARI RIVER POLLUTION: SUPREME COURT RESTRICTIONS IN RAJASTHAN

Context

- Recently, The **Supreme Court** has banned **construction and development activities within 100 metres of the Jojari River in Rajasthan** to curb pollution and protect the river ecosystem.
- It has also prohibited **hazardous industries within 500 metres** of either side of the river's existing flow path and directed the authorities to prepare a **20-point plan** to address pollution.



About Jojari River

- The **Jojari (Jojri) River** is a **seasonal river of Rajasthan** and forms part of the **Luni River system**.
- It passes through **Pali and Jodhpur districts** and ultimately joins the **Luni River near Balotra**.

Environmental Principles & Constitutional Linkages

- **Precautionary Principle:** Prevent environmental harm even without complete scientific certainty.
- **Polluter Pays Principle:** Polluter bears the cost of preventing and remedying environmental damage.
- **Sustainable Development:** Balance development with environmental protection and **inter-generational equity**.

- **Public Trust Doctrine:** State holds natural resources like **rivers, forests and water bodies** in trust for the public.
- **Constitutional Basis:** **Article 21** – clean environment as part of right to life; **Article 48A** – State's duty to protect environment; **Article 51A(g)** – citizens' duty to protect nature.

About Luni River

- **Origin:** Near the **Pushkar Valley/Ajmer region of Rajasthan**.
- **Direction:** Flows generally towards the **southwest**.
- **Important tributaries:** **Jojari, Sukri, Bandi and Jawai**.
- **Characteristic:** It is an **ephemeral/seasonal river** in much of its course.
- **Lower course:** Its water becomes increasingly **saline**.
- **Terminal region:** The river system ultimately drains towards the **Rann of Kachchh**.

1.8. CAUVERY WATER SHARING DISPUTE RISES AGAIN

Context

- Tamil Nadu has complained that Karnataka is not releasing its **proportionate share of Cauvery water**, leading to a shortage in Tamil Nadu. Karnataka has said that its own water availability is affected by rainfall and reservoir levels.



The Supreme Court has asked Tamil Nadu to take the issue to the **Cauvery Water Management Authority (CWMA)**, which manages water sharing between the two States.

About the Cauvery River Dispute

- The **Cauvery River Dispute** is a long-running conflict over sharing Cauvery water, mainly between **Karnataka and Tamil Nadu**, with Kerala and Puducherry also involved. The dispute arises because **Karnataka, the upper-riparian state, needs water for its farmers and cities**, while **downstream Tamil Nadu depends heavily on Cauvery water for agriculture and drinking needs**.
- The **Supreme Court in 2018** led the formation of the Cauvery Water Management Authority (CWMA) to **implement its Cauvery water-sharing arrangement** and **monitor, regulate and manage the sharing and release of water** among Karnataka, Tamil Nadu, Kerala and Puducherry.
- **It is recurring problem due to Poor rainfall and drought** often lead to disagreements over how much water Karnataka should release.

Cauvery Water Management Authority (CWMA)

- **It was** Set up under the **Cauvery Water Management Scheme, 2018**, following the Supreme Court's final verdict on the Cauvery dispute.
- It implements the Tribunal's award and regulates **storage, sharing and release of Cauvery water** among Karnataka, Tamil Nadu, Kerala and Puducherry.

- Headed by a **full-time Chairman**, with members from the **Ministry of Jal Shakti, CWC** and representatives of the four States.
- **Cauvery Water Regulation Committee (CWRC)** is the subordinate technical body assisting the **CWMA** with real-time monitoring of reservoir storage and water releases.

Legal Framework for Inter-State River Disputes

- **Constitutional Basis: Article 262** empowers Parliament to provide for adjudication of inter-State river water disputes and to bar the jurisdiction of the Supreme Court and other courts in such matters.
- The **Inter-State River Water Disputes Act, 1956** provides for constitution of tribunals; the **River Boards Act, 1956** provides for boards to regulate and develop inter-State rivers.
- **The Cauvery Tribunal:** The **Cauvery Water Disputes Tribunal** was constituted in **1990**; its final award, given in **2007**, was modified by the Supreme Court in its **2018** judgment.

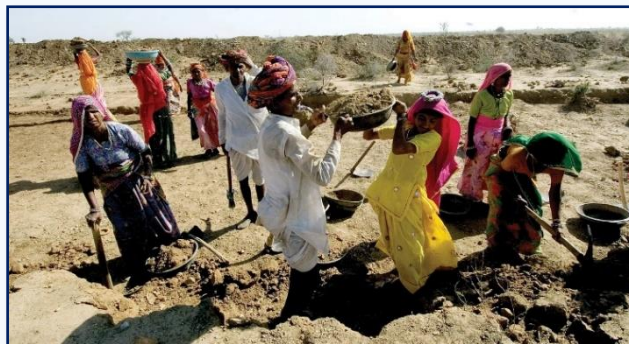
About The River Cauvery

- **Origin & Course:** The **Cauvery River** originates at **Talakaveri in Karnataka**, flows through Karnataka and Tamil Nadu, and finally drains into the **Bay of Bengal**.
- **Major Dams:** Important dams include **Krishna Raja Sagara (KRS) and Kabini in Karnataka**, and **Mettur Dam in Tamil Nadu**.
- **Importance:** It is a major source of **irrigation, drinking water and hydropower**, especially for Karnataka and Tamil Nadu.

1.9. SUPREME COURT'S OBSERVATIONS ON MGNREGA

Context

- The **Supreme Court**, while hearing a petition concerning **delayed payment of wages under MGNREGA**, observed that the scheme is a **"good, effective scheme"** and should be implemented properly.



About MGNREGA

- **Full Name: Mahatma Gandhi National Rural Employment Guarantee Act, 2005**
- Initially enacted as the **National Rural Employment Guarantee Act (NREGA), 2005**.
- Renamed **MGNREGA in 2009**.
- Implemented by the **Ministry of Rural Development**.

Objective

- To enhance the **livelihood security of rural households** by providing at least **100 days of guaranteed wage employment** in a financial year to every rural household whose adult members volunteer to undertake **unskilled manual work**.

Key Features of MGNREGA

1. Demand-Driven Employment

- Provides employment within **15 days of demand**.

- Failure to provide work makes the applicant eligible for **unemployment allowance**.

2. Statutory Guarantee

- Guarantees employment under an **Act of Parliament**.
- The **Right to Work** is a **Directive Principle under Article 41**, not a Fundamental Right.

3. Timely Wage Payment

- Wages should be paid within **15 days**.
- Delay attracts **compensation**, as per applicable rules.

Constitutional Connection

- **Article 21:** Guarantees the **Right to Life and Personal Liberty**, including life with dignity through judicial interpretation.
- **Article 41:** Directs the State to provide for the **Right to Work, Education and Public Assistance**, subject to its economic capacity.
- **MGNREGA employment is a statutory entitlement**, not a Fundamental Right.

About VB-G RAM G Act, 2025:

- MGNREGA, 2005 was repealed with effect from 1 July 2026 and replaced by the Viksit Bharat–Guarantee for Rozgar and Ajeevika Mission (Gramin) **[VB-G RAM G] Act, 2025**.
- The new Act provides a statutory guarantee of **125 days of wage employment** per rural household in a financial year, compared to **100 days under MGNREGA**.
- **Existing job cards and ongoing works** were transitioned to the new framework.

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UPSC PRELIMS PRACTICE QUESTIONS

Q. With reference to Census 2027, consider the following statements:

1. It will be India's first fully digital Census.
2. Caste enumeration will be undertaken during Population Enumeration.
3. Ladakh will have a separate reference date from most of India.
4. Census is a subject under the concurrent List.

Which of the statements given above are correct?

- (a) 1, 2 and 3 only
- (b) 1, 2, 3 and 4
- (c) 2 and 3 only
- (d) 1 and 4 only

Answer: (b) 1, 2, and 3 only

- **Statement 1** – Correct: Census 2027 will be India's first fully digital Census.
- **Statement 2** – Correct: Caste enumeration will be conducted during the Population Enumeration phase.
- **Statement 3** – Correct: Ladakh will have a separate reference date of 1 October 2026, unlike 1 March 2027 for most of India.
- **Statement 4** – Incorrect: Census is a Union subject under Entry 69, Union List of the Seventh Schedule.

Q. With reference to the NAMASTE Scheme, consider the following statements:

1. NAMASTE aims to promote the mechanisation of sanitation work and improve the safety of sanitation workers.
2. The scheme initially focused on Sewer and Septic Tank Workers and was later expanded to include Waste Pickers.
3. The proposed expansion of the scheme seeks to include workers engaged in Sewage Treatment Plants and Faecal Sludge Treatment Plants.

4. NAMASTE is implemented exclusively by the Ministry of Housing and Urban Affairs.

Which of the statements given above are correct?

- (a) 1, 2 and 3 only
- (b) 1 and 4 only
- (c) 2, 3 and 4 only
- (d) 1, 2, 3 and 4

Answer: (a)

Explanation

- Statements **1, 2 and 3** are correct. NAMASTE promotes **mechanisation, safety and livelihood support** for sanitation workers. It initially covered **SSWs**, later expanded to **Waste Pickers**, with the proposed expansion covering **rural areas, drain cleaners and STP/FSTP workers**.
- **Statement 4** is incorrect as the scheme is under the **Ministry of Social Justice and Empowerment**, with convergence with MoHUA.

Q. Consider the following statements regarding the Jojari River:

1. It is a tributary of the Luni River system.
2. It flows through the arid region of Rajasthan.
3. The Luni River ultimately drains towards the Rann of Kachchh.
4. The Jojari is a perennial river originating in the Himalayas.

Which of the statements given above are correct?

- (a) 1, 2 and 3 only
- (b) 1 and 4 only
- (c) 2 and 3 only
- (d) 1, 2, 3 and 4

Answer: (a)

- **Statement 1** is Correct: The **Jojari River** is a **tributary of the Luni River** in Rajasthan and joins the Luni near **Balotra**.

- **Statement 2 is Correct:** The Jojari flows through the **arid and semi-arid region of Rajasthan**, particularly around **Jodhpur and Pali**, where water availability is limited.
- **Statement 3 is Correct:** The **Luni River flows southwestwards** and its drainage system ultimately reaches the **Rann of Kachchh**.
- **Statement 4 is Incorrect:** The Jojari is **not a Himalayan river** and is **not a perennial river**. It is associated with the **seasonal drainage system of Rajasthan**.

Q. With reference to the above, consider the following statements:

- The Cauvery Water Management Authority was constituted under the Cauvery Water Management Scheme, 2018, pursuant to the Supreme Court's final verdict in the Cauvery water dispute.
- The Cauvery Water Regulation Committee (CWRC) functions independently of the CWMA and holds final authority over inter-State water allocation.
- Under Article 262 of the Constitution, Parliament may by law bar the jurisdiction of the Supreme Court and other courts in respect of inter-State river water disputes.

Which of the statements given above is/are correct?

- (a) I and II only

- (b) II and III only
(c) I and III only
(d) I, II and III

Answer: (c) I and III only

Explanation

Statement I is Correct: The CWMA was constituted in **June 2018** under the Cauvery Water Management Scheme, notified by the Central Government following the Supreme Court's **February 2018** judgment finally adjudicating the Cauvery water dispute.

Statement II is Incorrect: The CWRC operates under the superintendence of the CWMA and provides technical support in real-time monitoring of releases; it does not function independently, and final allocation authority vests in the CWMA.

Statement III is Correct: Article 262(2) empowers Parliament to enact a law excluding the jurisdiction of the Supreme Court and other courts over inter-State river water disputes, which it did through the Inter-State River Water Disputes Act, 1956.



Scan to attempt more questions

INTERNATIONAL RELATIONS

2.1. NATO ENTERS A NEW STRATEGIC ERA OF TRANSFORMATION

Context

- Amid the changing global security environment following the Russia–Ukraine conflict, **NATO** is undergoing a major strategic transformation.
- The alliance is shifting towards stronger European defence capabilities, higher defence spending, enhanced military preparedness and greater burden-sharing among member states.



What is NATO?

The **North Atlantic Treaty Organization (NATO)** is an **intergovernmental military alliance** established to ensure the collective defence and security of its members.

Formation

- **Established:** 4 April 1949
- **Founding Treaty:** North Atlantic Treaty (Washington Treaty)
- **Headquarters:** Brussels, Belgium
- **Current Members:** 32 countries (after the accession of Finland in 2023 and Sweden in 2024).

Objectives of NATO

- Ensure **collective defence** of member states.
- Preserve peace and security in the North Atlantic region.
- Promote political consultation and military cooperation.
- Strengthen interoperability among member armed forces.
- Respond to emerging security threats such as cyber attacks and terrorism.

Key Features

- **Article 5:** An armed attack against one member is considered an attack against all.
- Decisions are taken by **consensus**, not by majority voting.
- Has an integrated military command structure.
- Conducts joint military exercises and capability development.
- Partners with several non-member countries through cooperation programmes.

Why is NATO Transforming?

- Russia–Ukraine conflict has revived concerns over European security.
- European members are increasing defence spending and military capabilities.
- Greater emphasis on indigenous defence production and industrial capacity.
- Focus on cyber security, space, artificial intelligence and long-range precision weapons.
- Europe is expected to assume greater responsibility for its conventional defence while the United States focuses increasingly on the Indo-Pacific.

Defence Spending Target

- NATO members have agreed to spend **at least 5% of GDP** on defence and defence-related expenditure by **2035**, including investment in military capability and critical infrastructure.

NATO and India

- India is **not a member** of NATO.
- India maintains strategic partnerships with several NATO members through bilateral relations.
- NATO's evolving role has implications for India's security environment, defence cooperation and Indo-Pacific geopolitics.

2.2. OIL CARGO DISRUPTIONS FROM RUSSIAN BLACK SEA PORTS: IMPLICATIONS FOR INDIA

Context

- The ongoing **Russia–Ukraine conflict** has caused a **66% decline in India-bound oil cargoes from Russia's Black Sea ports** over the last two weeks. The disruption is linked to intensified **Ukrainian drone attacks on Russian shipping, ports, and oil export infrastructure**, raising concerns over India's energy security.



Key Highlights

1. Decline in Russian Oil Exports

- India-bound oil cargoes from Russian Black Sea ports have **fallen by about 66%**.
- The decline mainly affects exports from the **Novorossiysk Port**, Russia's largest Black Sea oil terminal.

2. India's Dependence on Russian Crude

- Russia remains one of India's largest crude oil suppliers.
- Over 50% of India's crude imports** came from Russia in June.
- Black Sea ports contribute nearly **30% of Russian oil exports to India**.

3. Cause of the Disruption

- Ukraine launched **Operation MoLoCh**, a large-scale maritime drone campaign.
- The operation targets:
 - Oil tankers
 - Port infrastructure
 - Fuel storage facilities
 - Cargo logistics in the **Black Sea** and **Sea of Azov**.

4. Impact on Global Oil Trade

- Reduced shipments may:
 - Increase freight costs.
 - Delay crude deliveries.
 - Raise global oil price volatility.
 - Force buyers to seek alternative suppliers.

5. Implications for India

- Possible diversification towards:
 - Middle East
 - United States
 - West Africa
- Higher import costs if disruptions continue.
- Greater emphasis on **energy security** and diversified sourcing.

Black Sea

Feature	Details
Type	Inland Sea
Connected to Mediterranean	Via Bosphorus → Sea of Marmara → Dardanelles
Connected to Sea of Azov	Kerch Strait
Major Littoral Countries	Russia, Ukraine, Turkey, Bulgaria, Romania, Georgia
Strategic Importance	Energy transport, grain exports, naval operations



Novorossiysk Port

- Located on the **northeastern coast of the Black Sea**.
- Russia's **largest commercial port**.
- Major export terminal for:
 - Crude oil
 - Petroleum products
 - Grain
- Key terminal of the **Caspian Pipeline Consortium (CPC)**.

Caspian Pipeline Consortium (CPC)

- International pipeline transporting crude oil from **Kazakhstan's Tengiz oil fields** to **Novorossiysk Port**.
- One of the world's major crude oil export routes.
- Critical for Eurasian energy trade.

2.3. INDIA–JAPAN DEFENCE COOPERATION: STRATEGIC PARTNERSHIP IN THE INDO-PACIFIC

Context:

- Japanese Defence Minister **Shinjiro Koizumi** is visiting India and is holding talks with Defence Minister **Rajnath Singh** on strengthening bilateral defence and security cooperation, including **defence equipment and technology, maritime security and cooperation in the Indo-Pacific**. The visit comes soon after the **8th India–Japan Defence Policy Dialogue** held in Tokyo in July 2026.



1. India–Japan Strategic Partnership

- India and Japan share a **Special Strategic and Global Partnership**, upgraded to this level in **2014**.
- The partnership is based on convergence over a **free, open and rules-based Indo-Pacific**.
- India's **Act East Policy** and **SAGAR vision** complement Japan's **Free and Open Indo-Pacific (FOIP)** approach.
- Both countries are also partners in the **Quad** along with the **United States and Australia**.

2. Key Areas of Defence Cooperation

A. Defence Equipment & Technology

India and Japan have cooperation in:

- Defence equipment and technology transfer
- Joint research, development and potential co-production
- Maritime technology
- Defence industrial cooperation
- Advanced and emerging technologies

B. Logistics & Interoperability

- The **Acquisition and Cross-Servicing Agreement (ACSA)** was signed in **2020**.
- It facilitates reciprocal provision of: Supplies, Services, Logistical support between the **Indian Armed Forces and Japan's Self-Defense Forces**.

C. Maritime Security

Areas include:

- Maritime domain awareness
- Naval cooperation
- Anti-piracy cooperation
- HADR
- Capacity building
- Freedom of navigation and rules-based maritime order

3. Important Defence Exercises

A. JIMEX

- Bilateral **naval exercise**.
- Focus: maritime cooperation and interoperability.

B. Dharma Guardian

- Bilateral **Army exercise**
- Enhances interoperability and joint operational capabilities.

C. Malabar

- Multilateral **naval exercise**.
- Participants: **India, Japan, USA and Australia**
- Japan's participation strengthens maritime cooperation among the **Quad countries**.

D. Veer Guardian

- Bilateral **Air Force exercise**.
- Conducted between the **Indian Air Force and Japan Air Self-Defense Force**.

4. Institutional Mechanisms

- **2+2 Dialogue:** Foreign Ministers + Defence Ministers
- **Defence Policy Dialogue:** Defence establishments of both countries

Military-to-Military Talks: Armed forces cooperation

- **Coast Guard-to-Coast Guard cooperation:** The **8th Defence Policy Dialogue** in July 2026 reviewed the entire spectrum of bilateral defence engagement.

5. Why Japan Matters for India?

A. Strategic

- Strengthens India's position in the **Indo-Pacific**.
- Supports a **rules-based maritime order**.
- Enhances strategic balance in the wider Indo-Pacific.

B. Defence

- Access to advanced Japanese defence technology.
- Greater interoperability through exercises and logistics cooperation.
- Scope for defence-industrial collaboration.

C. Economic & Technological

- Japan is an important source of investment and technology.
- Cooperation extends to **infrastructure, high technology, connectivity, clean energy and advanced transportation**.

UPSC PRELIMS PRACTICE QUESTIONS

Q. With reference to the North Atlantic Treaty Organization (NATO), consider the following statements:

1. NATO was established in 1949 under the North Atlantic (Washington) Treaty.
2. Article 5 of NATO provides for the principle of collective defence.
3. All decisions in NATO are taken by majority voting.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1, 2 and 3
- (d) 1 only

Answer: (a)

Explanation

- **Statement 1 is Correct:** NATO was established in **1949** through the **North Atlantic (Washington) Treaty**.
- **Statement 2 is Correct:** Article 5 states that an attack on one member is considered an attack on all.
- **Statement 3 is Incorrect:** NATO takes decisions **by consensus**, not by majority voting.

Q. Which of the following seas is directly connected to the Black Sea through the Kerch Strait?

- (a) Baltic Sea
- (b) Adriatic Sea
- (c) Sea of Azov
- (d) Caspian Sea

Answer: (c) Sea of Azov

Explanation: The **Kerch Strait** connects the **Black Sea** with the **Sea of Azov**, making it strategically significant for Russian maritime trade and naval movement.

Q. Consider the following pairs regarding India–Japan defence cooperation:

Exercise/Agreement	Nature
1. JIMEX	Naval Exercise
2. Dharma Guardian	Army Exercise
3. Veer Guardian	Air Force Exercise
4. ACSA	Defence Logistics Agreement

Which of the pairs given above are correctly matched?

- (a) 1 and 2 only
- (b) 1, 2 and 3 only
- (c) 2, 3 and 4 only
- (d) 1, 2, 3 and 4

Answer: (d) 1, 2, 3 and 4

- **JIMEX** → India–Japan **Naval** exercise.
- **Dharma Guardian** → India–Japan **Army** exercise.
- **Veer Guardian** → India–Japan **Air Force** exercise.
- **ACSA** → facilitates reciprocal provision of **supplies and services/logistical support** between the armed forces.



Scan to attempt more questions

ECONOMY

3.1. RAJYA SABHA PASSES MSME DEVELOPMENT (AMENDMENT) BILL, 2026

Context

- The **Rajya Sabha** has passed the **Micro, Small and Medium Enterprises Development (Amendment) Bill, 2026**, after it was earlier approved by the Lok Sabha.
- The Bill aims to improve the **liquidity of Micro, Small and Medium Enterprises (MSMEs)** by making it easier for them to receive timely payments through the **Trade Receivables Discounting System (TReDS)**.



What is the MSME Development (Amendment) Bill, 2026?

- It amends the **MSME Development Act, 2006**.
- It empowers the **Central Government** to notify a wider category of buyers who must procure goods and services from MSMEs through the **Trade Receivables Discounting System (TReDS)**.
- The objective is to **reduce payment delays** and improve **working capital availability** for MSMEs.

Why was the Amendment Needed?

MSMEs often face:

- Delayed payments from buyers.
- Cash flow shortages affecting production and employment.
- Dependence on costly short-term loans.

The amendment seeks to ensure **faster realization of invoices**, thereby strengthening the financial health of MSMEs.

Trade Receivables Discounting System (TReDS)

What is TReDS?

- **TReDS** is an **electronic invoice financing platform** regulated by the **Reserve Bank of India (RBI)**.
- It enables **MSMEs to convert their trade receivables (invoices) into immediate cash** by discounting them through financiers.

Participants

- MSME Sellers
- Buyers (Corporate entities, Government Departments, PSUs, CPSEs, etc.)
- Banks and NBFC Factors

Working Mechanism

1. MSME supplies goods/services.
2. Invoice is uploaded on TReDS.
3. Buyer accepts the invoice.
4. Banks/NBFCs bid to finance it.

5. MSME receives immediate payment after discounting.
6. Buyer pays the financier on the due date.

Objectives of the Bill

- Ensure timely payments to MSMEs.
- Improve liquidity and working capital.
- Reduce dependence on informal borrowing.
- Enhance ease of doing business.
- Promote digital financing.

Significance for MSMEs

- Faster access to funds.
- Lower financing costs.
- Improved cash flow.
- Increased production and exports.
- Greater financial inclusion.

About MSMEs in India

Classification

Enterprise	Investment	Annual Turnover
Micro	Up to ₹2.5 crore	Up to ₹10 crore
Small	Up to ₹25 crore	Up to ₹100 crore
Medium	Up to ₹125 crore	Up to ₹500 crore

Importance of MSMEs

- Contribute around **30% of India's GDP**.
- Account for nearly **45% of exports**.
- Generate employment for over **26 crore people** (direct and indirect).
- Promote balanced regional development.
- Support the **Make in India** initiative.

Key Constitutional & Institutional Linkages

- **Ministry:** Ministry of Micro, Small and Medium Enterprises.
- **Regulator of TReDS:** Reserve Bank of India (RBI).
- **Parent Law:** MSME Development Act, 2006.

3.2. RBI PLANS TO INTRODUCE POLYMER CURRENCY NOTES FROM FY 2026–27

Context

- The RBI plans to introduce polymer currency notes from FY 2026–27 after completing the ongoing pilot project.

What are Polymer Currency Notes?

- Polymer currency notes are banknotes made from **biaxially oriented polypropylene (BOPP)** instead of traditional cotton-based paper. They are stronger, more durable and equipped with advanced anti-counterfeiting technologies.



Why is RBI Introducing Polymer Notes?

- Improve the lifespan of banknotes in circulation.
- Strengthen protection against counterfeit currency.
- Reduce replacement and printing costs over time.
- Improve resistance to moisture, dirt and wear.
- Enhance public confidence in the currency system.

Key Features of Polymer Notes

- Manufactured using **polymer substrate (BOPP)** instead of cotton paper.
- Longer lifespan than conventional paper notes.
- Waterproof, tear-resistant and dirt-resistant.
- Can incorporate **transparent windows, holographic images and micro-security features**.
- Difficult to duplicate using conventional printing techniques.
- Better print quality and colour retention.

Advantages of Polymer Currency

- **Higher Durability:** Lasts significantly longer than paper notes.
- **Lower Counterfeiting:** Advanced security features make forgery difficult.
- **Reduced Replacement Cost:** Fewer notes need to be reprinted.
- **Cleaner Currency:** Less prone to absorbing moisture and contaminants.
- **Environmental Benefits:** Lower consumption of raw materials due to longer circulation life.

Currency Note Issuance in India

- **Currency Notes:** Issued by the **Reserve Bank of India** under the **Reserve Bank of India Act, 1934**.
- **₹1 Note:** Issued by the **Government of India** under the **Coinage Act, 2011** and signed by the **Finance Secretary**.
- All other currency notes are signed by the **RBI Governor**.

3.3. RBI SURPLUS & UPI USER CHARGES: CAN RBI FUND UPI WITHOUT CHARGING USERS?

Context

- The Reserve Bank of India (RBI) has stated that it has adequate financial resources to bear the cost of operating the **Unified Payments Interface (UPI)** without imposing charges on merchants or customers. The statement comes amid the introduction of the **Taxation Laws (Amendment) Bill, 2026**, which enables the government to notify certain digital transactions that may attract charges in the future.



Why is this in News?

- RBI Governor **Sanjay Malhotra** stated that the RBI's annual surplus is sufficient to finance UPI operational costs.

- The government has introduced the **Taxation Laws (Amendment) Bill, 2026**, allowing future notification of chargeable digital transactions.
- The issue has revived the debate over the long-term financial sustainability of India's digital payment ecosystem.

UPI (Unified Payments Interface)

- **Launched:** 2016
- **Developed by:** National Payments Corporation of India (NPCI)
- **Regulated by:** Reserve Bank of India (RBI)
- **Nature:** Real-time, interoperable digital payment system enabling instant bank-to-bank fund transfers using mobile devices.
- **Features:**
 - 24×7 instant fund transfer
 - QR code-based payments
 - Virtual Payment Address (VPA)
 - Supports P2P and P2M transactions

How is UPI Currently Funded?

- **Customers:** No transaction charges.
- **Merchants:** No Merchant Discount Rate (MDR) on most UPI transactions.
- Operational costs are currently supported through:
 - Government incentives
 - Banks and payment service providers
 - RBI's broader financial ecosystem

What is Merchant Discount Rate (MDR)?

- MDR is a fee paid by merchants to banks/payment service providers for processing digital transactions.
- It is generally charged on card-based transactions.
- Since **January 2020**, **zero MDR** has been applicable on RuPay debit cards and UPI transactions to promote digital payments.

Key Findings from RBI

- RBI earns significant annual surplus through:
 - Interest income
 - Foreign exchange operations
 - Investments
- The annual cost of operating the UPI platform is only a small fraction of RBI's surplus.
- Therefore, RBI believes public digital payment infrastructure can continue without imposing direct charges on users.

Taxation Laws (Amendment) Bill, 2026 – Key Provision

- Empowers the Central Government to **notify categories of digital transactions that may attract charges** in future.

- The Bill **does not immediately impose charges** on UPI transactions.
- It only creates an enabling legal framework for future policy decisions.

Why is UPI Important for India?

- Promotes a **cashless and less-cash economy**.
- Supports **Digital India** and financial inclusion.
- Reduces transaction costs and increases transparency.
- Facilitates seamless digital commerce for individuals, MSMEs and businesses.
- Strengthens India's digital public infrastructure (DPI).

3.4. E20 PETROL: CHLORIDE CONTAMINATION CONTROVERSY

Context

- Recently, India's state-owned Oil Marketing Companies (OMCs)—Indian Oil, BPCL and HPCL—rejected allegations of excessive **chloride contamination and moisture in E20 petrol**. Nationwide testing reportedly found chloride levels within permissible limits and no evidence of widespread water contamination.



What is E20 Petrol?

- **E20 = Petrol containing up to 20% ethanol blended with gasoline**, generally expressed by volume.
- It is part of India's **Ethanol Blended Petrol (EBP) Programme**.
- **Ethanol**: Biofuel alcohol produced mainly from agricultural feedstocks such as sugarcane and grains.
- BIS standard **IS 17021:2018** specifies E20 fuel as an admixture of **20% anhydrous ethanol + 80% ethanol-free motor gasoline**.

Why is Ethanol Blended with Petrol?

- **Reduce crude-oil imports** and improve energy security.
- **Promote domestic renewable fuel production**.
- Provide an additional market for **sugarcane, maize and other feedstocks**.
- Reduce dependence on fossil fuels and potentially lower **lifecycle greenhouse-gas emissions**.
- Support farmers and the **bioeconomy**.

What did the Latest Testing Find?

1. According to the OMCs' nationwide assessment:

- **100+ petrol samples** were tested for chloride.
- Samples from refineries reportedly showed chloride levels of **≤1 ppm**.
- Ethanol samples from around **80 distilleries** were tested.
- E20 samples from **80+ depots/terminals** were also examined.
- OMCs reported chloride levels in these E20 samples at **below 3 ppm**.

- They also stated that checks did **not find water ingress in underground storage tanks** across the fuel-station network.

2. Current controversy

- The issue gained attention after the **Society of Indian Automobile Manufacturers (SIAM)** had raised concerns about chloride/moisture and possible damage to vehicle components, but subsequently **withdrew its earlier warning**, stating that the data required further verification.

Why moisture is an Issue?

- The issue is **not that ethanol itself is a contaminant**; the concern is about **excess** chloride/moisture beyond prescribed fuel-quality limits.
- **Ethanol is hygroscopic**, it has a strong tendency to absorb water.
- Excess water can potentially cause: Water ingress leading to ethanol-water interaction then phase separation & fuel-system/engine problems.

About Chloride

- Chloride/inorganic chloride can be an **undesirable contaminant in fuel**.
- At elevated concentrations, it can contribute to **corrosion and deterioration of fuel-system components**.
- Hence, fuel-quality standards prescribe limits for parameters such as **inorganic chloride, water content, acidity and electrical conductivity**.

3.5. INDIA'S FOREX RESERVES RISE BY \$10.5 BILLION

Context

- India's **foreign exchange reserves increased by \$10.52 billion to \$692.87 billion**, according to the latest weekly data released by the RBI.
- The rise was mainly driven by an increase in **Foreign Currency Assets (FCA)**.



What are Foreign Exchange Reserves?

- Forex reserves are **external assets held or controlled by the RBI** to meet international payment requirements and manage external-sector stability.
- They act as a financial cushion against **global economic shocks and exchange-rate volatility**.

Components of India's Forex Reserves

India's foreign exchange reserves consist of four major components:

1. Foreign Currency Assets (FCA)

- The largest component of India's forex reserves.
- Includes assets held in major foreign currencies such as the **US dollar, euro, pound sterling and yen**.
- FCA increased by **\$8.75 billion to \$546.68 billion** during the reported week.

2. Gold Reserves

- Gold held by the RBI forms part of India's official reserves.

- Provides diversification and acts as a store of value during global financial uncertainty.

3. Special Drawing Rights (SDRs)

- International reserve assets created by the **International Monetary Fund (IMF)**.
- SDR is **not a currency**, but represents a potential claim on freely usable currencies of IMF member countries.

4. Reserve Tranche Position (RTP)

- India's **reserve position with the IMF**.
- It can be accessed by India when required, subject to applicable IMF arrangements.

Why are Forex Reserves Important?

- **External Stability:** Provide a buffer against external financial shocks.
- **Import Cover:** Help meet international payment and import requirements.
- **Currency Stability:** RBI can use forex reserves to manage excessive volatility in the rupee.
- **Investor Confidence:** Strong reserves improve confidence in India's external-sector position.
- **Crisis Management:** Provide protection against sudden capital outflows and global financial stress.

3.6. INDIA'S FIRST CORPORATE-RUN TRAIN: TEJAS EXPRESS

Context

- Recently, the Lucknow–New Delhi Tejas Express has been renamed 'Sprite Tejas Express' after IRCTC awarded its advertising and branding rights to Sprite, a unit of Coca-Cola India Private Limited.



Key Important Facts

1. The Tejas Express

- **Status:** It is India's first corporate train to operate on the Indian Railways network.
- **Introduction:** Operations commenced on October 4, 2019.
- **Operates Between:** Lucknow Junction (LJN), Uttar Pradesh to New Delhi (NDLS).
- **Operator:** The train is fully operated and maintained by IRCTC, a Central Public Sector Enterprise under the Ministry of Railways, rather than directly by Indian Railways.
- **Train Category:** It is a semi-high-speed train featuring modern onboard passenger amenities.
- **Speed Capability:** The coaches are designed to run at speeds up to 200 kmph. However, current track-related infrastructure limits its maximum operational speed to 160 kmph.

2. Manufacturing Hub

- The modern coaches of the Tejas Express are manufactured at the Rail Coach Factory (RCF) in Kapurthala, Punjab.

3. Significance of the Move

- **Non-Fare Revenue:** The co-branding and vinyl wrapping deal represents a significant push by IRCTC and Indian Railways to monetize railway assets and boost non-ticket revenue streams.
- **Privatization in Railways:** The operation of Tejas by IRCTC was a pilot project for the Ministry of Railways' broader initiative to introduce private operators in passenger train services to improve efficiency and world-class services.

3.7. GOVT. EXPLORES MDR MODEL TO MAKE UPI SELF-SUSTAINING

Context

- A **Parliamentary Standing Committee on Finance** has suggested making UPI financially self-sustaining, including options such as MDR on selected transactions or a tiered incentive model.



What is UPI?

- **UPI (Unified Payments Interface)**, developed by **NPCI**, enables real-time bank-to-bank digital payments through UPI IDs, mobile numbers and QR codes.
- It supports both P2P (Person-to-Person) and P2M (Person-to-Merchant) transactions.

What is Merchant Discount Rate (MDR)?

- **MDR** is a fee charged to a merchant for accepting digital payments.
- It is generally shared among participants involved in processing the transaction, including the **payment service provider, acquiring bank, issuing bank and payment network**, depending on the payment instrument.

Zero-MDR Regime for UPI

- Since **January 2020**, MDR has not been permitted on notified **UPI and RuPay debit-card transactions**.
- The zero-MDR policy helped promote **low-cost digital payments and financial inclusion**, particularly among small merchants.
- However, payment infrastructure involves costs related to **technology, cybersecurity, fraud prevention, network capacity and customer support**.

Why is UPI Sustainability an Issue?

- **Rising Operational Costs:** Digital payment infrastructure requires continuous investment in technology and cybersecurity.
- **Zero-MDR Model:** Merchants do not pay MDR on eligible UPI transactions, limiting direct revenue for the ecosystem.
- **Fiscal Burden:** Government incentives are required to partly compensate ecosystem participants.
- **Scale of Transactions:** The rapid expansion of UPI increases the need for robust infrastructure and fraud-prevention mechanisms.

3.8. INDIA'S CRUDE OIL IMPORT BILL RISES AMID WEST ASIA CRISIS

Context

- India's **crude oil import bill rose sharply in July 2026**, reflecting the impact of higher international crude prices amid the **West Asia crisis**. This brings into focus India's dependence on imported **crude oil, LPG and natural gas** and the vulnerability of its energy security to global price and supply disruptions.



Why is India's Crude Import Bill Important?

1. High Import Dependence

- India is among the world's major **crude oil consumers and importers**.
- A substantial share of crude processed by Indian refineries is imported.
- This creates vulnerability to **international price fluctuations, geopolitical conflicts and supply disruptions**.

2. Impact on Current Account

- Crude oil is a major component of India's merchandise imports.
- A sharp rise in crude prices can increase the **import bill**, thereby widening the **trade deficit**.
- If higher oil imports are not offset by exports and other inflows, it can put pressure on the **Current Account Balance**.

3. Inflationary Impact

- Higher crude prices → Higher cost of petroleum products → Higher transportation and production costs → **Cost-push inflation**
- The impact can spread across the economy because petroleum products are used in **transport, agriculture, manufacturing and logistics**.

4. Pressure on the Rupee

- Higher oil imports increase India's demand for foreign currency, particularly the **US dollar**.

Higher oil prices → Higher dollar demand → Potential pressure on Rupee

Indian Crude Basket

- The **Indian Crude Basket (ICB)** is a representative basket of crude oil grades imported by India.
- It is used as an important indicator of the **international crude oil price relevant to India**.
- The basket broadly comprises **Oman & Dubai crude and Brent-related crude**.
- It is different from the price of a single crude benchmark such as Brent.

3.9. A REVIVAL ROADMAP FOR DARJEELING AND DOOARS TEA

Context

- The **Indian Tea Association (ITA)** has sought urgent government intervention to revive the **Darjeeling, Dooars and Terai tea industries**, which face declining production, climate stress, rising costs and market challenges.



About Darjeeling Tea

Darjeeling Tea is a **GI-tagged premium orthodox tea** grown in the **Darjeeling hills of West Bengal**, renowned for its distinctive aroma and flavour and known as the **"Champagne of Teas."**

Key Facts on Darjeeling Tea

- **GI Tag:** First Indian product to receive a **GI tag (2004)**.
- **Tea type:** Predominantly **orthodox tea**; high-altitude cultivation, cool climate and well-drained soils contribute to its unique quality.

- **Challenges:** Ageing bushes, climate stress, rising costs, labour issues and competition from Nepalese tea.
- **Current issue:** Production declined from **14.49 million kg (1990) to 5.6 million kg (2025)**.
- **Revival:** Indian Tea Association (ITA) has sought government support for **plantation rejuvenation, modernisation and market protection**.

Why Revival Roadmap for Darjeeling and Dooars Tea is needed?

- Darjeeling tea production fell from **14.49 million kg (1990) to 5.6 million kg (2025)** due to **ageing bushes, climate pressures, rising costs, Nepalese imports and weak markets**. ITA proposed a **₹113-crore annual package** covering orthodox tea, working-capital interest, transport, mechanisation, social security, plantation rejuvenation and factory modernisation; a separate White Paper flags **structural, financial, climatic, labour and market challenges**.
- Hence ITA seeks **Minimum Sustainable Price for Made Tea, Minimum Import Price for orthodox tea, rationalised GST on ready-to-drink tea** and enhanced **RoDTEP** support for exports, alongside integration of revival measures with **government schemes**.

Decline in Darjeeling Tea Production

- **Production Slump:** The **Darjeeling White Paper** highlighted a sharp decline in production, from **14.49 million kg in 1990 to 5.6 million kg in 2025**.
- **GI Heritage at Risk:** The paper called for urgent, targeted intervention to safeguard the globally recognised **Geographical Indication (GI)** heritage of **Darjeeling tea**.
- **Financial Support Proposed:** The ITA proposed an indicative annual financial support package of approximately **Rs 113 crore**, covering orthodox production, working capital, transport, mechanisation, social security and factory modernisation.

About Indian Tea Association (ITA)

Indian Tea Association (ITA) is one of India's **oldest and leading tea-industry associations**, representing tea producers and plantation interests.

Key Facts

- **Established:** 1881
- **Headquarters:** Kolkata, West Bengal
- **Role:** Represents tea producers on issues related to **production, labour, trade, taxation, exports and government policy**.
- Primarily it is associated with tea plantations in **Assam, West Bengal and other major tea-growing regions**.

3.10. PNGRB AUTHORISES 1,800 KM OF LPG PIPELINE INFRASTRUCTURE

Context

- The **Petroleum and Natural Gas Regulatory Board (PNGRB)** has authorised the development of around 1,800 km of LPG pipeline infrastructure across **Telangana, Maharashtra, Uttar Pradesh, Uttarakhand, Karnataka and Goa**.



Key Pipeline Projects

Route	Length
Cherlapally (Telangana) – Nagpur (Maharashtra)	556 km
Jhansi (Uttar Pradesh) – Sitarganj (Uttarakhand)	611 km
Shikrapur (Maharashtra) – Goa and Hubli (Karnataka)	633 km

About PNGRB

- It is a **statutory body** established under the **Petroleum and Natural Gas Regulatory Board Act, 2006**.
- It regulates the **midstream and downstream petroleum and natural gas sectors**.
- Its mandate covers **refining, processing, storage, transportation, distribution, marketing and sale** of petroleum, petroleum products and natural gas.
- **Production of crude oil and natural gas is excluded** from its regulatory mandate.




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UPSC PRELIMS PRACTICE QUESTIONS

Q. With reference to the recently passed MSME Development (Amendment) Bill, 2026 and related provisions, consider the following statements:

- I. The Reserve Bank of India (RBI) regulates the Trade Receivables Discounting System (TReDS).
- II. The MSME Development (Amendment) Bill, 2026 amends the MSME Development Act, 2006.
- III. As per the current MSME classification, a Medium enterprise is one with investment up to ₹75 crore.

Which of the statements given above is/are correct?

- (a) I and II only
- (b) II and III only
- (c) I and III only
- (d) I, II and III

Answer: (a)

Explanation:

- **Statement I is Correct:** TReDS is an electronic invoice-financing platform regulated by the **RBI**.
- **Statement II is Correct:** The 2026 Amendment Bill amends the **MSME Development Act, 2006**, empowering the Central Government to notify a wider category of buyers required to procure via TReDS.
- **Statement III is Incorrect:** Under the current classification, a **Medium** enterprise is one with investment up to **₹125 crore** (and annual turnover up to ₹500 crore), not ₹75 crore.

Q. With reference to Polymer Currency Notes, consider the following statements:

1. Polymer banknotes are made from biaxially oriented polypropylene (BOPP).
2. The Reserve Bank of India issues all currency notes, including the ₹1 note.
3. Polymer notes generally have a longer circulation life than paper currency notes.

Which of the statements given above is/are correct?

- (a) 1 and 3 only
- (b) 2 and 3 only
- (c) 1, 2 and 3
- (d) 1 only

Answer: (a)

Explanation

- **Statement 1:** Correct. Polymer notes are printed on **BOPP substrate**.
- **Statement 2:** Incorrect. The **₹1 note is issued by the Government of India**, while all other banknotes are issued by the RBI.
- **Statement 3:** Correct. Polymer notes generally last much longer than conventional paper notes.

Q. With reference to India's Foreign Exchange Reserves, consider the following statements:

1. Foreign Currency Assets constitute the largest component of India's forex reserves.
2. Special Drawing Rights are created by the International Monetary Fund.
3. India's forex reserves consist only of foreign currency assets and gold.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Answer: (a)

Explanation

- **Statement 1: Correct.** FCA is the largest component of India's forex reserves.
- **Statement 2: Correct.** SDRs are international reserve assets created by the IMF.
- **Statement 3: Incorrect.** Forex reserves also include **SDRs and Reserve Tranche Position** with the IMF.

Q. With reference to the Tejas Express, consider the following statements:

1. The Lucknow–New Delhi Tejas Express was the first passenger train operated by IRCTC.
2. IRCTC is a private company independent of the Ministry of Railways.
3. Tejas Express is associated with premium passenger amenities such as catering, housekeeping and infotainment services.
4. The Lucknow–New Delhi Tejas Express commenced its inaugural commercial service in 2019.

Which of the statements given above are correct?

- (a) 1, 3 and 4 only
- (b) 1 and 2 only
- (c) 2, 3 and 4 only
- (d) 1, 2, 3 and 4

Answer: (a) 1, 3 and 4 only

Explanation

- **Statement 1: Correct.** The Lucknow–New Delhi Tejas was the first passenger train operated by IRCTC under the corporate-train model.

- **Statement 2: Incorrect.** IRCTC is a **Government of India public-sector undertaking under the Ministry of Railways**, not an independent private company.
- **Statement 3: Correct.** The service introduced premium facilities including food and beverage services, housekeeping, security and infotainment.
- **Statement 4: Correct.** The first IRCTC Tejas Express began operations on **4 October 2019** on the Lucknow–New Delhi route.



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ENVIRONMENT & GEOGRAPHY

4.1. ZSI PUBLISHES FIRST COMPREHENSIVE CATALOGUE

Context

- The **Zoological Survey of India (ZSI)** has published the "**Catalogue of Lepidoptera (Butterflies & Moths) of India**" in the peer-reviewed journal **Zoosystema**. It is the **first comprehensive scientific catalogue** of India's butterflies and moths, prepared after **12 years of research**, providing an updated and authoritative baseline for biodiversity conservation.



About Lepidoptera

- Lepidoptera** is one of the largest orders of insects comprising **butterflies and moths**.
- The name **Lepidoptera** means "**scale-winged insects**" (Greek: *lepidō* = scale; *ptera* = wings).
- They undergo **complete metamorphosis**:
 - Egg → Larva (Caterpillar) → Pupa (Chrysalis/Cocoon) → Adult.
- Characterised by **scaled wings**, **coiled proboscis**, and high ecological importance.

Key Statistics & Biogeographical Significance

- Global Share:** India is a certified Lepidoptera hotspot, housing **13,703 species**, which constitutes roughly **8.25% of the world's total Lepidoptera**.
- Composition:**
 - Moths outnumber butterflies significantly:** Out of the 13,703 species, **12,286 are moths** and **1,417 are butterflies**.
 - Taxonomic Breakdown:** The diversity spans 3,705 genera, 240 subfamilies, 102 families, and 31 super families.
- The "Night Shift" Pollinators:** The catalogue specifically highlights **2,205 species of Geometroidea** (nocturnal pollinators), accounting for 8.8% of the world's known species in this superfamily. They handle essential pollination services at night when daytime butterflies rest.

Ecological Importance of Butterflies and Moths

- Important **pollinators**, especially of wild flowering plants.
- Caterpillars act as **primary herbivores**, regulating vegetation.
- Serve as a major **food source** for birds, reptiles, bats and amphibians.
- Contribute to **nutrient recycling** as decomposers and detritivores.
- Sensitive to environmental changes, making them excellent **bio-indicators** of ecosystem health.

Why is the Catalogue Important?

- Establishes an **authoritative national database** on Lepidoptera.
- Supports **species identification, taxonomy and biodiversity research**.
- Helps in **ecological monitoring** and climate change studies.
- Assists in **wildlife conservation planning** and habitat management.

- Provides **legal and scientific reference** for future biodiversity documentation.

About Zoological Survey of India (ZSI)

- **Established: 1916**
- **Headquarters: Kolkata, West Bengal**
- **Ministry:** Ministry of Environment, Forest and Climate Change (MoEFCC)
- **Function:**
 - India's premier institution for **faunal exploration and taxonomic research**.
 - Surveys, documents and monitors the country's animal diversity.
 - Maintains the **National Zoological Collections (NZC)**.
 - Advises the Government on biodiversity conservation and wildlife taxonomy.

4.2. PROLONGED HEAT EXPOSURE DURING PREGNANCY AND ADVERSE BIRTH OUTCOMES

Context

A recent nationwide study based on **National Family Health Survey (NFHS-5)** data has established a significant association between **prolonged exposure to extreme heat during pregnancy** and adverse birth outcomes such as **low birth weight, preterm birth and stillbirth**.



Key Findings of the Study

- The study analysed data of **209,266 births** recorded between **2015 and 2020**.
- It linked **NFHS-5 (2019–21)** birth records with **high-resolution India Heat Index** estimates to measure maternal heat exposure.
- Researchers used "**consecutive sweltering days**" instead of average temperature to estimate heat stress.
- **First trimester** heat exposure showed the strongest association with **preterm births**.
- **Second trimester** exposure was more strongly associated with **low birth weight**.
- **Third trimester** exposure was linked to a higher risk of **stillbirth**.
- The risk was greater among:
 - Women with **low Body Mass Index (BMI <18.5)**.
 - Women from **lower educational and poorer socioeconomic backgrounds**.
- **Urban areas** recorded relatively higher rates of low birth weight.
- **Mountainous** and **humid subtropical** climatic regions showed stronger associations between heat stress and adverse pregnancy outcomes.

Why Does Extreme Heat Affect Pregnancy?

High ambient temperatures can:

- Increase **maternal core body temperature**.
- Cause **heat stress** and **dehydration**.
- Reduce **uterine blood flow**, limiting oxygen and nutrient supply to the fetus.

- Impair **fetal growth and development**.
- Increase the likelihood of **uterine contractions**, raising the risk of **preterm delivery**.

What is Heat Stress?

- Heat stress is the **physiological strain experienced by the human body when exposed to high temperatures, humidity and solar radiation**, reducing the body's ability to maintain a normal temperature.

Major Factors Influencing Heat Stress

- Air temperature
- Relative humidity
- Solar radiation
- Wind speed
- Duration of exposure
- Individual health and hydration status

What is the India Heat Index?

The **India Heat Index** is a high-resolution heat exposure dataset that combines:

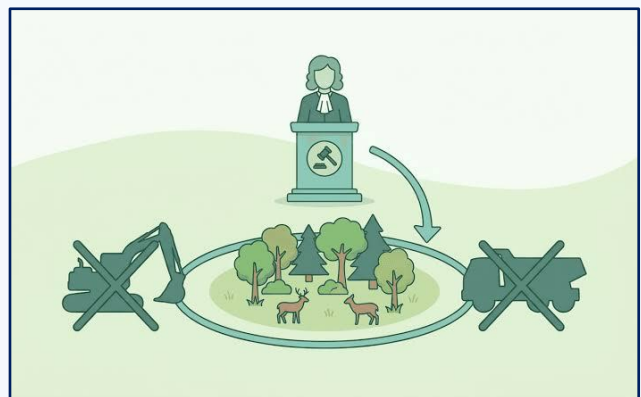
- Air temperature,
- Relative humidity,
- Solar radiation, and
- Wind conditions

To estimate the **actual heat stress experienced by people**, rather than temperature alone.

4.3. SUPREME COURT EXTENDS 10-KM MINING BUFFER TO ALL WETLAND RESERVES

Context

- The Supreme Court of India has clarified that its earlier direction prohibiting mining activities within a 10-km radius of the Asan Conservation Reserve (Uttarakhand) will apply uniformly to all notified wetland conservation reserves across India, ensuring parity in wetland protection.



Supreme Court Ruling: Key Highlights

- The **10-km mining restriction** around the **Asan Conservation Reserve (Ramsar Site)** will now apply to **all wetland conservation reserves** in India.
- The Court held that **all wetland conservation reserves belong to the same legal category**, and therefore should receive **equal environmental protection**.
- The restriction is aimed at preventing **ecological degradation** caused by mining near ecologically sensitive wetlands.
- The Court observed that the distinction applicable to **National Parks and Wildlife Sanctuaries** does not apply to **Conservation Reserves** under this order.

- The clarification came while hearing a petition regarding proposed mining activities near the **Asan Wetland**.

Background of the Case

- In **February 2024**, the Supreme Court issued an **interim order** prohibiting mining within a **10-km radius** of the **Asan Wetland Conservation Reserve** until prior approval from the **Standing Committee of the National Board for Wildlife (NBWL)** and the **Ministry of Environment, Forest and Climate Change (MoEFCC)**.
- The **Himachal Pradesh Government** later argued that the Asan Wetland lies outside its territory and sought exemption.
- The Supreme Court clarified that the **principle applies nationwide** to all notified wetland conservation reserves.

What is a Conservation Reserve?

- A **Conservation Reserve** is a **protected area** declared under the **Wildlife (Protection) Act, 1972**.
- It is generally notified on **government-owned land** adjoining **National Parks or Wildlife Sanctuaries**, or in ecologically important landscapes.
- Its objective is to **protect habitats, wildlife corridors and biodiversity** through community participation.
- Managed with the help of a **Conservation Reserve Management Committee**.

About Asan Conservation Reserve

- **Location:** Dehradun district, Uttarakhand.
- Situated at the **confluence of the Asan River and Yamuna River**.
- Declared Uttarakhand's **first Conservation Reserve** in **2005**.
- Recognised as a **Ramsar Site** in **2020**.
- A major habitat for **resident and migratory waterbirds**, especially during winter.

What is a Ramsar Site?

- A **Wetland of International Importance** designated under the **Ramsar Convention (1971)**.
- **Objective: Conservation and wise use of wetlands** through national and international cooperation.
- India is a **Contracting Party** to the Convention since **1982**.
- India has one of the **largest networks of Ramsar Sites** globally.

National Board for Wildlife (NBWL)

- Statutory body constituted under the **Wildlife (Protection) Act, 1972**.
- **Chairperson:** Prime Minister of India.
- Advises the government on **wildlife conservation policies**.
- Its **Standing Committee** considers proposals involving diversion of land or activities in and around protected areas.

4.4. MEGHALAYA LAUNCHES MISSION TO CONSERVE CLOUDED LEOPARDS

Context

- The **Government of Meghalaya** has launched a **dedicated conservation mission** for the **Clouded Leopard**, the State Animal of Meghalaya.



Key Fact About Clouded Leopard

- Scientific name:** *Neofelis nebulosa*
- IUCN Status:** **Vulnerable**
- Habitat:** Dense forests of the **Himalayas and Northeast India**, extending into Southeast Asia.
- India:** Mainly found in **Northeast India**, including **Assam, Arunachal Pradesh, Meghalaya, Nagaland, Mizoram, Tripura and Manipur**.
- Distinctive feature:** Named for its large, irregular **cloud-like markings** on the coat.
- Arboreal adaptation:** An excellent **tree climber**; its long tail helps maintain balance.
- Special feature:** It has **very long canine teeth relative to its skull**, giving it a distinctive appearance.
- Diet:** Carnivorous; feeds on **primates, birds, rodents, deer and other small mammals**.
- Conservation:** Threatened by **habitat loss, fragmentation and poaching**.

Distribution

In India, the **Clouded Leopard** is primarily distributed across the **Northeastern states**, including **Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim**, with its range also extending to **parts of North Bengal (West Bengal)**.

About Meghalaya Clouded Leopard Mission

- The **Meghalaya Clouded Leopard Mission** is a dedicated conservation programme launched to protect the **Clouded Leopard**, the State Animal of Meghalaya.
- Guided by the **Meghalaya Clouded Leopard Action Plan**, the initiative focuses on habitat protection and restoration, scientific research, long-term population monitoring, capacity building of frontline forest staff, and community participation.
- It also aims to reduce habitat degradation, poaching and illegal hunting through a landscape-based conservation approach.

4.5. ORANGE ALERT IN KERALA: IMD HEAVY RAINFALL WARNING

Context

- The **India Meteorological Department (IMD)** has issued an **Orange Alert** for **8 districts of Kerala** due to the combined impact of a **Low-Pressure Area (LPA)** over the Bay of Bengal and a **cyclonic circulation** over the northeast Bay of Bengal and adjoining West Bengal coast, leading to widespread heavy rainfall.



What is an Orange Alert?

- Orange Alert** means **"Be Prepared"**.

- It indicates the likelihood of **heavy to very heavy rainfall** (or severe weather) that may disrupt normal life.
- People and authorities are advised to remain prepared for possible flooding, landslides, and transport disruptions.

IMD Colour-Coded Weather Warning System

Alert	Meaning	Significance
Green	No warning	Normal weather conditions
Yellow	Be Updated	Heavy rainfall/weather is possible; stay informed
Orange	Be Prepared	Heavy to very heavy rainfall likely; take precautionary measures
Red	Take Action	Extremely heavy rainfall or severe weather; immediate response required

Meteorological Systems Responsible

Low-Pressure Area (LPA)

- A region where **atmospheric pressure is lower than surrounding areas**.
- Causes **air convergence**, cloud formation, and rainfall.
- Can intensify into a **Depression, Deep Depression**, and eventually a **Cyclonic Storm** if conditions remain favourable.

Cyclonic Circulation

- A rotating air circulation around a low-pressure centre.
- In the **Northern Hemisphere**, winds rotate **anticlockwise**.
- Enhances moisture transport and intensifies rainfall over nearby regions.

Why Does Kerala Receive Heavy Rainfall?

- **Southwest Monsoon** brings moisture-laden winds from the Arabian Sea.
- The **Western Ghats** act as an orographic barrier, forcing moist air to rise and produce heavy rainfall.
- Presence of **Low-Pressure Areas, cyclonic circulations**, and offshore troughs further enhances rainfall intensity.

India Meteorological Department (IMD)

- **Established:** 1875
- **Ministry:** Ministry of Earth Sciences
- **Headquarters:** New Delhi
- **Functions:**
 - Weather forecasting
 - Cyclone monitoring and warnings
 - Monsoon forecasting
 - Seismological observations
 - Climate services and disaster early warnings

4.6. NEERI-ZAR WATER PURIFIERS DEPLOYED IN FLOOD-HIT ASSAM

Context

- **CSIR-NEERI** has deployed **100 NEERI-ZAR water purification units** in flood-hit districts of Assam.
- The technology was developed in **2006** during the Barmer floods in Rajasthan and is designed for **emergency drinking-water supply**.



What is NEERI-ZAR?

- **NEERI-ZAR** is a **gravity-based, portable water purification system** developed by **CSIR-National Environmental Engineering Research Institute (NEERI)**.
- It requires **no electricity** and can be transported and installed easily.
- It is particularly suited for **disaster-hit and remote areas** where conventional water-treatment infrastructure may be unavailable.

Key Features of NEERI-ZAR

- **Gravity-operated:** Works without pumps or external power.
- **No electricity requirement:** Suitable for areas with disrupted power supply.
- **Removes:** Turbidity, organic matter and bacterial contamination.
- **Low maintenance:** Simple to operate and transport.
- **Emergency use:** Designed for rapid deployment during floods and other disasters.
- **Typical capacity:** About **20 litres/hour per unit**.

How Does It Help During Disasters?

- Floods can contaminate drinking-water sources with **suspended matter, pathogens and other contaminants**.
- **NEERI-ZAR → Treatment of contaminated water → Safer drinking water**
- It can therefore provide a **decentralised water-treatment solution** when pipelines, electricity and conventional treatment facilities are disrupted.

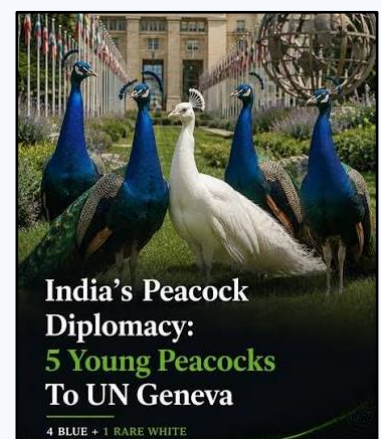
4.7. INDIA'S PEACOCK DIPLOMACY: FIVE PEACOCKS DONATED TO UN GENEVA

Context

- India has donated **five peacocks, including a rare white-feathered male, to the United Nations Office at Geneva (UNOG)**. The donation revives a decades-old tradition and highlights the peacock's significance as both a **national symbol of India** and a **representation of the country's rich biodiversity**.

About Indian Peacock

- **Scientific name:** *Pavo cristatus*
- **Family:** Phasianidae
- **National status:** National Bird of India



- **Declared National Bird: 1963**
- **IUCN Red List: Least Concern**
- **Legal protection in India:** Protected under the **Wild Life (Protection) Act, 1972**
- **Diet:** Omnivorous, feeding on seeds, grains, fruits, insects and small animals.
- **Habitat:** Open forests, scrublands, agricultural landscapes and areas close to human habitation.

Why was the Peacock chosen as India's National Bird?

- The choice reflects its **wide distribution, distinctive appearance and deep association with Indian culture and traditions**. The peacock has long featured in Indian art, architecture, mythology and religious traditions.

The Peacock's Distinctive Features

- The male peacock is particularly known for its long ornamental train, which displays numerous **eye-like spots or ocelli**.
- The train is primarily associated with **courtship and sexual selection**. The striking plumage makes the peacock one of the most recognisable birds associated with India.

Conservation Significance

- Although the Indian Peacock is classified as **Least Concern by the IUCN**, it enjoys significant protection under India's domestic wildlife legislation.

International Significance of the Peacock

- The donation to **UNOG in Geneva** gives the initiative a broader diplomatic and environmental dimension.
- It brings together three themes: **National Symbol → Biodiversity → International Environmental Diplomacy**
- The peacock therefore serves not merely as a cultural emblem but also as a symbol of India's commitment to **biodiversity conservation and environmental stewardship**.

4.8. SUPREME COURT: NO STATE CAN BLOCK TRADITIONAL ELEPHANT ROUTES

Context

- The **Supreme Court** has directed the **Centre to conduct a fresh nationwide survey** of traditional elephant corridors and identify physical barriers obstructing the free movement of wild elephants.



What are Elephant Corridors?

- An **elephant corridor** is a strip of land that facilitates the movement of elephants between **two or more viable habitat patches**.
- Corridors are crucial because elephant populations often require **large, interconnected landscapes** rather than isolated protected areas.
- Maintaining these routes helps reduce **habitat fragmentation** and **human–elephant conflict**.

Major Threats to Elephant Corridors

- **Infrastructure development** such as roads, railways and other linear projects can fragment habitats and disrupt elephant movement. **Encroachment and construction**, including buildings, resorts and human settlements, can obstruct traditional routes.
- Other major threats include **agricultural expansion, fencing and walls, trenches, firebreaks, mining and quarrying, and other land-use changes**. The Supreme Court highlighted in particular **physical barriers** that prevent elephants from using their traditional movement routes.

Elephant Corridors in India:

Corridor Name	Connected Habitats / State	Key Ecological Significance
1. Kaniyanpura–Moyar	Bandipur NP to Mudumalai TR (<i>Karnataka & Tamil Nadu</i>)	Crucial link in the Nilgiri Biosphere Reserve connecting the Western and Eastern Ghats elephant populations.
2. Thirunelli–Kudrakote	Wayanad Sanctuary to Brahmagiri Sanctuary (<i>Kerala & Karnataka</i>)	Vital passage in the Malnad-Nilgiri landscape, allowing genetic exchange across state borders.
3. Kallhatti–Sigur	Mudumalai Tiger Reserve (<i>Tamil Nadu</i>)	Part of the critical Sigur Plateau corridor network, landmarked by Supreme Court rulings for right-of-passage.
4. Edayarahalli–Doddasampige	MM Hills to BR Hills (<i>Karnataka</i>)	Facilitates movement between Biligirirangan Swamy Temple (BRT) Tiger Reserve and Male Mahadeshwara Hills.
5. Chilla–Motichur	Rajaji Tiger Reserve (<i>Uttarakhand</i>)	Spans across the Ganges river; vital for structural connectivity in the Shivalik-Ganges landscape.
6. Rawasan–Sonanadi	Rajaji TR to Corbett Tiger Reserve (<i>Uttarakhand</i>)	Essential east-west seasonal migration path for elephants in the North-Western landscape.
7. Siju–Rewak	Balpakram NP to Nokrek NP (<i>Meghalaya</i>)	Crucial connectivity bottleneck in the Garo Hills landscape.
8. Kanchanjuri / Haldhibari	Kaziranga NP to Karbi Anglong Hills (<i>Assam</i>)	Enables seasonal refuge movement during annual Brahmaputra floods in Kaziranga.
9. Similipal–Hadagarh–Kuldiha	Similipal TR to Kuldiha Sanctuary (<i>Odisha</i>)	Connects key protected areas in the fragmented East-Central landscape.
10. Titi–Reti	Buxa Tiger Reserve area (<i>North Bengal</i>)	Critical movement path in the high-conflict North Bengal-Dooars region.

4.9. KAZIRANGA, MINING AND WILDLIFE CORRIDORS: UNDERSTANDING THE ISSUE

Context

- Alleged mining activities near the **Kaziranga–Karbi Anglong** landscape have raised concerns over the protection of wildlife corridors, elephant movement routes and ecological connectivity. The issue has also highlighted the role of the **Central Empowered Committee (CEC)** and the regulation of activities within **Eco-Sensitive Zones (ESZs)**.



Why Kaziranga–Karbi Anglong is An Important Ecological Landscape?

- Kaziranga is not an isolated protected area. Its ecological security is closely linked with the **forested Karbi Anglong Hills**.
- During floods in the Brahmaputra floodplains, animals move towards the relatively elevated Karbi Anglong landscape. Thus, wildlife corridors between these areas are crucial for maintaining **habitat connectivity and seasonal animal movement**.

About Kaziranga National Park

1. **Location:** Located in **Assam**, mainly in the floodplains of the **Brahmaputra River**.
2. **One-Horned Rhinoceros:** Kaziranga is globally famous for the **Greater One-Horned Rhinoceros (*Rhinoceros unicornis*)** and is one of its most important conservation areas.
3. **Brahmaputra River:** The **Brahmaputra forms the northern boundary** of Kaziranga and its annual floods play an important role in maintaining the park's grassland and wetland ecosystem.
4. **Tiger Reserve:** Kaziranga is part of the **Kaziranga Tiger Reserve** and supports a significant population of **Royal Bengal Tigers**.
5. **UNESCO World Heritage Site:** Kaziranga National Park was inscribed as a **UNESCO World Heritage Site in 1985** for its exceptional biodiversity and conservation importance.

4.10. BRICS OPPOSES EU'S CARBON BORDER ADJUSTMENT MECHANISM (CBAM)

Context

- Recently, **BRICS countries criticised the European Union's Carbon Border Adjustment Mechanism (CBAM)** as unilateral and protectionist, arguing that it could increase the burden on developing countries' exports; they also called for greater and predictable **adaptation finance from developed countries**.



What is Carbon Border Adjustment Mechanism (CBAM)?

- **CBAM is an EU mechanism to impose a carbon-related cost on certain carbon-intensive goods imported into the European Union.**
- It aims to prevent **carbon leakage** and ensure that imported goods face a carbon cost comparable to goods produced within the EU.

How does CBAM Work?

- **Carbon-intensive goods imported into EU**
↓
- **Embedded emissions are calculated**
↓
- **Importer purchases CBAM certificates**
↓
- **Carbon-related cost is imposed**

If a carbon price has already been paid in the exporting country, the corresponding amount can be deducted under the mechanism.

Sectors Covered under CBAM

The current CBAM framework covers **six sectors**:

Sector	Examples/Significance
Iron & Steel	Major carbon-intensive industrial sector
Aluminium	Energy-intensive production
Cement	High process emissions
Fertilisers	Emissions-intensive production
Electricity	Carbon intensity varies by energy source
Hydrogen	Important for industrial decarbonisation

Why are Developing Countries Critical of CBAM?

1. **Trade Competitiveness:** Higher carbon-related costs may make exports from developing countries **less competitive** in the EU market.
2. **Development Concerns:** Developing countries argue that they require greater policy space to balance **economic development with climate action**.
3. **Climate Justice:** Developing countries emphasise their relatively lower historical contribution to cumulative greenhouse-gas emissions while facing significant climate impacts.
4. **Unilateral Climate Measures:** BRICS countries have raised concerns that unilateral trade-related climate measures could undermine **multilateral approaches to climate change**.

4.11. TRANS-BOUNDARY HIMALAYAN DISASTER IN NEPAL

Context

- Recently, a **massive flash flood along Nepal's Bhotekoshi River** killed over a hundred people and left hundreds missing, following a **rock-and-ice landslide along the Nepal–China border** that triggered a debris-laden flood.
- The disaster caused extensive damage to **villages, bridges and infrastructure**, while a possible **minor earthquake and ice avalanche** are being investigated as triggers through satellite imagery.



Location of the Flash Flood

- Mainly **Rasuwa district**, around the **Bhotekoshi River** and **Rasuwagadhi** near the Nepal–China border.

About FLASH FLOODS

Flash floods are **sudden and highly localised floods** that develop within **a few hours**, generally when intense rainfall produces runoff faster than the **soil, rivers and drainage systems** can absorb or carry it.

Major Causes

- **Cloudbursts & extreme rainfall** - sudden, very high-volume runoff; **IMD defines a cloudburst as ≥ 100 mm rainfall in about 1 hour** over a small area.

- **Steep slopes & narrow valleys** - rapidly concentrate and accelerate water flow, especially in mountainous regions.
- **Rapid snow/glacier melt** - sudden increase in river discharge, particularly when combined with heavy rainfall.
- **Dam/embankment failure** - sudden release of a large volume of stored water.
- **Deforestation & urbanisation** - reduce infiltration and increase **surface runoff**.
- **Landslides & ice/rock avalanches** - can suddenly introduce huge volumes of **debris, ice and sediment into river channels**, triggering destructive **debris-laden flash floods**, as recently witnessed in the **Bhotekoshi River, Nepal**.

Why are they highly destructive?

- **Steep terrain + intense runoff + saturated/impermeable surfaces** can cause water levels to rise extremely rapidly. **Siltation, landslides and blocked river channels** may temporarily obstruct flow and then trigger sudden downstream flooding.
- Flash floods generally have **less than 6 hours between the causative rainfall/event and the peak flooding**, leaving very little time for warning and evacuation.

Geomorphological Trigger for Bhotekoshi River flash flood

- A **rock-and-ice landslide/ice avalanche** along the **Himalayan Nepal–China border** introduced large amounts of **ice, rock and sediment** into the **Bhotekoshi River system**.
- The sudden debris influx generated a **debris-laden flash flood**, significantly increasing its destructive potential downstream.

About the Bhotekoshi River

- **Origin:** Rises in **Tibet (China)** and enters **Nepal** through the Himalayas.
- **River System:** A major tributary of the **Sunkoshi River**, forming part of the **Koshi river system**.
- **Course:** Flows through the **steep, tectonically active Himalayan terrain** of central Nepal.
- **Significance:** Known for its **high hydropower potential** and susceptibility to **landslides and flash floods**.

4.12. FEEDSTOCK PROCUREMENT: THE OPERATIONAL BACKBONE OF THE CBG ECOSYSTEM

Context

- Recently following the Union Cabinet's approval of the revamped **₹23,731-crore GOBARDhan (Galvanising Organic Bio-Agro Resources Dhan) scheme** (operational till 2036), establishing efficient feedstock supply chains has emerged as the critical operational lever to scale **India's Compressed Bio-Gas (CBG)** output.



Supply Chain & Logistical Constraints

- **Aggregator-Based Model:** Connects farmers with CBG plants without requiring rigid, legally binding industrial contracts.

- **Storage Hazards:** Requires specialized inventory handling to mitigate summer fire risks and monsoon moisture degradation.
- **Proximity Imperative:** Sourcing must remain strictly localized to prevent high transport emissions from offsetting CBG's net carbon benefits.

Policy Targets & Infrastructure Scale

- **Operational Capacity:** 1,302 functional CBG plants registered on the **GOBARdhan** portal, with 256 plants currently under construction.
- **Mandatory Phased Blending Pipeline (CNG & Domestic PNG):**
 - **FY 2026–27:** 3% CBG blending
 - **FY 2027–28:** 4% CBG blending
 - **Subsequent FYs:** 5% CBG blending

About Compressed Biogas (CBG)

1. **What is CBG?** Compressed Biogas is a **purified form of biogas**, produced through the anaerobic digestion of organic waste such as **cattle dung, agricultural residues, food waste and sewage**.
2. **Production Process:** Organic waste → **Anaerobic digestion** → Biogas → **Purification/upgrading** → Removal of CO₂, H₂S and moisture → **Compression** → CBG.
3. **Composition:** CBG primarily contains **methane (CH₄)** and has properties similar to **Compressed Natural Gas (CNG)**, allowing it to be used as a transport fuel.
4. **Major Government Initiative:** The **SATAT (Sustainable Alternative Towards Affordable Transportation)** initiative promotes the production and use of CBG in India by encouraging entrepreneurs to establish CBG plants.
5. **Environmental Benefits:** CBG helps in **waste management, reducing methane emissions from untreated organic waste, lowering dependence on fossil fuels**, and producing **bio-manure** as a by-product.

Major Feedstocks

CBG can be produced from:

- Agricultural residue
- Animal waste and cattle dung
- Food and kitchen waste
- Municipal organic waste
- Other biodegradable biomass

UPSC PRELIMS PRACTICE QUESTIONS

Q. With reference to the National Family Health Survey (NFHS), consider the following statements:

1. It is conducted under the Ministry of Health and Family Welfare with the International Institute for Population Sciences (IIPS) as the nodal agency.
2. It provides district-level information on population, health and nutrition indicators.
3. NFHS collects information only on maternal and child health.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 only
- (d) 1, 2 and 3

Answer: (a)

- **Statement 1 is Correct:** NFHS is conducted under the Ministry of Health and Family Welfare (MoHFW), with IIPS, Mumbai as the nodal agency.
- **Statement 2 is Correct:** It provides district-level data on population, health and nutrition indicators across India.
- **Statement 3 is Incorrect:** NFHS covers fertility, family planning, nutrition, mortality, anaemia, domestic violence and other health indicators, not just maternal and child health.

Q. With reference to the Clouded Leopard, consider the following statements:

1. It is listed as **Vulnerable** on the IUCN Red List.
2. It is included in **Appendix I of CITES**.
3. It is the State Animal of Meghalaya.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Answer: (d)

Explanation

- **Statement 1:** Correct. The Clouded Leopard is classified as **Vulnerable** by the IUCN.
- **Statement 2:** Correct. It is listed under **Appendix I of CITES**, providing the highest level of international trade protection.
- **Statement 3:** Correct. The **Clouded Leopard is the State Animal of Meghalaya**.

Q. With reference to NEERI-ZAR, consider the following statements:

1. It is a gravity-based water purification technology.
2. It requires electricity for its operation.
3. It can remove turbidity and bacterial contamination.
4. It was developed by CSIR-NEERI.

Which of the statements given above are correct?

- (a) 1, 3 and 4 only
- (b) 1 and 2 only
- (c) 2, 3 and 4 only
- (d) 1, 2, 3 and 4

Answer: (a)

Explanation:

- **Statement 1 – Correct:** NEERI-ZAR is gravity-operated.
- **Statement 2 – Incorrect:** It requires **no electricity**.
- **Statement 3 – Correct:** It removes **turbidity and bacterial contamination**.
- **Statement 4 – Correct:** It was developed by **CSIR-NEERI**.

Q. With reference to elephant corridors in India, consider the following statements:

1. Elephant corridors facilitate movement between two or more viable habitat patches.
2. Elephant corridors are synonymous with Elephant Reserves notified under Project Elephant.
3. Habitat fragmentation and physical barriers can impair elephant corridors.
4. The Indian Elephant is listed under Schedule I of the Wild Life (Protection) Act, 1972.

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 1, 3 and 4 only
- (c) 2, 3 and 4 only
- (d) 1, 2, 3 and 4

Answer: (b) 1, 3 and 4 only

- **Statement 1 – Correct:** Corridors connect two or more viable habitat patches.
- **Statement 2 – Incorrect: Elephant Corridors and Elephant Reserves are distinct concepts;** a corridor is primarily a movement pathway.
- **Statement 3 – Correct:** Infrastructure, construction and other physical barriers can fragment or obstruct corridors.
- **Statement 4 – Correct:** *Elephas maximus* is included in **Schedule I** of the Wildlife (Protection) Act, 1972.

Q. With reference to the European Union's Carbon Border Adjustment Mechanism (CBAM), consider the following statements:

1. CBAM seeks to address the problem of carbon leakage.
2. Iron and steel, aluminium, cement, fertilisers, electricity and hydrogen are among the sectors covered under CBAM.
3. CBAM is designed to replace the EU Emissions Trading System (EU ETS) for carbon-intensive industries within the European Union.

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 3 only
- (c) 2, 3 only
- (d) 1, 2 and 3 only

Answer: (b) 1 and 2 only

Explanation

- **Statement 1 – Correct:** CBAM aims, among other things, to address carbon leakage.
- **Statement 2 – Correct:** CBAM covers cement, iron and steel, aluminium, fertilisers, electricity and hydrogen.
- **Statement 3 – Incorrect:** CBAM does not replace the EU ETS. It complements the EU ETS by applying a carbon-related adjustment to specified imports entering the EU.



Scan to attempt more questions

SCIENCE & TECHNOLOGY

5.1. REASON FOR RISE IN ZONOTIC DISEASE LEPTOSPIROSIS IN KERALA

Context

- Kerala has recorded **50 leptospirosis deaths** this year, reaffirming its position as India's worst-affected State for the disease.
- First reported in **1989**, leptospirosis has remained endemic in Kerala for three decades and is now the **communicable disease with the highest mortality profile** in the State.



About the Leptospirosis Disease

- **Causative agent:** *Leptospira* bacteria.
- **Type:** **Zoonotic bacterial disease** — it can spread from animals to humans.
- **Reservoir:** **Rodents, especially rats**, are important reservoirs; several other mammals can also carry the bacteria.
- **Transmission:** Humans are usually infected when **urine from infected animals contaminates water or soil** and comes into contact with cuts, abrasions or mucous membranes.
- **Risk factors:** **Floods, heavy rainfall, stagnant/contaminated water, poor sanitation** and occupational exposure.
- **Symptoms:** Fever, headache, muscle pain, chills, vomiting and conjunctival redness. Severe cases can cause **kidney and liver damage**, bleeding and meningitis.
- **Severe form:** **Weil's disease** is a severe manifestation characterised particularly by **jaundice and kidney failure**.
- **Treatment:** **Antibiotics** are used; severe cases may require hospitalisation and supportive care.
- **Prevention:** Avoid contact with potentially contaminated water, use protective footwear/gloves, improve sanitation and control rodent populations.

5.2. "EVEREST", INDIA'S FIRST PRIVATE 800 KN ROCKET ENGINE

Context

- Bengaluru-based **Astrobase Space Technologies** unveiled **EVEREST**, India's first privately built **800 kilonewton** Full-Flow Staged Combustion (FFSC) LOX-Methane rocket engine.
- **Astrobase** is the **fourth commercial company globally** to successfully develop a high-thrust FFSC engine, joining a select group of nations and firms capable of this propulsion technology.



About the EVEREST Engine

- **Engine Class:** 800 kN (kilonewton)-class engine, equivalent to lifting approximately **80 tonnes** of thrust in vacuum conditions.
- **Cycle:** India's first fully integrated **Full-Flow Staged Combustion (FFSC)** engine -- among the most advanced rocket engine architectures, enabling chamber pressures exceeding **300 bar**.
- **Propellant:** Runs on **Liquid Oxygen and Liquid Methane (methalox)**, which burns cleaner than kerosene and suits reusable launch vehicles.

- **Global Rarity:** Only **SpaceX's Raptor** has flown an FFSC engine to date; globally, just seven FFSC engines have ever run on a test stand.

Significance for India's Private Space Sector

- **Indigenous Control:** Critical propulsion design authority, systems engineering, manufacturing knowledge, software and mission configuration remain under **Indian control**.
- **Complete Industrial Chain:** Astrobase is building the full chain from engine manufacturing and high-flow testing to stage integration, vehicle qualification and launch operations.
- **Complements ISRO:** Distinct from **ISRO's** ongoing semi-cryogenic engine programme, which uses a different propulsion cycle and fuel combination for the **LVM3** launch vehicle.

Roadmap and Test Milestones

- **Prior Milestones:** Sub-scale hot-fire test in **September 2025**; high-speed turbopump trials in **January 2026**.
- **Test Facility:** A **21.5-acre** propulsion test facility in **Anantapur, Andhra Pradesh**, capable of handling thrust levels up to **200 tonnes**.
- **Next Step:** A full-scale engine hot-fire test, followed by a planned cluster of seven **EVEREST** engines under a reusable medium-lift rocket targeting a maiden orbital launch by **2029**.

5.3. AI-POWERED SURVEILLANCE AT NON-INTERLOCKED LEVEL CROSSINGS

Context

- Indian Railways is deploying **AI-powered, solar-powered CCTV surveillance systems** at **non-interlocked level crossing (LC) gates** to strengthen real-time monitoring and prevent accidents.



What is a Level Crossing?

A **level crossing** is a place where a railway track intersects a road or pathway **at the same level**, rather than through an overbridge or underpass.

Types

- **Manned Level Crossing:** Operated and monitored by railway staff/gateman.
- **Unmanned Level Crossing:** No railway staff is stationed at the crossing.
- **Interlocked Level Crossing:** The gate is integrated with the railway signalling system, creating a safety interlock.
- **Non-interlocked Level Crossing:** The gate is **not directly integrated with the signalling system**.

Why are Non-Interlocked Crossings a Safety Concern?

- At a non-interlocked crossing:
- **Train cleared to proceed → Gateman closes & locks gate → Gateman confirms closure → Station Master relies on confirmation**
- The major weakness is the absence of a **direct technological mechanism for the Station Master to verify the physical closure of the gate**.

About AI-Powered Surveillance System

The proposed system aims to bridge this monitoring gap through:

- **Advanced CCTV cameras** at non-interlocked level crossings.
- **Live video feed** to:
 - Station Master of the nearest railway station
 - Railway engineering control room
- **Solar-powered operation**, enabling deployment even where conventional power infrastructure is limited.
- **Automated alerts** when:
 - Gate remains open.
 - Gate is not closed within the prescribed time.
- **Real-time monitoring** to supplement the gateman's confirmation.

Interlocking

- **Interlocking** is a railway safety arrangement designed to ensure that **signals, points and other signalling equipment operate in a logically coordinated manner**, preventing conflicting movements.
- At an **interlocked level crossing**, the signalling system is linked with the gate operation.

Basic principle:

- Gate not safely closed → Train movement should not receive the corresponding safe signal.

5.4. RELEASE OF "SRAVAANI" THE AI SPEECH RECOGNITION MODEL FOR 65 INDIAN LANGUAGES

Context

- Researchers at **IISc Bengaluru**, with ARTPARK and Google, have developed '**SraVaani**', an AI speech-recognition model trained on **65 Indian languages and dialects**. It aims to improve access to AI and digital services for **under-represented Indian languages**, supporting India's linguistic diversity.

About SraVaani

- **Developers:** Indian Institute of Science (IISc) SPIRE Lab, in collaboration with **ARTPARK** and **Google**.
- **Objective:** Extends automatic speech recognition to several regional and non-scheduled Indian languages that remain underserved by existing speech technology.
- **Licensing:** Freely and publicly available on **Hugging Face** under a **Massachusetts Institute of Technology (MIT) licence**.
- **Total Coverage:** Trained on **65 Indian languages and dialects**.
- **Breakdown:** Covers **20 scheduled languages** and **45 regional languages and dialects**.



- **Sample Languages:** Supports languages such as **Garo, Angika, Chakma, Kokborok, Tulu, Bundeli** and **Bajjika**.
- **Population Reach:** Potentially opens speech AI access to around **25 crore people** as per the **2011 Census**, whose languages are not properly handled by current systems.

Performance Benchmark

- **Word Error Rate:** Recorded a **9.5% word error rate** on **Garo**.
- **Comparative Performance:** Compares with a **69.4% error rate** for the next-best system evaluated on the same language.

5.5. ZHUQUE-3, CHINA'S FIRST LAND-BASED ROCKET RECOVERY

Context

- Recently, **China successfully recovered the first stage of its reusable Zhuque-3 rocket on land for the first time**, using deployable landing legs. Developed by private firm **LandSpace**, this was China's second rocket-stage recovery after the **Long March-10B** was recovered at sea on July 10.
- Globally, **LandSpace became the third entity after SpaceX and Blue Origin** to land an orbital-class rocket booster on legs.



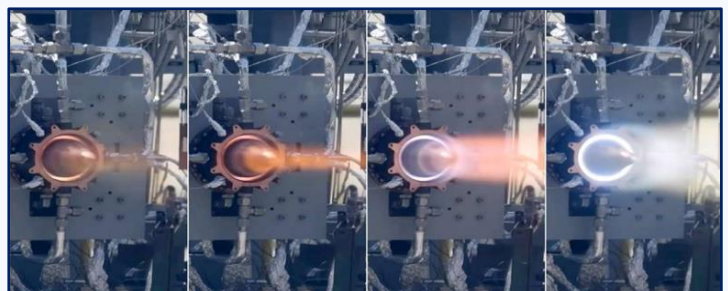
About Zhuque-3

- **Developer:** Built by **LandSpace**, a Beijing-based private commercial aerospace company; approved by the **China National Space Administration (CNSA)** as a new-generation reusable launch vehicle.
- **Propulsion:** Powered by **liquid oxygen-methane engines** (Tianque-series); the first stage uses nine such engines.
- **Configuration:** Single-core, two-stage, stainless-steel launch vehicle with an overall length of **66.1 metres** and a body diameter of **4.5 metres**.
- **Purpose:** Designed for **low-cost, high-capacity, high-frequency** satellite launches.

5.6. ROTATING DETONATION ENGINES (RDEs): NEXT-GENERATION PROPULSION

Context

- Recently Hyderabad-based defence start-up **D-Propulse** has successfully demonstrated a **Rotating Detonation Engine (RDE)** at a **DRDO facility**, highlighting India's growing capabilities in advanced propulsion technology.



About Rotating Detonation Engine (RDE)

- **Definition:** An advanced propulsion system that uses **detonation waves** for more efficient fuel-energy conversion, with potential applications in **rockets, missiles and hypersonic systems**. RDE Uses **detonation**, driven by a **supersonic shock wave**, instead of conventional combustion.

- **Working:** The detonation wave continuously rotates through a **ring-shaped (annular) chamber**, producing sustained thrust.

Key Difference: Rotary Detonation Engine (RDE) vs Conventional Internal Combustion Engine

Feature	Rotary Detonation Engine (RDE)	Conventional IC Engine
1. Combustion	Uses detonation —supersonic combustion driven by a shock wave	Uses deflagration —subsonic flame propagation
2. Pressure Generation	Generates pressure through a rotating detonation wave	Pressure builds from relatively gradual fuel combustion
3. Efficiency	Potentially higher thermodynamic efficiency	Comparatively lower efficiency
4. Fuel Consumption	Potential to achieve better fuel efficiency	Generally higher fuel consumption for equivalent output
5. Design & Size	Can potentially be more compact and lightweight due to pressure-gain combustion	Conventional combustion systems are generally more bulky for equivalent performance

5.7. H1N1 CASES RISE ACROSS INDIA

Context

- Recently, H1N1 (swine flu) cases have increased in several parts of India, mainly during the monsoon season when flu infections usually rise, with Kerala reporting the highest number of cases and deaths.
- Experts say there is no major cause for concern as most patients recover with timely treatment, and health authorities have not declared it an outbreak, advising early testing and quick treatment for suspected cases.



State-wise Trends

- **Delhi and Mumbai** saw a rise in H1N1 cases and set up special isolation/wards, while **Bengaluru** reported heavy respiratory illness among children, with testing mainly for severe or long-lasting cases.
- **Telangana** has not seen a major rise in H1N1 despite more viral-fever cases, while **Kerala** has seen influenza cases and deaths steadily increase from **May to July** (526 to 2,899 cases; 6 to 31 deaths).

About the H1N1 Virus

- H1N1 is an **Influenza A subtype** causing **swine flu**.
- Its Symptoms include **Fever, chills, cough, sore throat, runny/blocked nose, headache, tiredness, muscle or body aches; sometimes vomiting and diarrhoea**.
- Children and older adults, especially those with asthma or other chronic conditions are most Vulnerable to this virus.

- **The Virus was** first reported in **North America (April 2009)**; WHO declared a pandemic in **June 2009** after spread to **74 countries/territories**. It originated from **animal influenza viruses** and differed from earlier human H1N1 strains.
- India reported its first case in **May 2009**; it spreads mainly through **cough/sneeze droplets**, but also through contaminated surfaces. Symptoms usually appear in **1–4 days (about 2 days)**, and spread can occur before clear symptoms.

H1N1: Prevention & Treatment Measures

- **Diagnosis:** Most cases are identified clinically; **RT-PCR of respiratory samples** confirms infection and is generally more sensitive than rapid tests.
- **Vaccination:** Take the flu vaccine every year for protection.
- **Hygiene:** Wash hands, cover coughs/sneezes and avoid close contact with infected people.
- **Isolation:** Keep infected people away from others to prevent spread.
- **Antivirals:** High-risk and severe patients should get antiviral medicines early, preferably within **48 hours**.
- **Public Health:** Ensure vaccination, testing, monitoring and awareness, especially for **pregnant women, children, elderly and people with chronic diseases**.

Additional Scientific & Conceptual Insights

- **Antigenic Drift vs. Antigenic Shift:**
 - **Antigenic Drift:** Small, continuous genetic mutations occurring over time, causing minor updates in seasonal flu vaccines.
 - **Antigenic Shift:** A sudden, major genetic change resulting in a new influenza A strain (e.g., 2009 H1N1 pandemic) that has not previously circulated in humans, creating potential for a pandemic.

Influenza Subtypes (H1N1 vs. H3N2 vs. H5N1)

All three strains belong to the **Orthomyxoviridae** family (Influenza A genus) and are classified by their surface glycoproteins: **Hemagglutinin (H)**, which enables host cell entry, and **Neuraminidase (N)**, which facilitates viral release.

Parameter	Influenza A (H1N1)	Influenza A (H3N2)	Influenza A (H5N1)
Common Name	Swine Flu / Seasonal Flu	Seasonal Flu	Highly Pathogenic Avian Influenza (HPAI / Bird Flu)
Primary Host Reservoir	Pigs (swine), Humans	Swine, Birds, Humans	Wild aquatic birds (ducks, geese), Domestic poultry
Transmission to Humans	Human-to-human transmission is high via droplets/fomites.	Human-to-human transmission is high via droplets/fomites.	Zoonotic spillover from direct contact with infected birds; human-to-human spread remains extremely rare/limited.
Clinical Severity	Moderate; causes upper/lower respiratory	Moderate; often presents with higher fever, severe	Very High ; leads to rapid primary viral

	tract illness. High risk for vulnerable groups.	body aches, and prolonged cough compared to H1N1.	pneumonia, Acute Respiratory Distress Syndrome (ARDS), and multi-organ failure.
Vaccine Inclusion	Included in standard annual Quadrivalent Seasonal Flu Vaccines .	Included in standard annual Quadrivalent Seasonal Flu Vaccines .	Not part of seasonal flu shots; stockpiled as candidate pandemic vaccines by global agencies.

5.8. INDIGENOUS POPCORN MAIZE HYBRID: A STEP TOWARDS AGRICULTURAL SELF-RELIANCE

Context

- Recently, India has launched its **first indigenous, non-genetically modified (non-GM), high-expansion popcorn maize hybrid** in **Eluru district, Andhra Pradesh**.

About Indigenous Popcorn Maize Hybrid

- The newly launched variety is an **indigenously developed hybrid popcorn maize** with **high expansion capacity**, an important quality for commercial popcorn production.
- It is described as **non-GM**, meaning it has not been developed through genetic modification involving direct alteration of its genetic material using modern genetic engineering techniques.
- It seeks to reduce India's dependence on **imported hybrid technology** for high-quality popcorn maize.



Why is Popcorn Maize Different?

- Popcorn is a special type of **maize (Zea mays)** whose kernels contain a suitable proportion of **hard endosperm and moisture**.
- When heated, the moisture inside the kernel turns into steam, generating pressure that causes the kernel to **explode and form popcorn**.
- Expansion volume** is an important quality parameter for commercial popcorn.

Agricultural Significance

- Self-reliance:** Reducing dependence on imported hybrid technology.
- Indigenous innovation:** Promoting Indian agricultural research and locally developed varieties.
- Value addition:** Converting maize into higher-value processed food products.
- Farmer income:** Creating opportunities for farmers linked to specialised maize markets.
- Export potential:** Developing an Indian popcorn value chain with global market potential.

Hybrid Crop vs GM Crop

Hybrid Crop	GM Crop
Produced by crossing two genetically different varieties through conventional breeding.	Produced by directly modifying DNA using genetic engineering .

Combines desirable traits already present in the parent plants.	Can introduce, modify or silence specific genes.
No direct genetic engineering is involved.	Genetic modification is central to its development.
Example: Hybrid maize, hybrid tomato.	Example: Bt cotton.
Traits may not remain stable across generations.	Introduced traits can be maintained through propagation.

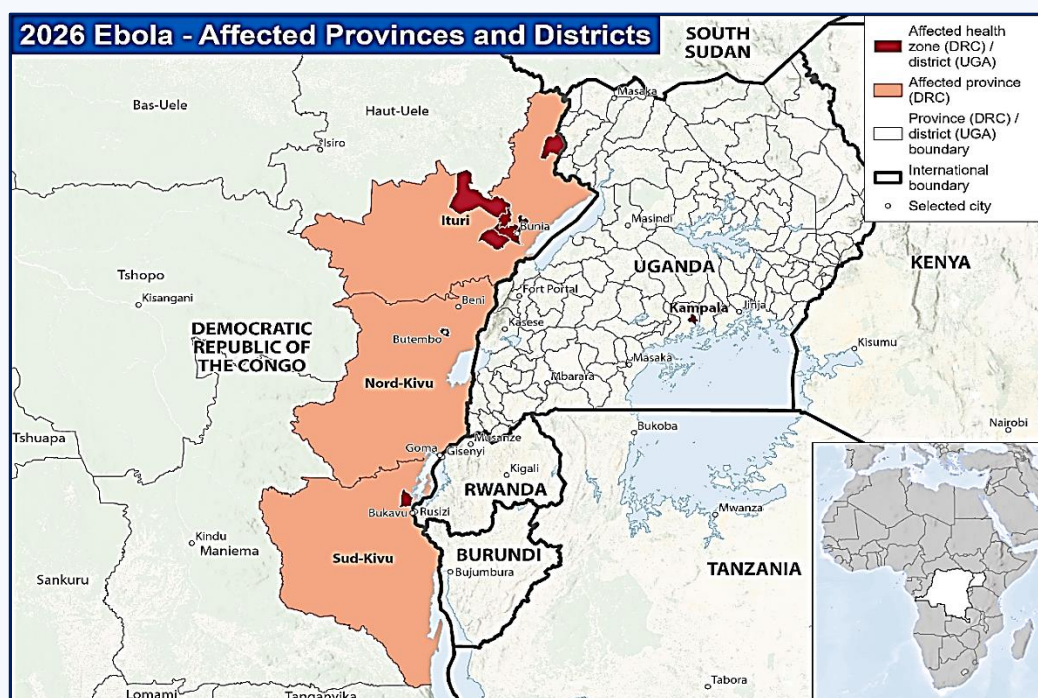
About Maize

- **Scientific name:** *Zea mays*.
- Maize is an important **cereal crop** and is used as food, animal feed and industrial raw material.
- It is used in products such as **starch, corn oil, ethanol and processed foods**.
- **Popcorn is a specialised type of maize** selected for its popping characteristics.

5.9. EBOLA OUTBREAK IN DEMOCRATIC REPUBLIC OF THE CONGO: BUNDIBUGYO VIRUS

Context

- The **Democratic Republic of the Congo (DRC)** is facing its **deadliest Ebola outbreak**, with **4,945 cases and 2,325 deaths** reported by August 2026.
- The outbreak is caused by the **Bundibugyo virus**, a species of Ebola for which there is currently **no licensed vaccine or specific approved therapeutic**.



About Ebola Disease?

- **Ebola disease** is a **severe and often fatal viral disease** caused by viruses belonging to the **Orthoebolavirus genus** of the **Filoviridae family**.
- It can cause **fever, severe weakness, muscle pain, vomiting, diarrhoea and, in severe cases, internal and external bleeding**.

- The average case fatality rate is around **50%**, although it has varied considerably between outbreaks.

Ebola Viruses and Human Disease

Three Orthoebolaviruses are particularly associated with major human outbreaks:

Virus	Disease
Ebola virus (EBOV)	Ebola virus disease (EVD)
Sudan virus (SUDV)	Sudan virus disease (SVD)
Bundibugyo virus (BDBV)	Bundibugyo virus disease (BVD)

Transmission

- Ebola viruses are primarily transmitted through **direct contact with the blood or other body fluids of infected people or deceased persons**.
- **Natural host:** Fruit bats of the **Pteropodidae family** are considered the likely natural hosts of Orthoebolaviruses.

About the Ebola Vaccine?

- **Ervebo®** is a licensed and WHO-prequalified vaccine against **Ebola virus disease caused by EBOV**.
- It is **not currently recommended for the Bundibugyo outbreak**, as there is insufficient evidence that it provides protection against BDBV.

About Bundibugyo Virus (BDBV):

- **Disease:** Bundibugyo virus disease (BVD)
- **Type:** Ebola virus species
- **First identified:** During an outbreak in **Bundibugyo District, Uganda, in 2007**
- **Licensed vaccine:** None specifically approved for BVD
- **Case fatality:** Previous BVD outbreaks have recorded approximately **30–50%** case fatality rates.

UPSC PRELIMS PRACTICE QUESTIONS

Q. With reference to Leptospirosis, consider the following statements:

- I. It is a zoonotic disease caused by pathogenic *Leptospira* bacteria, also known as Weil's disease in its severe form.
- II. It spreads primarily through respiratory droplets from infected individuals.
- III. The National Programme for Prevention and Control of Leptospirosis (NPPCL) was launched in 2015.
- IV. Unlike ELISA, PCR-based testing can give confirmatory results in the acute phase of infection.

Which of the statements given above is/are correct?

- (a) I and II only
- (b) I, III and IV only
- (c) II and III only
- (d) I, II, III and IV

Answer: (b) I, III and IV only

Statement I is Correct: Leptospirosis is a zoonotic disease caused by pathogenic *Leptospira*, historically termed Weil's disease in severe cases.

Statement II is Incorrect: It spreads through contact with contaminated soil/water, not respiratory droplets.

Statement III is Correct: NPPCL was launched in 2015 under the Ministry of Health and Family Welfare.

Statement IV is Correct: PCR detects bacterial DNA and is reliable in the acute phase, unlike ELISA.

Q. With reference to H1N1 (swine flu), consider the following statements:

- I. H1N1 is a subtype of the Influenza A virus.
- II. Routine H1N1 testing is conducted at all government hospitals in India.
- III. Anti-flu drugs are more effective when administered within the first few days of fever onset.

Which of the statements given above is/are correct?

- (a) I and II only

- (b) II and III only
- (c) I and III only
- (d) I, II and III

Answer: (c) I and III only

Explanation

Statement I is Correct: H1N1, commonly known as **swine flu**, is a subtype of the **Influenza A** virus.

Statement II is Incorrect: Routine H1N1 testing is **not** conducted at government hospitals, which makes it difficult to classify flu-like cases; testing is largely restricted to symptomatic cases in select facilities.

Statement III is Correct: Anti-flu drugs are more effective when started within the **first few days of fever**, and suspected cases should ideally be tested within **24 to 48 hours** of developing symptoms.

Q. With reference to railway level crossings, consider the following statements:

1. A manned level crossing is necessarily an interlocked level crossing.
2. Interlocking integrates level-crossing operation with railway signalling.
3. AI-enabled CCTV can provide real-time monitoring of non-interlocked crossings.
4. Kavach and level-crossing CCTV have identical primary functions.

Which of the statements given above are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1, 3 and 4 only
- (d) 2, 3 and 4 only

Answer: (b) 2 and 3 only

Explanation

Statement 1 – Incorrect: A crossing can be **manned but non-interlocked**.

Statement 2 – Correct: Interlocking links **gate operation with railway signalling**.

Statement 3 – Correct: AI-enabled CCTV enables **real-time monitoring and alerts**.

Statement 4 – Incorrect: Kavach provides automatic train protection, while CCTV monitors level-crossing gates.

Q. With reference to SraVaani, an Indian multilingual speech technology initiative, consider the following statements:

1. **SraVaani** was developed by IISc's Speech and Language Technology (SPIRE) Lab in collaboration with **ARTPARK and Google**.
2. **SraVaani** is trained on **65 Indian languages and dialects**, covering **20 Scheduled Languages** and **45 regional languages and dialects**.
3. **SraVaani** is released under a **proprietary licence restricted to research use only**.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

Answer: (a) 1 and 2 only

Explanation

- **Statement 1 is Correct:** SraVaani was developed by IISc's SPIRE Lab, in collaboration with **ARTPARK and Google**, to advance speech technology for India's diverse linguistic landscape.
- **Statement 2 is Correct:** SraVaani covers **65 Indian languages and dialects**, comprising **20 Scheduled Languages** and **45 regional languages and dialects**.
- **Statement 3 is Incorrect:** SraVaani is **openly available on Hugging Face** under the MIT licence. Therefore, it is **not a proprietary, research-use-only model**.



Scan to attempt more questions

HISTORY & CULTURE

6.1. MYSURU DASARA'S CEREMONIAL ELEPHANT MARCH BIDS FAREWELL

Context

- Recently, the **Karnataka Forest Department** conducted **Gajapayana** at **Veeranahosahalli**, on the outskirts of **Nagarahole Tiger Reserve**, marking the beginning of preparations for **Mysuru Dasara**; veteran tusker **Abhimanyu** was given a ceremonial farewell.



What is Mysuru Dasara?

- Historical Origins:** The tradition of elephants participating in the royal procession dates to **1610 AD** at **Srirangapatna**, with celebrations traced further to the **Vijayanagara Empire** and later continued by the **Wadiyar dynasty** of Mysuru.
- State Festival Status:** **Mysuru Dasara** is designated Karnataka's **Nadahabba** (state festival) and is celebrated over ten to eleven days, culminating in the **Jamboo Savari** on **Vijayadashami**.

Gajapayana: The March to Mysuru

- Ritual Purpose:** **Gajapayana**, literally the "elephant march," is the ceremonial journey of selected elephants from forest camps to **Mysuru**, marking the formal start of **Mysuru Dasara** preparations.
- Rituals Performed:** Before departure, the elephants undergo purification rites and are offered a traditional naivedya, with prayers directed to the forest deity and **Goddess Chamundeshwari**.
- The **2026** Gajapayana included a ceremonial farewell to tusker **Abhimanyu**, recognising his service as a member of the **Dasara jumbo squad** and the **Forest Department**.

Jamboo Savari and the Golden Howdah

- Golden Howdah:** The **Jamboo Savari** procession on Vijayadashami carries the idol of **Goddess Chamundeshwari** in a **750-kg golden howdah** borne by a specially trained lead elephant.
- Mahout & Kavadi:** Each Dasara elephant is cared for by a dedicated **mahout** (handler) and **kavadi** (assistant), who train and accompany the animal throughout the festivities.

6.2. LEGAL PROTECTION FOR VANDE MATARAM

Context

- Recently, Parliament passed the **Prevention of Insults to National Honour (Amendment) Act, 2026**, giving **Vande Mataram** the same **legal protection as the National Anthem**. The law punishes anyone who **intentionally disrupts or prevents the singing** of the National Anthem or Vande Mataram, but **does not force anyone to sing or participate**.



About the National Honour (Amendment) Act, 2026

- **Purpose:** Gives **Vande Mataram** the same legal protection against insult and disruption as the **National Anthem**.
- **What it prohibits:** Intentionally **preventing or disrupting** the singing of the National Anthem or Vande Mataram is punishable.
- **No compulsion:** The Act **does not force citizens to sing or participate** in either song.
- **Freedom of choice:** It does not prescribe **which stanzas must be sung** or how a person must participate.

The Bijoe Emmanuel Precedent (1986)

- **Bijoe Emmanuel case (1986):** The Supreme Court held that students who **stood respectfully but did not sing the National Anthem** could not be punished for their genuine religious belief.
- **Fundamental Rights:** Forcing someone to sing can violate **Article 19(1)(a) (freedom of expression)** and **Article 25(1) (freedom of conscience)**.
- **Key principle:** **Fundamental Duties cannot override Fundamental Rights**, and respectful silence without disruption is not an offence.

Status of Vande Mataram Since 1950

- On **January 24, 1950**, at the Constituent Assembly's last sitting, **Dr. Rajendra Prasad** declared **Jana Gana Mana** the National Anthem, giving **Vande Mataram** equal status as the national song
- The Constitution contains **no reference** to a national song; its status rests entirely on this 1950 statement and subsequent convention
- In **October 1937**, the **Congress Working Committee** resolved that only the first two, secular stanzas be sung at official gatherings, excluding the later devotional verses invoking Hindu goddesses

Relevant Constitutional Provisions

- **Article 25 & Article 26:** freedom of conscience, free profession/practice/propagation of religion, and freedom to manage religious affairs without State interference
- **Article 19(1)(a):** freedom of speech and expression, extended by courts to include the freedom to remain silent
- **Article 51A:** Fundamental Duties, including respect for the national anthem -- held subordinate to Part III rights

UPSC PRELIMS PRACTICE QUESTIONS

Q. With respect to the following statements:

- I. Gajapayana refers to the ceremonial elephant march that marks the beginning of Mysuru Dasara preparations.
- II. The Golden Howdah used to carry the deity during the Jamboo Savari weighs approximately 750 kg.
- III. Mysuru Dasara is celebrated primarily to commemorate Lord Rama's victory over Ravana, as described in the Ramayana.

Which of them given above is/are correct?

- (a) I and II only
- (b) II and III only
- (c) I and III only
- (d) I, II and III

Answer: (a) I and II only

Explanation

Statement I is Correct: Gajapayana, the ceremonial journey of elephants from forest camps to Mysuru, formally marks the start of preparations for the Mysuru Dasara festivities.

Statement II is Correct: The idol of Goddess Chamundeshwari is carried in a 750-kg golden howdah during the Jamboo Savari procession on Vijayadashami.

Statement III is Incorrect: Mysuru Dasara primarily commemorates Goddess Chamundeshwari's (a form of Durga) victory over the demon Mahishasura, not Lord Rama's victory over Ravana.

Q. With reference to the above, consider the following statements:

- I. The Prevention of Insults to National Honour (Amendment) Act, 2026 makes it mandatory to sing all six stanzas of Vande Mataram at official functions.

- II. The Supreme Court in Bijoe Emmanuel v. State of Kerala (1986) held that the Fundamental Duties under Article 51A cannot override the Fundamental Rights guaranteed under Part III.
- III. Vande Mataram was accorded equal status with Jana Gana Mana through a statement by Dr. Rajendra Prasad at the Constituent Assembly in 1950.

Which of the statements given above is/are correct?

- (a) I and II only
- (b) II and III only
- (c) I and III only
- (d) I, II and III

Answer: (b) II and III only

Explanation

Statement I is Incorrect: The 2026 Amendment does not mandate singing of the song or prescribe any particular stanzas; it penalises only the intentional prevention or disturbance of a singing already taking place.

Statement II is Correct: In Bijoe Emmanuel (1986), Justice O. Chinnappa Reddy's Bench held that Article 51A duties cannot be used to cut down or override the fundamental rights guaranteed under Part III of the Constitution.

Statement III is Correct: Dr. Rajendra Prasad's presidential statement at the Constituent Assembly's last sitting on January 24, 1950 gave Vande Mataram equal status with Jana Gana Mana, though it did not make it the anthem or a co-anthem.



Scan to attempt more questions

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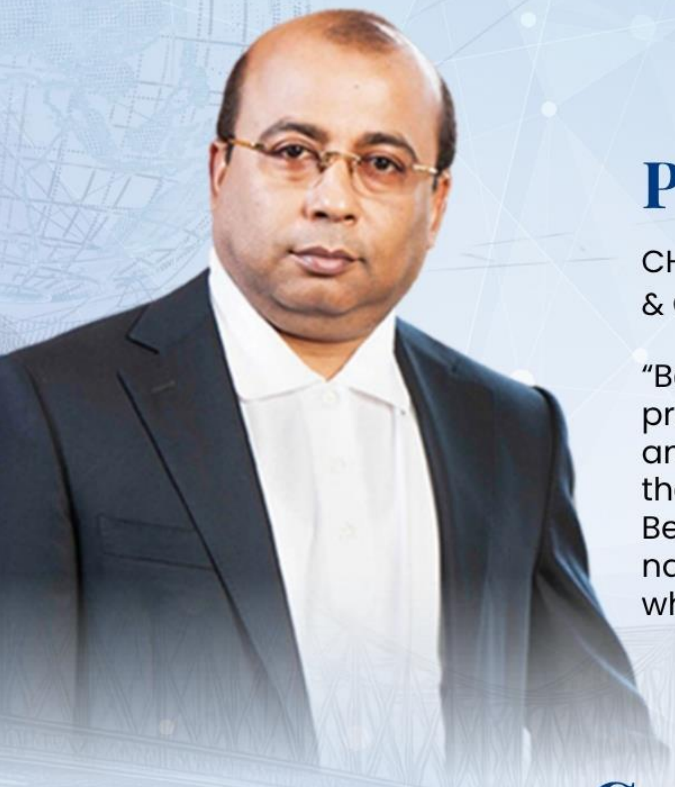
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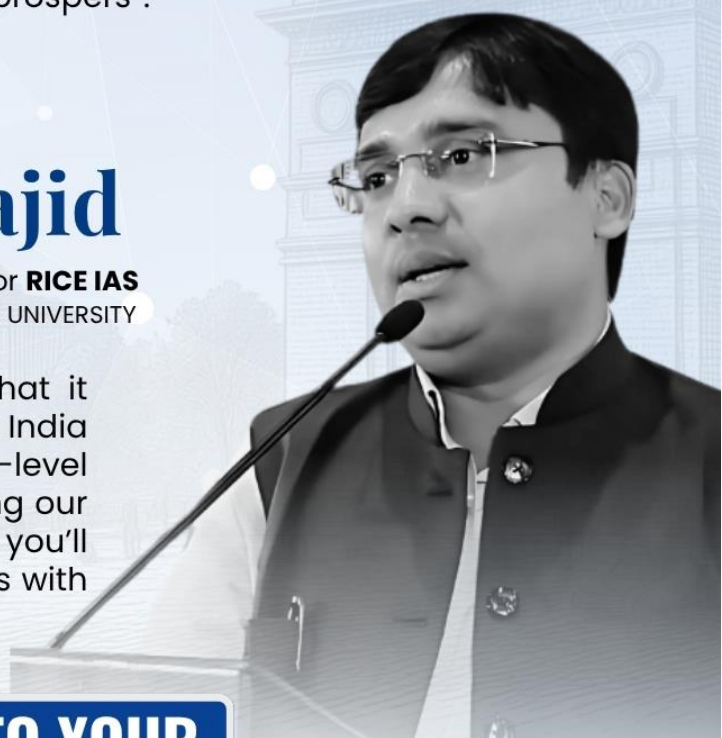
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