
Prelims Exam Topics

ALANINE AMINOTRANSFERASE (ALT)

Context

The Ministry of Health and Family Welfare (MoHFW) has advised monitoring Alanine Aminotransferase (ALT) levels for the early detection of liver injury.

About Alanine Aminotransferase (ALT)

- **Definition:** Alanine Aminotransferase (ALT), also known as Serum Glutamic-Pyruvic Transaminase (SGPT), is an enzyme found predominantly in liver cells (hepatocytes), with smaller amounts present in the heart and skeletal muscles.
- **Function:** It catalyses the conversion of alanine to pyruvate, playing a key role in amino acid metabolism and energy production.
- **Clinical Role:** Liver cell damage releases ALT into the bloodstream, making it an early and sensitive biochemical marker of hepatocellular injury.
- **Diagnostic Role:** ALT is measured through a blood test as part of the Liver Function Test (LFT); elevated levels may occur in viral hepatitis, alcohol-related liver disease, Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD), autoimmune hepatitis, and drug-induced liver injury, but may also arise from muscle or cardiac injury.
- **Interpretation:** Normal ALT values do not exclude significant liver disease; patients with MASLD or advanced cirrhosis may have normal or mildly elevated ALT levels, while interpretation depends on clinical context, with lower cut-offs often used in chronic Hepatitis B and C.
- **Early Screening:** Enables early identification of liver injury, facilitating timely diagnosis and intervention before symptoms develop.

KH-101 CRUISE MISSILE

Context

A suspected Russian Kh-101 cruise missile recently landed in eastern Poland, raising security concerns along NATO's eastern flank.

About Kh-101 Cruise Missile

- **Nature:** The **Kh-101** (NATO designation: **AS-23A Kodiak**) is a **Russian air-launched, long-range, subsonic stealth cruise missile**.
- **Developer:** Developed by **Tactical Missile Armament Corporation (KTRV)** in the **late 1990s**.
- **Role:** Designed for **precision strikes** against high-value **ground targets**, including military installations, bunkers, and infrastructure.
- **Performance:** Powered by a **turbofan engine**, it flies at **Mach 0.76**, has a **range of 2,500–3,000 km**, and features a **low radar cross-section** for enhanced stealth.

MOKEN PEOPLE

Context

Scientists have confirmed that **Moken sea nomad children** possess exceptional underwater vision, enabling them to see underwater with nearly **twice the clarity** of other children.

About Moken People

- **Identity:** The **Moken**, also known as **Sea Nomads** or **Sea Gypsies**, are an indigenous seafaring community inhabiting the **Andaman Sea** along the coasts of **Myanmar and Thailand**; their name means "**sea drowned**" in the Moken language.
- **Lifestyle:** They are among the **last remaining sea nomadic communities**, travelling seasonally in traditional wooden boats called **Kabang** and relying on **fishing, free diving, spear hunting, and shellfish collection** for subsistence.
- **Legal Status:** Most Moken remain **stateless**, lacking citizenship in either **Thailand or Myanmar** due to their traditional nomadic lifestyle.

INS NIPUN

Context

INS **NIPUN** was recently delivered to the **Indian Navy** at **Visakhapatnam**.

About INS NIPUN

- **Type:** INS **NIPUN** is a **Diving Support Vessel (DSV)** designed for **deep-sea diving, submarine rescue, and underwater intervention operations**.
- **Developer:** Built by **Hindustan Shipyard Limited (HSL)** in accordance with the **Indian Register of Shipping (IRS)** classification rules.

- **Capabilities:** Equipped with **Deep Sea Saturation Diving**, **dynamic positioning**, **submarine rescue**, and **deep-sea intervention systems**; serves as the **Mother Ship** for the **Deep Submergence Rescue Vessel (DSRV)** to rescue personnel from distressed submarines, with **~75% indigenous content**.

URBAN CHALLENGE FUND (UCF)

Context

The Union Government has approved or accorded **in-principle approval to 33 projects** under the **Urban Challenge Fund (UCF)**.

About Urban Challenge Fund

- **Nature:** The **Urban Challenge Fund (UCF)** is a **Centrally Sponsored Scheme (CSS)** of the **Ministry of Housing and Urban Affairs (MoHUA)** to support **competitive, bankable, and transformative urban infrastructure projects**.
- **Focus Areas:** Supports projects under **Creative Development of Cities, Cities as Growth Hubs, and Water & Sanitation**, while promoting reforms in **urban governance, finance, and planning**.
- **Funding Pattern:** Central assistance is capped at **25%** of project cost, with **at least 50%** mobilised through **market-based financing** (municipal bonds, bank loans, PPPs), while the balance is contributed by **States/UTs, ULBs, or other sources**.
- **Coverage & Credit Guarantee:** Covers **all cities with ≥ 10 lakh population (2025 estimates)**, **all State/UT capitals**, and **industrial cities with ≥ 1 lakh population**; additionally, a **₹5,000 crore Credit Repayment Guarantee Scheme** provides a **Central guarantee of up to ₹7 crore or 70% of the first loan (whichever is lower)** for **ULBs in Northeastern & Hilly States** and other **ULBs with population below 1 lakh**.

NATIONAL GEOSPATIAL KNOWLEDGE-BASED LAND SURVEY OF URBAN HABITATIONS (NAKSHA)

Context

The **Department of Land Resources (DoLR)** is implementing the **NAKSHA** pilot in **Goa** to create accurate digital maps of urban land parcels.

About National Geospatial Knowledge-based Land Survey of Urban Habitations (NAKSHA)

- **Nature:** NAKSHA is a **GIS-based urban land parcel mapping initiative** launched by the **Department of Land Resources (DoLR), Ministry of Rural Development** under the **Digital India Land Records Modernization Programme (DILRMP)**.
- **Objective:** To prepare **high-accuracy digital maps of urban and peri-urban land parcels** for improved urban planning, infrastructure development, and land governance.
- **Coverage:** Implemented across **urban habitations** in multiple **States and Union Territories**, with pilot implementation in selected cities.
- **Legal Status:** The survey **does not alter existing land titles or boundaries**, is **not a land acquisition or taxation exercise**, and **existing ownership disputes continue to be governed by applicable legal processes**.

ARCTIC COUNCIL

Context

A Parliamentary Standing Committee on External Affairs has recommended appointing an **Indian Polar Ambassador** and pursuing **full-fledged membership** in the **Arctic Council**.

About Arctic Council

- **Nature:** The **Arctic Council** is an **intergovernmental forum**, established through the **Ottawa Declaration (1996)**, to promote cooperation on issues concerning the **Arctic region**.
- **Headquarters:** **Tromsø, Norway**
- **Membership:** It comprises **eight Arctic States—Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States—**along with **six Permanent Participants** representing **Arctic Indigenous Peoples**.
- **Observer Status:** Observer status is open to **non-Arctic States** and international organisations; **India** is one of the **13 Observer States**.
- **Observers:** Observer States **do not possess decision-making powers** and cannot independently undertake research or make financial contributions under the Council's framework.
- **Institutional Nature:** The Council is **not a treaty-based international organisation** and functions through **consensus** among member states.
- **Mandate:** It promotes **sustainable development, environmental protection, and scientific cooperation** in the Arctic, while excluding military security matters.

CRETE ISLAND

Context

Thousands of people were recently evacuated as **wildfires** spread across the **Greek island of Crete**, intensified by strong winds.

About Crete Island

- **Location:** Crete is the **largest island of Greece**, located in the **southern Aegean Sea** (part of the **Mediterranean Sea**), about **160 km south of mainland Greece**.
- **Geography:** Covering **8,336 sq. km**, it is the **fifth-largest island in the Mediterranean Sea**, bordered by the **Sea of Crete (north)**, **Libyan Sea (south)**, **Myrtoan Sea (west)**, and **Carpathian Sea (east)**.
- **Historical Importance:** Cradle of the **Minoan Civilization (c. 2700–1420 BCE)**, Europe's earliest advanced civilisation; later ruled by the **Mycenaeans, Romans, Byzantines, Venetians, Ottomans**, and became part of **Greece** after independence from Ottoman rule.
 - **Minoan Civilization:** A **Bronze Age civilisation** centred on **Crete**, regarded as **Europe's earliest advanced civilisation**.
- **Battle of Crete (1941):** A major **Second World War** battle in which **Nazi Germany** captured Crete through a large-scale airborne invasion.



Mains Exam Topics

CLOUDBURSTS

Context

The growing discussion on **cloudbursts** has brought attention to their scientific definition, forecasting challenges, regional vulnerability, and the governance issues that influence disaster impacts.

What makes the Himalayas disproportionately vulnerable to cloudbursts compared to the Western Ghats or Northeast India?

- **Tectonic Fragility:** The Himalayas are young, actively rising fold mountains with fractured rocks, loose debris and unstable slopes. This inherent geological instability makes them highly susceptible to landslides and slope failures even under localized intense rainfall, unlike the ancient, compact rocks of the Western Ghats.
 - **E.g.** The 2021 Chamoli disaster involved failure of fractured Himalayan rock–ice masses, unlike the more stable basaltic terrain of the Western Ghats.
- **Orographic Intensification:** The already-fragile slopes are subjected to highly concentrated rainfall as the Himalayas force rapid uplift of moisture-laden monsoon winds, producing localized, high-intensity cloudbursts. In contrast, the gentler relief of the Western Ghats and the dispersed hill systems of Northeast India generally distribute rainfall over a wider area and longer duration.
 - **E.g.** The 2013 Kedarnath cloudburst delivered exceptionally intense rainfall within a few hours.
- **Cryospheric Coupling:** The concentrated rainfall destabilises glaciers, seasonal snowpack and moraine-dammed lakes, generating glacial lake outburst floods (GLOFs) that substantially increase flood volume beyond rainfall itself.
 - **E.g.** The 2023 South Lhonak GLOF in Sikkim magnified downstream flooding following heavy rainfall.
- **Valley Confinement:** The enlarged flood volume is channelled through narrow, steep Himalayan gorges, preventing lateral spread and sharply increasing flow velocity, erosive force and debris-carrying capacity, unlike the wider floodplains of Northeast India where floodwaters dissipate energy.
 - **E.g.** Flash floods in the Alaknanda gorge attain much higher velocities than comparable flows in the Brahmaputra basin.

- **Anthropogenic Exposure:** The high-energy river corridors contain roads, hydropower projects, tourism infrastructure and settlements, placing people and assets directly in the path of destructive flash floods and converting a natural hazard into a major disaster.
 - **E.g.** Infrastructure development in the Rishiganga valley increased exposure during the 2021 Chamoli flood.

Why are cloudbursts fundamentally harder to forecast than cyclones or monsoon depressions?

- **Spatial Localisation:** Cloudbursts are hyper-localised convective events typically confined to 10–20 sq km, whereas cyclones and monsoon depressions are synoptic-scale systems spanning hundreds of kilometres with organised, trackable circulation.
 - **E.g.** The 2010 Leh cloudburst affected only a few square kilometres, while Cyclone Fani was continuously tracked across the Bay of Bengal.
- **Temporal Compression:** Cloudbursts form and dissipate within an extremely short lifecycle, often in less than an hour, unlike cyclones which develop over several days and can be monitored through successive stages.
 - **E.g.** The 2013 Kedarnath cloudburst reached peak intensity within hours, whereas Cyclone Amphan evolved over nearly a week.
- **Observational Blind Spot:** The brief lifecycle leaves little opportunity for observation systems to capture the event in real time. Sparse Doppler weather radars and rain gauges, especially across mountainous terrain, often miss cloudbursts before they mature, whereas satellites can continuously monitor the broad circulation of cyclones.
- **Model Resolution Failure:** The grid resolutions are too coarse to simulate individual cumulonimbus cells, whereas the large-scale circulation of cyclones and monsoon depressions is well represented.
 - **E.g.** IMD's mesoscale models operate at kilometre-scale grids that capture monsoon depressions but not individual cloudburst cells.
- **Lead Time Collapse:** Only short nowcasts of one to two hours are possible for cloudbursts, unlike cyclones that allow multi-day warnings and evacuations.
 - **E.g.** Cyclone Fani enabled nearly three days of evacuation, whereas cloudburst forecasts generally provide little actionable warning before impact.

How can the misuse of the term "cloudburst" shift attention away from governance failures?

- **Definitional Looseness:** "Cloudburst" has no single standardised threshold in India (varying from over 100 mm/hour to over 100 mm in a short spell), allowing extreme rainfall events of different origins to be labelled under the same term regardless of their actual meteorological cause.
 - **E.g.** The 2021 Uttarakhand flash floods were initially described as a cloudburst, although later analysis pointed to a rock–ice avalanche rather than classic convective rainfall.
- **Naturalisation Framing:** Disasters are portrayed as sudden, unavoidable acts of nature, shifting public attention away from identifiable and manageable risk factors.
 - **E.g.** Characterising the 2013 Kedarnath disaster primarily as a cloudburst overshadowed years of construction on a known flood-prone riverbed.
- **Causal Substitution:** Meteorological explanations often substitute for governance analysis, causing investigations to stop at the rainfall trigger while overlooking unregulated construction, deforestation and poor drainage that converted a natural hazard into a disaster.
 - **E.g.** Reporting on Himachal Pradesh's 2023 floods focused heavily on rainfall intensity, with comparatively limited scrutiny of illegal riverbed construction.
- **Institutional Accountability Evasion:** Institutions responsible for land-use regulation, hazard mapping and infrastructure approvals escape meaningful scrutiny, as natural disasters are perceived to have no administrative authors.
 - **E.g.** Agencies approving infrastructure in the Rishiganga valley faced limited direct accountability as attention centred on the cloudburst narrative.
- **Policy Stagnation:** Weak institutional accountability reduces the urgency for reforms, allowing gaps in land-use planning, building regulations and early-warning systems to persist across successive disasters.
 - **E.g.** Despite repeated Himalayan flash floods since 2013, enforcement of hazard-zone construction restrictions has remained weak, contributing to recurring losses in 2021 and 2023.

Way forward:

- **Strengthen Early Warning Systems:** India should strengthen real-time cloudburst detection through denser Doppler weather radar networks and satellite-linked nowcasting systems, as cloudbursts evolve within minutes and require the maximum technically feasible warning lead time.

- **E.g.** Himachal Pradesh's automated rain-gauge network has enabled localized flash-flood alerts, reducing response time compared to manual reporting.
- **Build Community Preparedness:** India should institutionalise community preparedness through regular awareness programmes, evacuation drills and clear response protocols, ensuring alerts translate into timely movement to safe locations.
 - **E.g.** Post-2013 disaster preparedness drills along Uttarakhand's Char Dham route have improved evacuation during subsequent flash-flood warnings.
- **Reduce Land-Use Exposure:** India should minimise permanent exposure by enforcing hazard-zone regulations, scientific land-use planning and relocation of highly vulnerable settlements, as evacuation alone cannot eliminate risk in high-velocity flood corridors.
 - **E.g.** National Green Tribunal restrictions on construction along the Ganga floodplain seek to prevent unsafe development in flood-prone areas.
- **Expand Structural and Ecological Buffers:** India should expand both structural and ecosystem-based mitigation measures, including stormwater drainage, retention structures, afforestation and watershed treatment to reduce runoff, stabilise slopes and moderate flood intensity.
 - **E.g.** Watershed treatment under the Integrated Watershed Management Programme combines check dams with afforestation to moderate peak runoff in Himalayan catchments.
- **Deepen Transboundary Basin Cooperation:** India should deepen transboundary river-basin cooperation through hydrological data sharing, coordinated forecasting and basin-level management, as downstream flood risk continues to depend on upstream river conditions beyond national borders.
 - **E.g.** India's flood forecasting cooperation with Nepal and Bhutan enables upstream rainfall information to strengthen downstream warnings.