Today's Prelims Topics

India's Air Defence System

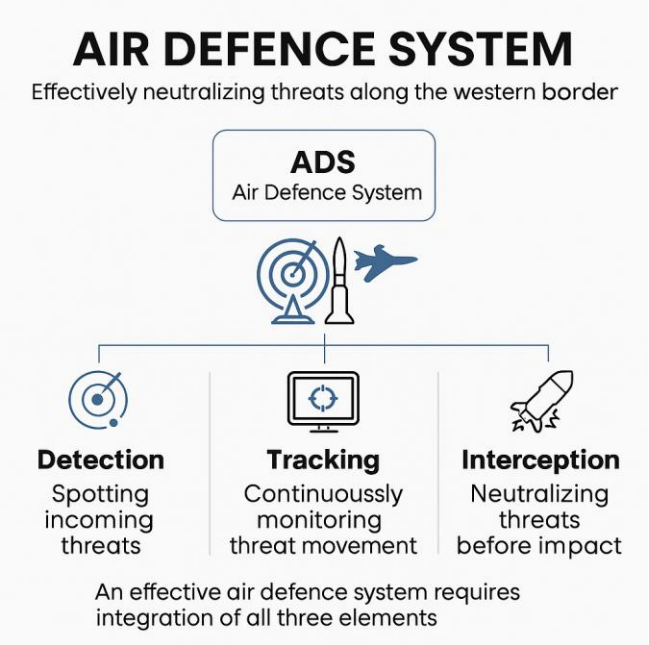
Context

India's Air Defence System (ADS) effectively neutralized threats along the western border.

Some Key Air Defence System in India

S-400 Triumf (Sudarshan Chakra)

- Acquired from **Russia**; known as Sudarshan Chakra in India.
- Among the **most advanced long-range surface-to-air missile (SAM)** systems globally.
- **Equipped with**:
  - Command-and-control system
  - Phased array radars
  - Electronic warfare countermeasures.
- Provides complete **360-degree radar and missile coverage.**
- Multi-missile compatibility enables layered defence with different missile types for various ranges.
- Can track and engage multiple targets simultaneously-can track up to 300 targets and engage 36 at once.
- **Range & Capability:**
  - Tracking range: up to 600 km.
  - Engagement range: up to 400 km (depending on missile type).
  - Altitude coverage: from 30 meters to 30 km (effective against low-flying drones to high-altitude aircraft and missiles).
- **Rapid deployment**: can be operational within 5–10 minutes.
- Integrated with the Indian air defence network for enhanced coordination.



Barak 8

- Jointly developed by **India and Israel.**
- Medium- to long-range SAM (MR SAM/LR SAM).
- Achieves speeds up to **Mach 2**.
- Capable of simultaneously **engaging multiple aerial targets**.
- **Operational range**: up to 100 km.
- Available in both **maritime and land-based** variants.

Akash Weapon System

- **Indigenously** developed by India.
- Short-range SAM system.
- Equipped with built-in **Electronic Counter-Counter Measures (ECCM)** for high immunity against jamming.
- Can engage multiple targets simultaneously in both group and autonomous modes.
- **Range & Capability:**
  - Engagement range: 4.5 km to 25 km.

    - **Altitude of operation**: 100 meters up to 20 km.
- **Fully automatic** with quick response from detection to kill.
- Command guidance system for missile control.
- Entire system is **mobile and adaptable** to different air defence environments.

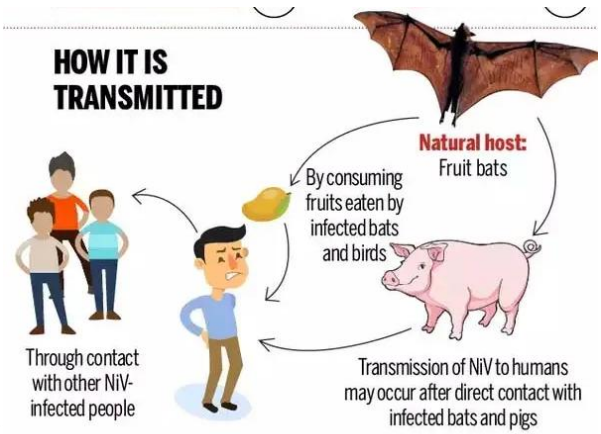
Source: **Indian Express: How Air Defence Systems work**

Nipah Virus

Context

A woman in Mallapuram (Kerala) tested positive for Nipah Virus.

About Nipah Virus



- NiV is a **single-stranded,** enclosed, negative-sense RNAvirus.
- **Nipah Virus Origin and Spread:**
    - First emerged in 1999 among Malaysian pig farmers.
    - Detected in Bangladesh and eastern India in 2001.
    - Traces found in Cambodia, Ghana, and Thailand.
- **Testing**: RT-PCR, IHC, ELISA, and SNT are tests used for detection.
- **Nipah Virus Symptoms**: The human infection presents as an **encephalitic syndrome.**
    - **Initial signs**: Fever, headache, muscle aches, nausea, sore throat.
    - **Progression:** Dizziness, drowsiness, neurological signs of encephalitis.
    - **Severe cases:** Seizures, coma within 24-48 hours.
    - **Severity varies:** Mild to severe illness, including brain swelling and possible death.
    - **In Pigs**: The virus primarily affects the respiratory and nervous systems.
        - A common symptom in pigs is a chronic cough, often referred to as '**barking pig syndrome**'.
        - Pigs may also show symptoms like shivering and seizures.
        - The disease spreads rapidly among pigs.

- **Encephalitic Syndrome**: It is a medical condition characterised by inflammation of the brain.
- **Full Form of all the Test Used for Detection:**
    - **RT-PCR – Reverse Transcription Polymerase Chain Reaction**
    - **IHC – Immunohistochemistry**
    - **ELISA – Enzyme-Linked Immunosorbent Assay**
    - **SNT – Serum Neutralization Test** (also known as Virus Neutralization Test in some contexts)

- **Treatment of Nipah Virus**:
    - No specific treatment or vaccine currently available.
    - Ribavirin (antiviral) might help reduce mortality in encephalitis cases.
    - Treatment focuses on intensive supportive care and symptom management.

Source: **Indian Express: 42-year old woman tests positive for Nipah Virus**

HAROP – India's Kamikaze Drone (Loitering Munition)

Context

India reportedly used Israeli HAROP drones to destroy a Pakistani air defence system in Lahore

About HAROP

Aspect	Details
Type	Loitering munition / Kamikaze (suicide) drone
Developer	Israel Aerospace Industries (IAI)
Functionality	Combines UAV and missile capabilities; loiters over a target area and crashes into targets with an explosive payload
Key Features	➔ Engages **high-value and mobile targets** such as radars, command posts, tanks, surface-to-air missile (SAM) systems, and moving vehicles ➔ Equipped with **Electro-Optical (EO) sensors** for real-time visual identification and target acquisition ➔ Up to **9 hours** of flight time ➔ Can be launched from **truck-mounted canisters, naval vessels, or fixed ground systems** ➔ Operates effectively in **Global Navigation Satellite System (GNSS)-denied environments**; **resistant to GPS jamming** ➔ Offers both **autonomous and manual targeting**; supports fire-and-forget engagement

Source: **Indian Express: All About IAI Harop**

International Monetary Fund (IMF)

Context

India abstains from the IMF vote to give more funds to Pakistan.

More in News

- The Executive Board of the IMF met to vote on disbursing $1 billion out of a total $7 billion Extended Fund Facility (EFF) to Pakistan and to extend a further $1.3 billion to the cash-strapped nation as a Resilience and Sustainability Facility (RSF).

About International Monetary Fund (IMF)

- It is a **specialised agency** of the United Nations (UN), founded at the Bretton Woods Conference in 1944. **(HQ- Washington DC)**
- **Membership:** 190 countries.
- It grants loans **only to its member countries.**
- **Reports released by IMF:**
    - **World Economic Outlook (WEO):** A biannual report analysing global economic trends and forecasts.
    - **Global Financial Stability Report (GFSR):** Focuses on global financial markets and assesses risks to financial stability.
- **Lending facilities of IMF:** Extended Fund Facility, Rapid Financing Instrument, Rapid Credit facility.

Structure of the IMF

- **Board of Governors:** Highest decision-making body of the IMF. Each member country is represented by its Finance Minister or Central Bank Governor. They meet annually to review key policies and global economic challenges.
- **Executive Board:** Composed of 24 Executive Directors, this board is responsible for the day-to-day operations of the IMF.
- **Managing Director:** The Managing Director is the head of the IMF and its staff.

Quota System

- The IMF operates on a quota system, which reflects each member's relative position in the global economy. A member's quota is determined by its GDP, trade openness and other factors.
- Quotas determine the financial contribution of each member country, voting power, and access to IMF resources. Quotas are denominated in Special Drawing Rights (SDRs), the IMF's unit of account.
- A country's voting power is directly related to its quota; the higher the quota, the more voting power the country has. The U.S. has the largest quota and voting share, followed by Japan, China and Germany.
- India has **2.75% of the total quota,** making it the **8th largest** quota-holding country.

UPSC PYQ

Q. ''Rapid Financing Instrument'' and ''Rapid Credit Facility'' are related to the provisions of lending by which one of the following? **(2022)**

(a) Asian Development Bank
(b) International Monetary Fund
(c) United Nations Environment Programme Finance Initiative
(d) World Bank

Answer: B

Source: **The Hindu: India abstains from IMF vote to give more funds to Pakistan, flags its 'poor track record'**

Songar drones

Context

Pakistan likely used gun-toting Turkish Songar drones to strike on India.

About Songar Drones

- **Origin:** Developed by *Asisguard*, a defence firm based in Ankara, Turkey.
    - Inducted into service in **2019** as Turkey's first domestically produced armed drone.
- A quadrotor **unmanned combat aerial vehicle (UCAV)** designed for both **autonomous and remote-controlled missions.**
- **Performance**: Maximum takeoff weight: **45 kg**
    - Flight time (without payload): **25–30 minutes**
    - Operational range: **3–5 km** from the control station
    - Operating altitude: **Up to 2,800 meters above sea level** and **400 meters above ground level**
- **Key Features:**
    - Can be equipped with a stabilised automatic machine gun, mini-missiles, or 81mm mortar rounds.
    - Capable of targeting enemy personnel, vehicles, and lightly fortified structures.
    - Transmits **real-time video and telemetry data** to ground operators.
    - Equipped with **daylight and infrared cameras** for effective day-night and all-weather operations.
    - Supports **route planning, autonomous flight, and automatic return-to-base** when communication is lost or battery is low.
    - Enhances survivability and reduces dependency on manual control.
    - Multiple Songar drones can operate in coordinated swarms, executing simultaneous, multi-directional attacks to overwhelm enemy defences.

Source: **What are Turkish Songar drones, used by Pak to attack India?**

Poison of animals stronger than cyanide

Context

While cyanide is known for its lethality, some animals carry even more potent toxins.

About Cyanide

- **What is Cyanide?** Cyanide is a fast-acting and potentially deadly chemical that interferes with the body's ability to use oxygen. It inhibits cellular respiration, leading to rapid organ failure and death in large doses.
- **Lethality**: Just 1.5 mg per kg of body weight can be fatal to humans. It's commonly known for its use in chemical weapons and infamous poisonings.
- **How it compares**: Despite its potency, certain animals in nature possess **toxins far stronger than cyanide**, often used for defense or hunting.

Animals with Toxins More Lethal Than Cyanide

Animal	Toxin	Lethality / Effect	Comparison with Cyanide
Golden Poison Frog	Batrachotoxin	Disrupts nerve signaling, causing paralysis and death. Just 2 micrograms can kill a human.	**Far more potent** – one frog carries enough toxin to kill 10 adults.
Blue-Ringed Octopus	Tetrodotoxin	Causes paralysis and respiratory failure. No known antidote.	**Much deadlier** – a few milligrams can be fatal.
Pufferfish (Fugu)	Tetrodotoxin	Found in organs; extremely toxic. Requires trained chefs to prepare safely.	**Tetrodotoxin is 1,200 times more toxic than cyanide.**
Cone Snail	Conotoxin	Injects venom via harpoon-like tooth. Causes paralysis, can be fatal.	Some species have **toxins stronger than cyanide** with no antidote.
Box Jellyfish	Complex venom	Can cause heart failure in minutes; excruciatingly painful.	Considered among the **most lethal marine toxins**.
Brazilian Wandering Spider	Neurotoxic venom	Can cause muscle spasms, breathing issues, and death.	**More complex and potent** than many known chemical poisons.
Deathstalker Scorpion	Neurotoxic venom	Affects nervous system, dangerous for children and the elderly.	Its venom is **more targeted and severe** than cyanide in small doses.
Stonefish	Protein-based venom	Injects venom through dorsal spines, causes extreme pain and potential death.	Among the **deadliest fish venoms**, much faster-acting than cyanide.
Inland Taipan	Taipoxin (neurotoxin)	One bite can kill over 100 people; extremely rare in human encounters.	**Considered the most venomous snake** – deadlier than cyanide.

Komodo Dragon	Anticoagulant venom	Causes blood pressure drop, prevents clotting – leads to slow, fatal weakening of prey.	Less instant than cyanide, but effective and deadly in a natural context.

Source: **Indian Express: The poison of this animal is 1,200 times stronger than cyanide**

Editorial Summary

Single Use Packagings make Majority of Himalayan Waste

Context

According to the Zero Waste Himalaya Alliance, single-use food and beverage packaging forms major plastic waste in the eco-sensitive Himalayan region.

Causes of Plastic Pollution Crisis in the IHR

- **Proliferation of Single-Use Plastics:** Widespread use of single-use food and beverage packaging, which forms over **84%** of plastic waste in the region.
- **Tourism Pressure:** Seasonal influx of tourists generates massive waste, especially in ecologically fragile zones like rivers, trekking trails, and pilgrimage sites.
- **Lack of Localized Waste Infrastructure:** Inadequate collection, segregation, recycling, and disposal mechanisms in remote mountainous areas.
- **Non-Recyclable and Low-Value Plastics:** Over **70%** of the plastic waste is non-recyclable multilayered packaging with no economic value for waste pickers.
- **Limited Awareness and Behavioural Challenges:** Poor public awareness about responsible consumption and improper disposal of plastic waste.
- **Policy Gaps and Weak Enforcement:** National waste policies often overlook the **unique challenges of mountain ecosystems**, leading to ineffective implementation.
- **Lack of Producer Responsibility Enforcement:** Weak implementation of **Extended Producer Responsibility (EPR) laws** in difficult-to-reach mountain regions.

What are the Harmful Effects

- **Soil and Water Pollution:** Unscientific disposal of single-use plastics leads to significant soil and water contamination in the Indian Himalayan Region (IHR).
    - Plastics leach toxic chemicals into the soil and water, threatening both terrestrial and aquatic life.
    - Microplastics have been detected in rivers, lakes, streams, and even glaciers, contaminating vital freshwater sources that millions downstream depend on.
- **Threat to Biodiversity and Wildlife:** Plastic waste in sensitive ecosystems, such as glaciers and river systems, disturbs the natural balance and threatens unique Himalayan flora and fauna.
- **Human Health Risks:** Contaminated water sources pose health risks to local communities and populations downstream who rely on Himalayan rivers for drinking water and agriculture.
- **Long-Term Environmental Impact:** Single-use plastics can persist for hundreds of years, causing prolonged environmental degradation.
    - The presence of plastics even in remote glaciers and high-altitude lakes highlights the extent and persistence of the problem.

Best Case Studies from Himalayan States

- **Sikkim**: First state to ban polystyrene plates and bottled water in offices (2016).
- **Ladakh**: Tourist areas declared plastic-free; refill stations and cloth bags promoted.
- **Nagaland**: Grassroots-led audits promote Extended Producer Responsibility (EPR).
- **Uttarakhand**: Integrated Mountain Initiative advocates mountain-specific waste policies.
- **Darjeeling (WB)**: Municipal plastic-free drives and THC-led school participation.

Way Forward

- **Ban on Multi-Layered Plastics (MLPs):** Immediate and outright ban on **multi-layered plastics**, which are largely non-recyclable and dominant in food packaging waste.
- **Corporate Accountability: Hold food and beverage brands accountable** for the plastic waste they generate through Extended Producer Responsibility (EPR).
- **Mandatory Front-of-Package Labelling (FoPL):** Enforce **clear labelling** on food and beverage products to inform consumers and discourage environmentally harmful consumption.
- **Shift to a 'Design Out Waste' Approach:** Move **beyond recycling** towards designing products that create minimal waste and are easy to reuse, recycle, or compost.
- **Dedicated Waste Management Resources for Mountain Regions:** Equip **rural and mountain local bodies** with **financial, technical, and human resources** for sustainable and location-sensitive waste management.
- **Integrated Policy Framework:** Develop a **robust, mountain-sensitive waste policy** integrating local realities, traditional knowledge, and decentralised solutions.

Source: **The Hindu: Single-use food, beverage packaging forms 84% of Himalayan plastic waste**

Why caste census will not facilitate comprehensive reform of higher education

Context

Despite growing access, India's higher education system remains marred by deep-rooted caste-based disparities. This highlights a demand for a more comprehensive reform than just a caste census.

Persisting Inequalities in Indian Higher Education

- **Underrepresentation in Faculty:** Over 60% of OBC faculty positions in premier institutions remain unfilled as of 2021.
- **Uneven Enrollment:** SC/ST/OBC enrollment remains concentrated in specific states, with vast regional disparities in access.
- **Privatisation Barrier:** 91% of private HEIs remain unaided, restricting access through high fees and wealth-based filtering.
- **Exploitation in Student Work:** Marginalised students often take up underpaid jobs due to lack of financial support, increasing vulnerability.
- **Strategic Caste Invisibility:** Beneficiaries of reservation may selectively invoke or erase caste identity depending on context, hiding ongoing inequalities.
- **Lack of Nuanced Support:** One-size-fits-all reservations fail to distinguish between historically oppressed and those who have overcome systemic barriers.

Why Caste Census Alone Won't Ensure Comprehensive Reform

- **Static Framework — Doesn't Address Evolving Inequities**: The 1931 caste data still underpins current reservations, despite 90+ years of socio-economic shifts. A census may count castes, but won't capture new vulnerabilities like digital exclusion or language-based barriers in online education.
- **Fails to Address Quality of Education:** In many rural or SC/ST-dominated colleges, outdated curricula, lack of faculty, and poor infrastructure persist—issues that caste enumeration cannot fix. A college in Bihar or Jharkhand may have high SC enrollment but dismal learning outcomes.
- **Privatised Sector Exclusion:** With over **29,000 private colleges** filtering students through high tuition, many marginalised students are excluded regardless of their caste. A caste census has **no legal bearing** on these unaided institutions unless followed by regulation.
- **No Resolution to Merit vs Equity Tensions***:* In NEET and JEE admissions, debates over "merit dilution" often overshadow discussions on systemic disadvantage. A caste census might quantify numbers but **won't bridge the social hostility** marginalised students face after admission.
- **Ignores Intersectionality***:* A Dalit woman from a tribal region faces compounded barriers due to caste, gender, and geography. A caste census doesn't factor these intersections, which are critical in deciding scholarship, hostel, and mentorship policies.
- **May Reinforce Binary Quota Politics:** Demands to increase OBC quota to 52% (matching their estimated population) might emerge after a caste census, risking a **numbers game** instead of reforms like **targeted sub-quotas for the most backward** or **economic support within castes**.

Recommendations

- **Establish a Dynamic, Granular Database:** Track education, employment, and institutional performance across socio-economic and caste categories.
- **Reform Reservation Design:** Move from blanket quotas to need-sensitive mechanisms, targeting the most disadvantaged within castes.
- **Include Private HEIs in Equity Mandate:** Create frameworks for social inclusion even in fee-charging private institutions.

- **Mandatory Financial Support Systems:** Ensure state-backed stipends and protections for economically vulnerable students in higher education.
- **Expose Caste Invisibility Tactics:** Design policies that track not just entry through quotas but long-term social outcomes and mobility.
- **Focus on Institutional Reform:** Strengthen governance, pedagogy, and accountability mechanisms in public and private universities alike.

Source: **The Hindu: Why caste census will not facilitate comprehensive reform of higher education**