

CYCLONE REMAL AND ITS LANDFALL

Why in news? Cyclonic storm “Remal”, originating in the central Bay of Bengal, is expected to escalate into a **severe cyclonic storm** by May 25. As per the IMD, the cyclone is expected to make landfall between Sagar Island in West Bengal and Khepupara in Bangladesh around the midnight of May 26.

Cyclone

- A cyclone is a large-scale system of air that rotates around the centre of a low-pressure area. It is usually accompanied by violent storms and bad weather.
- It is characterised by inward spiralling winds that rotate anticlockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.
- **Characteristics of a Tropical Cyclone:**
 - The **centre of a cyclone is very calm and clear with very low air pressure**. The average speed is **120 kmph**.
 - They develop over oceans and sea only. They are seasonal in nature.
 - They move from east to west under the influence of trade winds.
- **Classification of cyclones**
 - Cyclones are classified **on the basis of wind speed** by the Indian Meteorological Department (IMD):
 - **Depression:** Wind speeds of between 31–49 km/h
 - **Deep Depression:** Between 50-61 km/h
 - **Cyclonic Storm:** Between 62–88 km/h
 - **Severe Cyclonic Storm:** Between 89-117 Km/h
 - **Very Severe Cyclonic Storm:** Between 118-166 Km/h
 - **Extremely Severe Cyclonic Storm:** Between 167-221 Km/h
 - **Super Cyclonic Storm:** Above 222 Km/h

Landfall of a cyclone

- Landfall is the event of a tropical cyclone coming onto land after being over water.

- As per the IMD, a tropical cyclone is said to have made a landfall when the **center** of the storm – or its **eye** – moves over the coast.
 - The "eye" of a cyclone is a region of relatively calm weather found at the center of the storm.
 - It is a circular or oval-shaped area characterized by light winds, clear or partly cloudy skies, and decreased precipitation.
 - Within the eye, winds are light and variable, often with clear or only partially cloudy skies.
 - The size of the eye can vary significantly, ranging from a few kilometers to over 50 kilometers (30 miles) in diameter in larger cyclones.
- During landfall, the outer bands of the storm may have already reached the coast, bringing strong winds, heavy rain, and storm surge.
 - A landfall should not be confused with a ‘direct hit’, which refers to a situation where the core of high winds (or eyewall) comes onshore but the centre of the storm may stay remain offshore.

Cyclone management – Steps taken by India

- **National Cyclone Risk Mitigation Project (NCRMP):**
 - It focuses on capacity building, early warning systems, cyclone shelters, evacuation planning, and community awareness.
- **IMD’s Colour Coding of Cyclones:** Four colours - Green, Yellow, Orange, and Red – are used by IMD to make people aware about the severity of cyclones.
- **Integrated Coastal Zone Management (ICZM) Project**
- **Coastal Regulation Zones (CRZ)**
- **Other general steps taken:**
 - National Disaster Response Force (NDRF)
 - National Disaster Management Plan (NDMP)
 - National Institute of Disaster Management (NIDM)
 - State Disaster Management Authorities (SDMAs)

AI AGENTS

- AI agents are advanced systems capable of real-time interactions using text, voice, and images.
- Unlike traditional models that only handle text, AI agents can process diverse inputs from their surroundings and respond accordingly.
- AI agents are nimble when it comes to adapting to new situations. This facet makes them incredibly versatile and capable of handling a wide range of situations.
- Currently, they are used in fields such as gaming, robotics, virtual assistants, autonomous vehicles, etc.
- **Potential uses of AI agents**
 - **Intelligent Assistants**
 - AI agents can serve as intelligent and highly capable assistants, handling tasks like offering personalized recommendations and scheduling appointments.
 - **Education and Training**
 - AI agents can act as personal tutors, customizing themselves based on a student's learning style and offering tailored instructions.
 - **Healthcare Support**
 - AI agents can assist medical professionals by providing real-time analysis, diagnostic support, and patient monitoring.
- **Risks and challenges**
 - Privacy and security are a key area of concern as AI agents gain access to more personal data and environmental information.
 - Just like any AI model, AI agents can carry forward biases from their training data or algorithms, leading to harmful outcomes.

Large Language Models (LLMs)

- LLMs use deep learning techniques to process large amounts of text.
- They work by processing vast amounts of text, understanding the structure and meaning, and learning from it.
- LLMs are trained to identify meanings and relationships between words.
- The greater the amount of training data a model is fed, the smarter it gets at understanding and producing text.
 - The training data is usually large datasets, such as Wikipedia, OpenWebText, and the Common Crawl Corpus.

LLMs Vs. AI Agents

- **Enhanced Interactions**
 - While LLMs like GPT-3 and GPT-4 generate human-like text, AI agents enhance interactions using voice, vision, and environmental sensors, making them more natural and immersive.
- **Real-Time Conversations**
 - Unlike LLMs, AI agents are designed for instantaneous, real-time conversations with responses much similar to humans.
- **Contextual Understanding**
 - AI agents understand and learn from the context of interactions, providing more relevant and personalized responses compared to LLMs.
- **Autonomous Capabilities**
 - Unlike LLMs, AI agents can perform complex tasks autonomously, such as coding and data analysis.
 - When integrated with robotic systems, they can even perform physical actions.

WHAT IS ASTROSAT MISSION?



A team of Indian astrophysicists has used observations from AstroSat to discover the aperiodic modulation of high-energy X-ray photons in Swift J1727.8-1613, a black hole binary source.

- It is the **first dedicated Indian astronomy mission** aimed at studying celestial sources in the X-ray, optical and UV spectral bands simultaneously.
- AstroSat, with a lift-off mass of 1515 kg, was launched on September 28, 2015, into a 650 km orbit by PSLV-C30 from Satish Dhawan Space Centre, Sriharikota.
- AstroSat carries a total of five scientific payloads enabling imaging, studying the temporal and spectral properties of galactic and extra- galactic cosmic sources in a wide range of wavelengths on a common platform.
- One of the unique features of AstroSat mission is that it enables **simultaneous multi-wavelength observations of** various astronomical objects with a single satellite.
- The spacecraft control centre at Mission Operations Complex (MOX) of ISRO **Telemetry, Tracking and Command Network (ISTRAC)**, Bengaluru, manages the satellite during its entire mission life.
- The main **scientific objectives** of AstroSat mission are:
 - To understand the high energy processes in **interacting binary systems** with a compact object accreting matter from a companion star.
 - Study **star birth regions** and high-energy processes in star systems lying beyond our galaxy.
 - Detect new transient X-ray sources in the sky.
 - Perform a limited deep-field survey of the Universe in the Ultraviolet region.

What is the Black Hole X-ray Binary?

- It is an **interaction between a black hole**, a super-dense object with gravity so strong that even light cannot escape, and a normal star, much like our own Sun.
- These two are locked in a gravitational embrace, orbiting each other.
- The black hole, being the heavier partner, exerts a powerful pull on the normal star, literally sucking matter away from it.
- This stolen matter does not fall straight into the black hole, but, instead, forms a swirling disk around it, like water swirling down a drain.

- As this disk spins faster and faster, it gets incredibly hot, reaching millions of degrees.
 - This intense heat causes the matter to glow brightly, **emitting powerful X-rays** that we can detect here on Earth with our telescopes.
 - These **X-ray binaries** are a reminder that, even though black holes are often thought of as dark and mysterious, they can create spectacular displays of light and energy, revealing their presence across vast distances.
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WHAT IS THYROID?



World Thyroid Day is observed annually on May 25th to raise awareness about the thyroid gland and the various conditions that affect it.

- The thyroid is a small, **butterfly-shaped gland** located at the base of the neck, just below the Adam's apple.
- It's a part of your **endocrine system** and controls many of your body's important functions by producing and releasing thyroid hormones, like **thyroxine (T4) and triiodothyronine (T3)**.
 - These hormones affect every cell in the body.
 - They support the rate at which the body uses fats and carbohydrates.
 - They help control body temperature.
 - They have an effect on heart rate.
 - They help control how much protein the body makes.

What is Thyroid Disease?

- It is a general term for a medical condition that keeps your thyroid **from making the right amount of hormones**.
- Thyroid disorders are very common and **mainly occur in women**, although anybody-men, teenagers, children, and babies, too, can be affected.
- The **two main types** of thyroid disease are

- **Hypothyroidism (underactive thyroid):** Not enough thyroxine is produced for the body's needs. This is the most common thyroid disorder.
- **Hyperthyroidism (overactive thyroid):** Too much thyroxine is produced for the body's needs.
- **What causes a thyroid disorder?**
 - There are many causes of the different thyroid disorders.
 - Most commonly the cause is due to **autoimmune thyroid disease**. This is a process in which the body's immune system attacks the **thyroid cells** as though they were foreign cells.
 - In response, the thyroid gland becomes **underactive** (hypothyroidism) or **overactive** (hyperthyroidism).
 - The autoimmune form of hypothyroidism is called Hashimoto's thyroiditis. The autoimmune form of hyperthyroidism is called **Graves' disease**.
- **Symptoms:**
 - **Hypothyroidism:** tiredness, feeling cold, weight gain, poor concentration and depression.
 - **Hyperthyroidism:** weight loss, heat intolerance, anxiety, and, sometimes, sore and gritty eyes.
- **Treatment:** Thyroid disorder and many of its symptoms can be treated. Most thyroid disorders are **treated with daily medication**.

WHAT IS NATIONAL COMPANY LAW TRIBUNAL (NCLT)?



The National Company Law Tribunal (NCLT) has reportedly issued notices to Think and Learn Pvt. Ltd. (TLPL), Byju's parent company, in three cases of alleged non-payment of dues to operational creditors.

- It is a **quasi-judicial body** established under the **Companies Act, 2013** and was constituted on June 1, 2016, by the Government of India.

- **Committee:** The NCLT was formed based on the recommendation of the **Balakrishna Eradi committee** on law relating to the insolvency and winding up of companies.
- **Functions:**
 - It was incorporated for resolving the **civil corporate disputes** arising under the **Companies Act, 2013**.
 - It is empowered to hear and decide on cases related to **mergers and acquisitions**, oppression and mismanagement, the winding up of companies, and other matters related to corporate law.
 - It is also an **adjudicating authority** for the Insolvency resolution process of companies and Limited Liability Partnerships under the **Insolvency and Bankruptcy Code (IBC), 2016**.
- The **establishment of NCLT consolidates the corporate jurisdiction of the following** authorities:
 - Company Law Board (CLB)
 - Board of Industrial and Financial Reconstruction (BIFR)
 - Appellate Authority for Industrial and Financial Reconstruction
 - All the powers relating to the winding up of a Company
 - All other provisions vested in High Courts.
- **Composition:** The NCLT shall consist of a **President** and such number of Judicial and Technical Members as may be required.
- **Principal Bench: New Delhi**
- **Powers:**
 - It is not limited or bound by the rules laid down in the Code of Civil Procedure and is **guided by the principles of natural justice**, subject to the other provisions of this Act and any rules that are made by the Central Government.
 - The NCLT **can enforce any order** that it gives in the same manner as a court would enforce it.
 - It has the power to scrutinize its own orders.
 - It has the power to regulate their own procedure.

FOOD IRRADIATION

The Union government is planning to significantly scale up the irradiation of onions this financial year to increase the shelf life of its buffer stock.



About Food Irradiation:

- It is a technology that **improves the safety and extends the shelf life** of foods by reducing or eliminating microorganisms and insects.
- **Sources used for irradiation:** Gamma rays, X-rays and electron beam.
- Irradiation can serve many purposes:
 - **Prevention of Foodborne Illness:** To effectively eliminate organisms that cause foodborne illness, such as Salmonella and Escherichia coli (E. coli). These bacteria make millions of people sick and send thousands of people to the hospital each year.
 - **Preservation:** To destroy germs that cause spoilage and decomposition and extend the shelf life of foods.
 - **Control of Insects:** To destroy insects in or on tropical fruits imported into the United States. Irradiation also decreases the need for other pest-control practices that may harm the fruit.
 - **Delay of Sprouting and Ripening:** To inhibit sprouting (e.g., potatoes) and delay ripening of fruit to increase longevity.
 - **Sterilization:** Irradiation can be used to sterilize foods, which can then be stored for years without refrigeration. Sterilized foods are useful in hospitals for patients with severely impaired immune systems.