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Time: 45 Min

Date: 07-07-2026

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REIMAGINING URBAN INFRASTRUCTURE FOR FLOOD RESILIENCE

Context

- The heavy rainfall in Mumbai has once again exposed the vulnerability of Indian cities to urban flooding, highlighting the need to redesign urban infrastructure to absorb rainwater in a climate-resilient manner.

What is Urban Flooding?

- Urban flooding is defined as a **frequent phenomenon** in urban areas where water runoff from impermeable surfaces, such as concrete structures, leads to flooding, particularly during prolonged rainfall.
- This type of flooding is exacerbated by rapid urban development, poor flood management, and encroachment onto flood-prone areas.

Why Are Indian Cities Vulnerable to Urban Flooding?

- **Disrupted Hydrological Systems:** The urban expansion has disrupted natural hydrological networks like rivers, creeks, wetlands, lakes, salt pans, and floodplains that traditionally absorbed rainwater.
- **Loss of Permeable Surfaces:** The replacement of open spaces and soil with concrete roads, pavements, and buildings has reduced groundwater recharge and increased surface runoff.
- **Drainage Systems:** Many Indian cities are dependent on conventional storm-water drainage systems that are inadequate to handle short-duration but high-intensity rainfall events associated with climate change.
 - ♦ **In Mumbai,** the drainage network largely relies on gravity to discharge water into the sea.
- **Climate Change:** Rising global temperatures have increased the frequency and intensity of **extreme rainfall events**, making urban flooding more frequent even in cities with improved drainage infrastructure.

Solutions to Mitigate Urban Flooding

- Upgrading and maintaining stormwater drainage infrastructure.
- Protecting and restoring wetlands, lakes, and natural waterways.
- Promoting green infrastructure: rain gardens, green roofs, permeable pavements.

- Implementing urban planning policies to prevent construction on flood-prone areas.
- Rainwater harvesting and better solid waste management.

Steps taken by India

- **Swachh Bharat Mission (Urban):** While primarily focused on sanitation, this mission also emphasizes solid waste management and pollution control, which contribute to preventing waterlogging and flooding.
- **National Smart Cities Mission:** It promotes the measures to manage urban flooding through rainwater harvesting, green spaces and proper drainage system.
- **Atal Mission for Rejuvenation and Urban Transformation (AMRUT):** The Mission focuses on development of basic infrastructure, in the cities and towns, in the sectors of water supply; sewerage and septage management; storm water drainage.
- **Guidelines and Regulations:** The government has issued guidelines for sustainable urban development, encouraging the incorporation of features like permeable pavements, green roofs, and retention ponds to enhance water absorption.
- **The Ministry of Housing & Urban Affairs (MoHUA)** has formulated **Model Building Bye Laws (MBBL), 2016** for the States/UTs.
 - ♦ As per MBBL, all buildings having a plot size of **100 sq.m.** or more shall mandatorily include the complete proposal of rainwater harvesting.
- **The National Water Policy (2012)** advocates that the conservation of rivers, river corridors, water bodies and infrastructure should be undertaken in a scientifically planned manner through community participation.
- **Jal Shakti Abhiyan:** It aims to harvest the monsoon rainfall through creation of artificial recharge structures, watershed management, recharge and reuse structures, intensive afforestation and awareness generation.
- **MoHUA has issued Standard Operating Procedures (SoPs)** on Urban Flooding in 2017 and published manual on **Storm Water Drainage Systems, 2019** to assist the States/ Union Territories (UTs), Urban Local Bodies (ULBs) and other stakeholders

Global Best Practices Related to Mitigating Urban Flooding

- **China's Sponge City Policy:** Following the devastating **Beijing floods of 2012**, China adopted the Sponge City approach to improve the water retention capacity of urban areas.
- **The Netherlands' Blue-Green Infrastructure:** It is an integrated network of natural and engineered systems that manage rainwater while improving urban resilience and environmental quality.
- **Singapore**, a global leader in **managing urban flooding despite its high rainfall and dense urban environment**.

What are 'sponge cities'?

- The term "sponge cities" is used to describe **urban areas with abundant natural areas such as trees, lakes and parks** or other good design intended to absorb rain and prevent flooding.
- It is designed to make greater use of lower-impact "nature-based solutions" to better distribute water and improve drainage and storage.
- It includes the use of **permeable asphalt, the construction of new canals and ponds** and also the **restoration of wetlands**, which would not only ease waterlogging, but also improve the urban environment.

Challenges Before Indian Cities

- **Continued encroachment** upon wetlands, lakes, and floodplains.
- **Unplanned urbanisation** and extensive concretisation.
- **Limited adoption** of nature-based solutions in urban planning.
- **Fragmented institutional responsibilities** for water and land management.

Way Ahead

- Integrating natural ecosystems with urban planning is necessary for a sustainable and climate-resilient approach to flood management.
- Combine engineering solutions, smart planning, real-time tech, and community involvement to build flood-resilient cities will mitigate the concern of Urban Flooding in India.

Source: IE

EL NIÑO MAY RESHAPE INDIA'S POWER PLANNING

Context

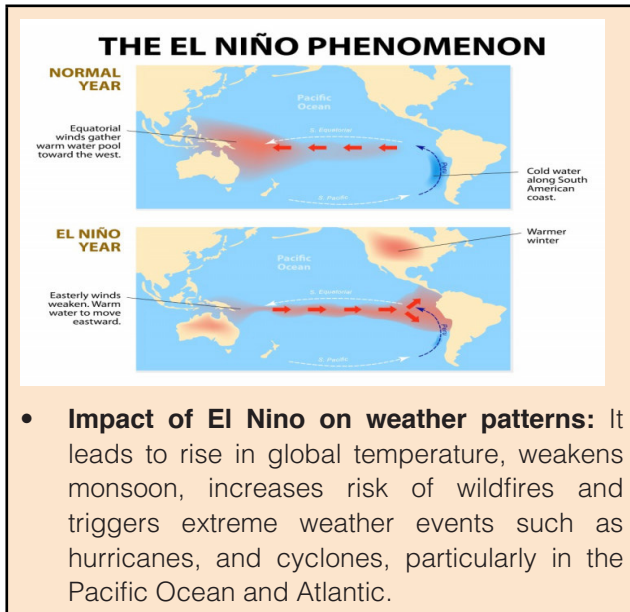
- **As per the Centre for Research on Energy and Clean Air (CREA) India's power system stands to be strained more** by the **developing El Niño** than that of any other country.

Major Highlights

- **El Nino Conditions:** The **India Meteorological Department (IMD)** confirmed that **El Niño conditions had emerged over the equatorial Pacific** and were expected to strengthen through the monsoon.
 - ♦ It has forecast below-normal southwest monsoon rainfall at 90% of the long-period average, with a 60% chance of a deficient season.
- **Rise in Power Generation Gap:** CREA projects that **weaker wind and hydropower output**, combined with **rising demand for air conditioning**, could open a **generation gap of nearly 18 TWh (terawatt-hour)** over a period of one year to June 2027.
- **Coal Fired Plants:** The gap would most likely be filled by coal-fired power plants, resulting in an **estimated 17 million tonnes of additional carbon dioxide emissions**.
- **Solar Remains Stable:** Unlike hydropower and wind, **solar generation is expected to remain largely stable** during El Niño conditions, reinforcing its growing role in India's energy transition.
- **Vulnerability Due to Weather:** The findings suggested that **India's power system is becoming increasingly vulnerable to weather driven demand shocks** rather than only fluctuations in renewable energy output.

El Nino

- El Niño means **Little Boy** in Spanish. It is a climate phenomenon characterized by the periodic warming of sea surface temperatures in the central and eastern equatorial Pacific Ocean.
 - ♦ During El Niño, **trade winds weaken**.
 - ♦ Warm water is pushed back east, toward the west coast of the Americas and as a result **cold water is pushed towards Asia**.



- **Impact of El Nino on weather patterns:** It leads to rise in global temperature, weakens monsoon, increases risk of wildfires and triggers extreme weather events such as hurricanes, and cyclones, particularly in the Pacific Ocean and Atlantic.

Electricity Generation Capacity of India

- In 2025, **total electricity generation increased by 1%**, **coal generated electricity declined by 4%** and renewable electricity generation grew by 22%.
 - ♦ As of March 2026, **non-fossil installed capacity** reached 283.46 GW — 150.26 GW of solar, 56.09 GW of wind, 51.41 GW of large hydro and 8.78 GW of nuclear.
 - ♦ 44.6 GW of solar and 6 GW of wind were added in 2025-26.
 - ♦ **Coal remains the largest single source of power**, at about 42% of installed capacity, though coal generation fell 3.69% over the year.
- Grid operators **curtailed around 2.1 TWh of solar and wind generation** last year to keep coal fired plants operating because of **limited system flexibility**.
 - ♦ Deploying just 10 gigawatt hours (GWh) of **battery storage could have absorbed that surplus renewable electricity** and shifted it to evening peak demand, reducing reliance on coal.
- It is desirable that India must move much **faster on batteries and grid upgrades** so that clean energy can meet future demand surges.

Energy Storage

- **Energy storage** refers to systems that can **store excess renewable electricity during periods of high generation** and discharge it when demand rises but power generation remains low.

- Energy storage systems **convert electricity** from renewable sources such as solar and wind, when it is available, **into forms that can be stored**.
- Later, it converts these **back into electricity** when need arises.

Types of Energy Storage

- **Pumped hydro storage (PHS)** uses **surplus electricity to pump water** from a lower reservoir to a higher one. When electricity demand peaks, it releases the stored water downhill through turbines to generate power.
- **Battery Energy Storage Systems (BESS) technology** stores **electricity chemically** and discharges it when needed.
 - ♦ **Lithium-ion batteries**, particularly lithium iron phosphate (LFP) batteries, are currently the dominant technology for grid-scale storage because of their falling costs, high efficiency and long operational life.
- **Concentrating solar-thermal storage systems:** This technology uses mirrors that capture and focus sunlight onto a receiver.
 - ♦ As the receiver gets heated, materials such as molten salt are circulated inside the receiver to store the heat.
- **Compressed-air energy storage systems** use excess electricity to compress air and store it in underground caverns or tanks.
- **Flywheel energy storage systems** store electricity as rotational energy by spinning a rotor at extremely high speeds.
- **Gravity energy storage systems** use electricity to lift heavy weights to higher elevations. When electricity is needed, the weights are lowered, converting gravitational energy back into electricity through generators.

India's Energy Storage Capacity

- The government is primarily focusing on the **two major systems above: PHS and BESS**.
- At present, India has an **installed BESS capacity of around 0.27 GW**.
- **PHS capacity** stands at about **7.2 GW**. There are plans, however, for a massive scale-up over the next decade.
- A Central Electricity Authority (CEA) plan projects the **country's total energy storage capacity to reach 174 GW/888 gigawatt hours by 2035-36**.
 - ♦ This includes **80 GW/321 GWh of BESS and 94 GW/567 GWh of PHS**.

Way Ahead

- The 2026-2027 El Niño should be viewed as a **test of India's electricity system rather than simply another weather event.**
- The modelling, which compares the projected El Niño period with the preceding La Niña phase, suggests **climate variability could increasingly shape electricity demand, renewable generation and fossil fuel use.**
- The findings suggest the **growing importance of batteries, transmission upgrades and grid flexibility** alongside **renewable energy expansion** as India seeks to build a more resilient power system.

Source: TH

AI GOVERNANCE AND A VOICE FOR THE GLOBAL SOUTH

Context

- India faces a choice between **dependency and leadership in AI governance.**

Background

- India hosted the **India AI Impact Summit 2026**, which sought to put the **needs and challenges of the Global South** at the centre of the Artificial Intelligence (AI) discourse.
 - ♦ The summit's themes framed by India were rooted in the **contextual realities of the Global South** with a focus on real-world harms.
- **India's approach was different from the previous summits** (at Bletchley Park, 2023, U.K.; Seoul 2024, and Paris 2025) that **prioritised both catastrophic and existential risks** over questions of present harms, equity and inclusion.
- As the Summit evolved, **the political and policy momentum shifted toward raising capital for AI development in India.**
 - ♦ **India joined Pax Silica, signalling strategic alignment** with the United States-dominated semiconductor supply chain.

Challenges India Faces in Emerging as a Global Leader in AI

- **Middle power dilemma:** India is inclined towards becoming a middle power i.e. a country that is important and influential in world affairs. But it is challenged by the U.S., Japan, and many European countries as they are much more advanced in AI technology.

- ♦ India is still a developing country and also wants to represent the interests of the Global South.
- **U.S. Foreign Policy:** The U.S. has declared its disinterest in AI governance, especially global multilateral or multistakeholder governance.
 - ♦ This raises fundamental questions for India and the Global South on concentration of infrastructure, and economic power in the U.S..
- **Other Concerns:** India's dependence for AI on western countries raises the questions about data security, land acquisition for creating data centres and western countries taking all the profits from the partnership.

Opportunities for India

- **The first of a two-part UN Global Dialogue on AI** is underway in Geneva.
 - ♦ Stakeholders will convene to discuss how the multilateral and multistakeholder ecosystem can come together to collectively **define the rules for the governance of AI.**
- India can use the opportunity to stitch together a **fractured AI policy agenda that currently lacks a leader.**
 - ♦ India remains one of the few countries with the political heft, the technical capacity, and a diverse market to play this role.
 - ♦ Rather than positioning itself **merely as a destination for investment or a market for AI**, India could reassert a vision of **technological development rooted in public purpose, user safety, strategic autonomy, and international cooperation.**

The Global Dialogue on AI Governance

- **The Global Dialogue on AI Governance** is a **universal, multi-stakeholder UN forum** established under **General Assembly Resolution 79/325.**
- It was established following the **Global Digital Compact adopted as part of the Pact of the Future in 2024.**
- The Global Dialogue is a unique opportunity to **advance international governance of artificial intelligence (AI).**
 - ♦ **It will also include thematic discussions around four clusters** covering AI's social and economic implications, bridging AI divides, safe and trustworthy AI and human rights in the AI context.

- Minister of State for External Affairs Kirti Vardhan Singh will lead the Indian delegation that will participate in the **inaugural United Nations' Global Dialogue on AI Governance**.

Way Ahead

- India should reiterate the need for **international norms that empower Global South countries** to focus on building local AI ecosystems and fostering innovation, safeguarding users, and enhancing regulatory capacity.
- It should also **advance critical debates on competition and consumer protection** and ensure economic value accrues within national markets.
- India must **create pathways for international cooperation on AI within the Global South**.

Source: TH

SHOULD VOTING BE A FUNDAMENTAL RIGHT IN INDIA?

Context

- Recently an old constitutional debate has been revived by demanding that voting should be recognised as a fundamental right.

Right to Vote in India

- Article 326** of the Indian Constitution provides that every citizen of India, not less than **18 years of age** is entitled to be registered as a voter for Elections to the House of the People and Legislative Assembly of every State on the basis of **adult suffrage**.
- Originally, the minimum voting age under Article 326 was 21 years. **The 61st Constitutional Amendment Act, 1988** reduced it to 18 years.
- Status of the Right to Vote in India:**
 - In the **N.P.Ponnuswami case (1952)**, a Constitution Bench of the Supreme Court held that the right to vote is a **statutory right**.
 - The Supreme Court in **Kuldip Nayar v. Union of India (2006)** held that the 'right to elect' is a **statutory right** under **Section 62 of the RPA, 1951**, and not a fundamental or constitutional right.
 - In the **Jyoti Basu case (1982)**, the court reiterated that the right to vote is neither a fundamental right nor a common law right but a **statutory right**.

Gradual Constitutionalisation of Voting Rights

- The Supreme Court has progressively expanded constitutional protection to different aspects of voting through various judgements.
- Right to Know (2002):** In **Union of India vs Association for Democratic Reforms**, the Court recognised that voters have a fundamental right under **Article 19(1)(a)** to know the criminal background, educational qualifications, and financial assets of candidates.
 - The Court held that an informed voter is essential for meaningful democratic participation.
- Freedom to Make an Informed Choice (2003):** In **People's Union for Civil Liberties vs Union of India**, the Court distinguished between:
 - The right to vote, which remains statutory.
 - The freedom of voting, which includes making an informed choice and is protected under Article 19(1)(a).

Why Should Voting Receive Constitutional Protection?

- Basic Structure Doctrine:** In **Kesavananda Bharati vs State of Kerala**, the Supreme Court held that democracy is part of the Constitution's Basic Structure.
 - Since democracy cannot function without citizens participating in elections, voting represents the practical exercise of popular sovereignty.
- Article 326 Provides Constitutional Recognition:** The Constitution guarantees universal adult suffrage under Article 326 and the Parliament only prescribes procedural aspects through electoral laws.
 - Therefore, the citizen's entitlement to participate in elections originates from the Constitution rather than ordinary legislation.

Concerns Over Recognising Voting as a Fundamental Right

- Reduced Legislative Flexibility:** Parliament's ability to prescribe qualifications, disqualifications, and electoral procedures will face greater constitutional constraints and judicial scrutiny.
- Excessive Judicialisation:** Routine electoral matters, such as voter registration, electoral rolls, and polling procedures, could increasingly become subjects of constitutional litigation.
- Adequate Constitutional Safeguards:** Universal adult suffrage under Article 326, along with the basic structure doctrine protecting democracy

and free and fair elections, already provides substantial constitutional protection to voting rights.

Concluding remarks

- The Supreme Court has progressively constitutionalised the electoral process by protecting voters' **right to know, freedom of electoral choice, ballot secrecy, and the right to reject candidates through NOTA.**
- Given that democracy and free and fair elections form part of the Constitution's Basic Structure, there is a compelling constitutional argument that the core right of every eligible citizen to vote deserves explicit constitutional protection, while allowing Parliament to regulate the procedural aspects of elections.

Source: TH

NEWS IN SHORT

INDIRA POINT

Context

- The Directorate of Lighthouses and Lightships at Sri Vijaya Puram (Port Blair) has approached the Andaman and Nicobar Coastal Zone Management Authority and the Environment Ministry seeking approval for protection and development work at Indira Point.

What is Indira Point?



- Indira Point is **India's southernmost point**, located on **Great Nicobar Island** in the Andaman and Nicobar Islands.
- It lies **south of Galathea Bay**, where the proposed Great Nicobar mega infrastructure project is being developed.

- The Indira Point lighthouse, **built in 1972** on 11.5 hectares of land, stands 35 metres tall and is made of cast iron.
- **The 2004 tsunami** caused the southern shoreline of Great Nicobar Island to subside by roughly 4.25 metres, pushing the sea closer to the lighthouse.

Why Does the Proposal Require Environmental Clearance?

- The project site falls within ecologically sensitive **Island Coastal Regulation Zone (ICRZ) categories.**
 - ♦ **ICRZ-1A rules** bar most development activity, with limited exceptions for eco-tourism, roads (including those built on stilts) and — in exceptional circumstances — defence, strategic, or public utility projects, provided a detailed impact assessment is carried out.
 - ♦ **ICRZ-IV**, on the other hand, permits and regulates certain activities such as land reclamation, bunding and erosion control.

Source: IE

INDIAHANDMADE

Context

- **Indiahandmade** is a **dedicated digital marketplace** that brings India's handloom and handicraft traditions into the online economy.

About

- India currently has an estimated **64.66 lakh handloom and handicraft artisans.**
 - ♦ **Women form a major part of this workforce**, accounting for **71% of handloom weavers and 64% of total artisans** as of 2025.
- **Indiahandmade was launched in 2023**, to strengthen the **visibility of handmade products** and open wider market opportunities for sellers.
- **Developed By: Digital India Corporation** under the Ministry of Textiles.
- **Salient Features:**
 - ♦ **Specialised Online Marketplace:** It enables weavers and artisans to sell their handloom and handicraft products online.
 - ♦ **Direct Buyer Access:** Artisans and weavers are directly connected with buyers, helping reduce intermediaries and support fair compensation.
 - ♦ **Digital Empowerment:** Artisans and weavers are provided with digital tools and visibility

to participate more effectively in online commerce.

- ♦ **It offers a wide range of products**, including apparel, home décor, furnishings, paintings, furniture, religious items, stationery, musical instruments, jewellery, bags and footwear.

It also highlights special product categories such as **GI-tagged and ODOP products**.

Source: PIB

RECORD FLOW OF FPIS INTO INDIAN BONDS

Context

- **Foreign Portfolio Investment** under general limit debt securities **came in at ₹55,518 crore in June 2026**.

About

- **Foreign Portfolio Investment (FPI)** refers to investments made by foreign individuals, institutional investors, or funds in financial instruments such as **stocks, bonds, mutual funds, and government securities**.
 - ♦ FPIs **do not participate in the management or decision-making** of the companies in which they invest and are generally considered **passive investors**.
- **Foreign Institutional Investment (FII)** is a category of FPI that refers specifically to investments made by foreign institutional investors such as mutual funds, pension funds, insurance companies, and hedge funds.
 - ♦ These institutions **invest pooled funds** in financial markets and typically **play a more active role** in investment research and decision-making.
- **Government Securities (G-Secs)**, are tradeable debt instruments issued by the central/ state governments to fund public projects, manage fiscal deficits, control market liquidity.
 - ♦ Foreign investors can invest in **Indian G-Secs through routes such as the General Route and the Fully Accessible Route (FAR)**.
- **Classification of Capital Gains**
 - ♦ **Long-Term Capital Gains (LTCG)** arise when a Government Security is held beyond the prescribed holding period.

Listed G-Secs: More than 12 months.

Unlisted G-Secs: More than 24 months.

- ♦ **Short-Term Capital Gains (STCG)** arise when a Government Security is held for less than the prescribed holding period.

Listed G-Secs: Up to 12 months.

Unlisted G-Secs: Up to 24 months.

- **Recognising the importance of a competitive tax framework in attracting global capital**, the Government has introduced **a tax exemption for FPIs/FIIs investing in G-Secs**.

Income Type	Previous Tax Rate	New Tax Rate
Interest Income from Securities	20%	NIL
Short-Term Capital Gains (STCG)	30%	NIL
Long-Term Capital Gains (LTCG)	12.5%	NIL

Source: Ministry of Finance

Source: TH

VIKRAM-1 TO SHOWCASE INDIA'S SPACE INNOVATION

Context

- Skyroot Aerospace has announced that Vikram-1, will carry six payloads during Mission Aagaman.

What is Vikram-1?

- Vikram-1 is a **four-stage orbital launch vehicle** developed by Skyroot Aerospace, an Indian space-tech start-up.
 - ♦ The first three stages are solid-fuelled, providing robust initial thrust, while a hypergolic liquid upper stage allows for precise orbital manoeuvres.
- It is India's first privately developed **orbital-class rocket**.
- Vikram-I can deploy up to **350 kg into low Earth orbit (LEO)** and **260 kg into a sun-synchronous orbit (SSO)**.

Payloads to be launched by Vikram

- **Payloads celebrating creativity and India's scientific heritage:**
 - ♦ **Cosmic Bloom**, developed by Cosmos Diamonds, featuring a diamond jewellery creation mounted on an aluminium base plate.

- ♦ **Microart:** An 18K gold rocket holding micro-sculptures of Sir C.V. Raman, Dr. Vikram Sarabhai, and Dr. A.P.J. Abdul Kalam — each smaller than a grain of rice.
- **Technology Demonstration Payloads:**
 - ♦ Robotic Arms by Cosmoserve
 - ♦ SOLARAS by Grahaa Space
 - ♦ SCOPE by Skyroot Aerospace
 - ♦ One international payload — uD3PP and mD3RN — developed by Dcubed GmbH, Germany.

Source: TH, TH, IE

FDA APPROVES THE FIRST PROTAC DRUG

Context

- The U.S. Food and Drug Administration (FDA), approved the **drug Vepdegestrant** for patients with **ESR1-mutated, ER-positive, and HER2-negative advanced breast cancer**.

About

- It is the world's first therapy that the FDA has approved that is based on **PROTAC (Proteolysis-Targeting Chimera) technology**.
- The approval paves the way for drugs designed to remove harmful proteins from cells, rather than simply block them.

How Do PROTACs Work?

- **'PROTAC' stands for proteolysis-targeting chimaera**, which is a kind of molecule designed to remove specific proteins from a cell.
- **A PROTAC has two ends:** one **binds to the target protein** and the other binds to an **E3 ligase**, an enzyme involved in the cell's protein degradation process.
- By bringing these components together, the PROTAC causes the target protein to be degraded by the cell. This is called **targeted protein degradation**.

Significance

- Conventional drugs work by binding to a protein in a way that prevents it from performing certain roles in the body. Hence the drugs need to be present for long periods in the body.
- **PROTACs however act like catalysts**, while the proteins they target end up being degraded, they themselves are not degraded.

- After triggering one degradation process, the PROTAC can **detach itself and repeat it with another** instance of the same protein. This mechanism allows a single PROTAC molecule to act multiple times.

Source: TH

OLDEST QUASARS FOUND

Context

- The **Euclid space telescope** has spotted the oldest quasars ever discovered, deepening a cosmic mystery that has been puzzling scientists.

About

- **A quasar is the intensely luminous core of a distant galaxy** powered by a **supermassive black hole**.
- As gas spirals into the black hole, **extreme amounts of gravitational energy are converted into radiation**, making **quasars shine with the light of a trillion suns**.
- They provide **valuable insights into the early evolution of galaxies and black holes**.
 - ♦ The light from the oldest pair comes from **when the universe was roughly 670 million years old**, just five percent of its current age of 13.8 billion years.
 - ♦ This beats the **previous record for oldest and therefore most distant quasar** announced in **2021 by around 20 million years**.

Black Hole

- A black hole is an extremely dense object whose gravity is so strong that nothing, not even light, can escape it.
- It does not have a surface, like a planet or star. Instead, it is a region of space where **matter has collapsed in on itself**.
 - ♦ This catastrophic collapse results in a **huge amount of mass being concentrated in an incredibly small area**.
- **Formation:** A black hole is formed when a **really massive star runs out of fuel** to fuse, blows up, leaving its core to implode under its weight to form a black hole.
 - ♦ The centre of a black hole is a **gravitational singularity**, a point where the general theory of relativity breaks down, i.e. where its predictions don't apply.
 - ♦ A black hole's great gravitational pull emerges as if from the **singularity**.

Do You Know?

- Known black holes fall into **two classes**:
 - ♦ **Stellar mass**: 5 to tens of times the Sun's mass;
 - ♦ **Supermassive**: 100,000 to billions of times the Sun's mass;
 - ♦ **Middleweight** black holes may exist between these classes, but none have been found to date.
- Spaghettification**: As objects approach the event horizon of a black hole, they're horizontally compressed and vertically stretched, like a noodle.
- The nearest known black hole, called Gaia BH1**, is about **1,500 light-years away**.
- Sagittarius A***: Sagittarius A* is more than 25,000 light years from Earth – nearest supermassive black hole, with an estimated mass millions of times that of the Sun.
 - ♦ Often abbreviated by researchers to Sgr A* (pronounced "Sagittarius A star"), it sits in the constellation of Sagittarius at the heart of the Milky Way.

Source: TH

INS MAHENDRAGIRI**Context**

- The Indian Navy is set to commission INS Mahendragiri (F38), the sixth indigenous stealth frigate under Project 17A, at Visakhapatnam.

About

- Named after the majestic **Mahendragiri mountain range** in the Eastern Ghats, the stealth frigate was designed by the Indian Navy's Warship Design Bureau and **built by Mazagon Dock Shipbuilders Limited**, Mumbai.
- The frigate is powered by a modern **Combined Diesel or Gas (CODOG)** propulsion system, enabling high-speed operations with exceptional endurance across the full spectrum of maritime missions.
- The frigate is equipped with an advanced suite of indigenous and state-of-the-art weapons and sensors, including surface-to-surface and surface-to-air missile systems, sophisticated electronic warfare capabilities, comprehensive anti-submarine warfare systems, and an integrated Combat Management System.
- With over **75 per cent indigenous content**, Mahendragiri exemplifies the Government's Aatmanirbhar Bharat initiative.

Project 17A (Nilgiri-class Programme)

- Project 17A** is the follow-on class to the **Project 17 (Shivalik-class)** frigates.
- It includes **7 stealth frigates**:
 - ♦ **4** being built by Mazagon Dock Shipbuilders Limited (MDL), Mumbai;
 - ♦ **3** by Garden Reach Shipbuilders & Engineers (GRSE), Kolkata.
- The warships have a displacement of **6,670 tonnes**, are **149 metres** long, can reach a top speed of **28 knots**, and carry 225 personnel.

Source: PIB

