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WHAT IS THE CENTRAL GROUND WATER BOARD (CGWB)?



- It is a **multidisciplinary scientific organization** of the **Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti, Government of India.**
- It is the **National Apex Agency** entrusted with the responsibilities of **providing scientific inputs** for **management, exploration, monitoring, assessment, augmentation, and regulation of groundwater resources** of the country.
- It was established in 1970 by **renaming the Exploratory Tube wells Organization** under the **Ministry of Agriculture, Government of India.**
- It was **merged with the Ground Water Wing of the Geological Survey of India** during 1972.
- **Mandate: Develop and disseminate technologies** and monitor and **implement national policies** for the scientific and sustainable **development and management** of India's **groundwater resources.**

Organization Setup:

- It is **headed** by the **Chairman** and has five members.
 - CGWB is a multidisciplinary scientific organization **consisting of Hydrogeologists, Geophysicists, Chemists, Hydrologists, Hydrometeorologists, and Engineers.**
 - It has **four main wings**, namely
 - Sustainable Management & Liaison (SML)
 - Survey, Assessment & Monitoring (SAM)
 - Exploratory Drilling & Materials Management (ED&MM)
 - Water Quality & Training and Technology Transfer (WQ&TT).
 - **Headquarters: Bhujal Bhawan, Faridabad, Haryana.**
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WHAT IS OSTEOARTHRITIS?



- Arthritis is a general term that means **inflammation of the joints.**
- **Osteoarthritis (OA)**, commonly known as **wear-and-tear arthritis**, is the **most common type of arthritis.**
- **What Causes OA?**
 - It is associated with a **breakdown of cartilage in joints.**
 - **Cartilage** is a **firm, rubbery material** that **covers the ends of bones** in normal joints. Its main **function** is to **reduce friction in the joints** and serve as a "**shock absorber.**"
 - **Osteoarthritis** causes the **cartilage** in a joint to **become stiff** and **lose its elasticity**, making it more **susceptible to damage.**
 - As the cartilage deteriorates, **tendons and ligaments stretch**, causing **pain.**
 - If the condition worsens, the **bones could rub against each other.**
- It **commonly occurs in the weight-bearing joints** of the **hips, knees, and spine.**
- It **also affects the fingers, thumbs, neck, and large toe.**
- It usually **does not affect other joints unless previous injury**, excessive stress, or an underlying disorder of cartilage is involved.
- It is more **likely to develop as people age.** But it can affect much younger people, too, especially those who have had a prior joint injury.

Treatment:

- Although there is **no cure** for osteoarthritis, there are many **treatment options** available to help **manage pain** and keep people active.
 - As a **last resort**, a **damaged joint may be surgically fused or replaced** with one made of a combination of metal, plastic, and/or ceramic.
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WHAT ARE BHAIRAV BATTALIONS?



- They are a **new class of compact, high-tech combat units of the Indian Army.**
 - **Each battalion** comprises personnel from **infantry, artillery, air defence, signals, and other combat support arms.**
 - They are specially equipped for **swift, surprise, and high-impact operations** in diverse combat environments.
 - **Unlike Para Special Forces**, which handle strategic missions deep inside enemy territory, **Bhairav Battalions** are **positioned closer to the border.**
 - Their job is to **handle tactical, fast-breaking situations, the kind that require immediate response** rather than detailed planning.
 - In the Army's own words, Bhairav units are **built to "fight tonight"**, meaning they must be **ready to move at short notice, often without waiting for larger formations.**
 - The Bhairav units will act as a **bridge between Special Forces and regular infantry**, aimed at freeing up Special Forces for more critical assignments.
 - The battalions are being **placed under corps and division-level formations**, especially in **sectors considered sensitive, Rajasthan, Jammu, Ladakh, and the Northeast.**
 - Their structure allows them to be deployed for **multi-domain tasks**, a mix of ground action, drone operations, and electronic support.
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WHAT IS A CONTEXT WINDOW IN AI?



- The **Context Window** of an **Artificial Intelligence (AI)** model measures how much information the AI model can **remember, working similarly to humans' short-term memory.**
 - AI models don't read words; instead, they **read chunks of characters called tokens.**
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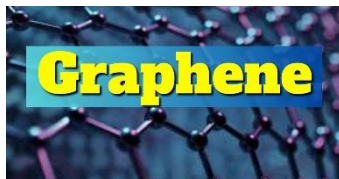


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- **Context Window** is the amount of text, in tokens, that the model can consider or “remember” at any one time.
- A larger context window enables an AI model to process longer inputs and incorporate a greater amount of information into each output.
- A Large Language Model’s (LLM’s) context window can be thought of as the equivalent of its working memory.
- It determines how long of a conversation it can carry out without forgetting details from earlier in the exchange.
- It also determines the **maximum size of documents or code samples that it can process at once.**
- **When a prompt, conversation, document, or code base exceeds an AI model’s context window, it must be truncated or summarized** for the model to proceed.
- Generally speaking, **increasing an LLM’s context window size translates to increased accuracy, fewer hallucinations, more coherent model responses, longer conversations** and an improved ability to analyze longer sequences of data.
- However, **increasing context length** is not without tradeoffs: it often entails **increased computational power requirements**—and therefore **increased costs**—and a potential **increase in vulnerability to adversarial attacks.**

GRAPHENE



- It is an **allotrope of carbon**, along with diamond and graphite. It is a **two-dimensional material** consisting of a single layer of carbon atoms arranged in a **honeycomb structure.**
- The stacked form of **graphene is graphite.**
- Graphene was first isolated in 2004.
- **Applications:** Graphene has found hundreds of innovative applications, from **sensors and electronics to energy storage and healthcare.**



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- **Properties of Graphene**
 - **Thickness:** Graphene is the **world's thinnest material** – it is only one atom thick, one million times thinner than a human hair.
 - **Strength:** It is stronger than steel.
 - **Flexibility:** It is extremely flexible and stretchable.
 - **Conductivity:** It is an excellent electrical and thermal conductor.
 - **Transparency:** It is almost perfectly transparent.
 - It is impermeable to gases, even those as light as hydrogen or helium.

PRADHAN MANTRI-RASHTRIYA KRISHI VIKAS YOJANA



- It is a **Centrally Sponsored Scheme (CSS)** operating under **Ministry of Agriculture and Farmers Welfare**.
- It is aimed at **accelerating agricultural growth** and improving farmers' income.
- **Objectives of Pradhan Mantri Rashtriya Krishi Vikas Yojana:**
 - To encourage States to increase public investment in agriculture and allied sectors.
 - To enhance **agricultural productivity** and overall farm growth.
 - To strengthen **agricultural and post-harvest infrastructure** and reduce losses.
 - To promote diversification into high-value crops, horticulture, livestock, and fisheries.
 - To encourage adoption of modern, innovative, and climate-resilient farming practices.
 - To reduce regional disparities in agricultural development.
- **Features of Pradhan Mantri Rashtriya Krishi Vikas Yojana:**
 - **State-Led and Decentralized Approach:** States have the **flexibility to plan** and implement agricultural projects according to local priorities.

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- **Growth-Oriented Scheme:** The scheme aims to achieve a sustained annual growth rate of around 4 percent in **agriculture and allied sectors**.
- **Wide Sectoral Coverage:** It supports crop production, horticulture, livestock, fisheries, organic farming, agricultural research, and marketing infrastructure.
- **Incentive-Based Funding:** States receive financial assistance based on their commitment to increasing public investment in agriculture.
- **Funding Pattern of Pradhan Mantri Rashtriya Krishi Vikas Yojana:**
 - **General States:** 60 percent Centre and 40 percent State
 - **North-Eastern and Hilly States:** 90 percent Centre and 10 percent State
 - **Union Territories:** 100 percent central funding.

INTERNATIONAL RENEWABLE ENERGY AGENCY



- It is an **intergovernmental organisation** that was **founded in 2009** to support countries in their transition to a **sustainable energy future**.
- It serves as the **principal platform for international cooperation**, a centre of excellence, and a repository of policy, technology, resource and **financial knowledge on renewable energy**.
- **Member countries:** It has **170 Members (169 States and the European Union)**. **India** is also one of the **founder members of IRENA**.
- **Governance of International Renewable Energy Agency:**
 - **Assembly:** It is IRENA's ultimate decision-making authority, made up of **one representative from each Member**.
 - **Council:** It is composed of **21 Member States elected for a two-year term** and is accountable to the Assembly.
 - **Council members serve on a rotating basis** to ensure the effective participation of both developing and developed countries and a fair and equitable geographical distribution.

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- **Secretariat:** It comprises the **Director-General and his staff**, provides administrative and technical support to the Assembly, the Council and their subsidiary bodies.
 - Its **head quarter** is in **Abu Dhabi United Arab Emirates**.
 - It is an official **United Nations observer**.
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BATTLING THE FOG: HOW TRAINS AND FLIGHTS MANAGE WINTER DISRUPTIONS

- Northern India is mainly affected by **radiation fog**, which forms on clear winter nights when the ground cools rapidly, moisture condenses, and calm winds trap the fog near the surface. This leads to frequent episodes of extremely low visibility that disrupt train and flight operations.
- **Air pollution** worsens the problem. Smog mixes with fog, making it denser, lowering it closer to ground level, and prolonging poor visibility even after sunrise.
- High pollution levels, especially around Delhi, have increasingly intensified and extended fog-related disruptions over the years.

How Flights Operate in Low-Visibility Conditions?

- **Low Visibility Procedures (LVP)** - When dense fog sharply reduces visibility, airports activate Low Visibility Procedures. These include Low Visibility Take-Offs and precision landings using advanced navigation aids.
- **Instrument Landing System (ILS) CAT IIIB** – ILS, a ground based radio navigation system, provides pilots with accurate horizontal and vertical guidance during landing. CAT IIIB, one of the highest precision categories, allows landings with visibility as low as 50 metres.
- **Limited Airport and Aircraft Capability** - Only select Indian airports, most notably Delhi, are equipped for CAT IIIB operations.
 - Airports without such systems must resort to delays or cancellations during heavy fog.

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- Aircraft and flight crew also require specific certification to operate under CAT IIIB conditions.
- **Airline Preparedness** - Airlines plan rosters to ensure enough CAT IIIB-trained pilots and crew are available at fog-prone airports. They also position CAT IIIB-certified aircraft at these hubs to reduce disruption.
- **Forecasting and Regulation** - The aviation regulator has designated December 10 to February 10 as the official fog season. Airlines and airports rely on real-time weather data, predictive analytics, and AI-based tools to anticipate fog and manage operations more efficiently.

How Indian Railways Manages Train Operations During Fog?

- Dense winter fog in northern India causes severe train delays, sometimes exceeding 12 hours.
- Safety concerns make fog management a critical operational priority for Indian Railways.
- **Fog Safety Devices for Loco Pilots**
 - Indian Railways uses Fog Safety Devices (FSDs)—GPS-based handheld tools that give audio-visual alerts to drivers about signals, stations, crossings, and obstacles in geo-fenced areas.
 - In December 2025, 25,939 FSDs were deployed, with around 23% allocated to Northern Railway, the most fog-prone zone.
- **Modified Signalling to Reduce Risk**
 - To prevent congestion and accidents during fog, Northern and North Central Railways use modified automatic signalling, limiting train movement to two trains between stations. Luminous strips on signals improve visibility.
- **Kavach: Automatic Train Protection System**
 - Indian Railways is rolling out Kavach, its Automatic Train Protection (ATP) system, which displays signal information inside the locomotive cabin and automatically applies brakes if needed.
 - This allows safer operations even in dense fog.

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REIMAGINING DELIMITATION

Delimitation Challenge: Possible Solutions for Southern States

- The **84th Constitutional Amendment** (2001) froze Lok Sabha seat redistribution until after the **first Census post-2026**, to reward States that successfully implemented family planning.
 - With the delayed Census now expected by 2028 and delimitation before the 2029 elections, southern States face the risk of losing political influence as population-heavy northern States gain more seats.
 - **Proposed Solutions to Ensure Fair Representation**
 - **Expand Lok Sabha Without Redistributing Seats** - Increase the total number of Lok Sabha seats while retaining the 2011 Census-based distribution. This avoids seat losses for any State but still favours States with higher population growth.
 - **Balance Power Through Rajya Sabha Reform** - Increase Lok Sabha seats and give equal representation to all States in the Rajya Sabha, similar to the U.S. Senate model. This would strengthen federal balance but is politically contentious.
 - **Strengthen State-Level Representation** - Expand Vidhan Sabha seats to equalise population-to-representative ratios across States, improving governance at the State level while keeping the Lok Sabha unchanged.
 - **Mixed Formula for Lok Sabha Allocation** - Allocate 60% of Lok Sabha seats based on population and 40% based on population-control performance. Inspired by the EU's degressive proportionality model, this rewards demographic responsibility while preserving fairness.
 - A united southern position, especially around the mixed formula approach, could provide a fair compromise—balancing population size with demographic performance and preventing political marginalisation.
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