

Today's Prelims Topics

Suzetrigine – A New Non-Opioid Painkiller

Context

The United States Food and Drug Administration (FDA) has approved **suzetrigine**, a **non-opioid painkiller** developed by **Vertex Pharmaceuticals**.

What Are Opioids?

- Opioids are a class of drugs that are **either derived from or mimic natural substances found in the opium poppy plant**.
- **Common Opioids Include:** Oxycodone, Morphine, Codeine, Heroin & Fentanyl
- These drugs work by binding to opioid receptors in the brain, blocking pain signals and producing a sense of **pleasure or euphoria**.
- This euphoric effect makes **opioids highly addictive**, often leading to dependence and misuse
- **Opioid Crisis in the U.S.:**
 - 82,000 opioid-related overdose deaths in 2022 (US Centers for Disease Control and Prevention, CDC).
 - U.S. consumes 30 times more opioid medication than necessary (BBC report).
 - In 2017, President Donald Trump declared a public health emergency due to the opioid epidemic, calling it a “national shame”.

How Does Suzetrigine Work?

- Suzetrigine targets pain signals before they reach the brain, unlike opioids, which alter pain perception in the brain.
- It interrupts the pain pathway at the nerve level, preventing the brain from recognizing pain even when tissue damage exists.

Difference Between Suzetrigine & Opioids

Feature	Opioids	Suzetrigine
Action	Blocks pain signals in the brain	Interrupts pain signals before they reach the brain
Addiction Risks	High – Causes euphoria & pleasure	Low/None – Does not trigger pleasure
Side Effects	Addiction, overdose risk, respiratory issues	Expected to be safer, but high cost

Source:

- [Indian Express - Suzetrigine](#)

UIDAI notifies new rules for Aadhaar authentication

Context

The Ministry of Electronics and Information Technology (MeitY) has notified amendments to the Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Act, 2016.

About Key Amendments

- **Expanded Scope of Aadhaar Authentication:** The amendment broadens the use of Aadhaar authentication to include **both government and non-government entities** for: **Good governance, Social welfare programs, Innovation and knowledge dissemination & Ease of living**
 - These changes will **improve service delivery** in various sectors such as: **E-commerce, Travel & tourism, Hospitality, Healthcare.**
 - This will allow **private entities** to utilize Aadhaar authentication for **secure, seamless, and trusted transactions.**
- **New Approval Process for Aadhaar Authentication Request:**
 - **Application Submission:** Any entity (government or private) seeking Aadhaar authentication must submit an application detailing the **intended use case** to the **concerned Ministry or Department** (either Central or State Government).
 - **Review and Recommendation:** The **Unique Identification Authority of India (UIDAI)** will examine the request.
 - Approvals will be issued by MeitY based on **UIDAI's recommendation.**
 - **Final Notification:** The concerned **Ministry or Department** will notify the entity **after receiving confirmation from MeitY**
- **Key Changes in the Language of Rules:**
 - The previous rule's phrase: **"Interest of good governance, preventing leakage of public funds"** → **Removed** from the new amendment.
 - The new version states that **any non-government entity** seeking Aadhaar authentication must:
 - Justify its request under **Rule 3**
 - Demonstrate that it serves the **interest of the State**

Objectives of the Amendment

- Improve **transparency** and **inclusivity** in decision-making.
- Enhance the **ease of living** by expanding Aadhaar authentication to various sectors beyond government entities.
- Enable **trusted transactions** for service providers and service seekers.
- Encourage **innovative digital solutions** leveraging Aadhaar authentication.

Source:

- [The Hindu - UIDAI amends Aadhar rules](#)

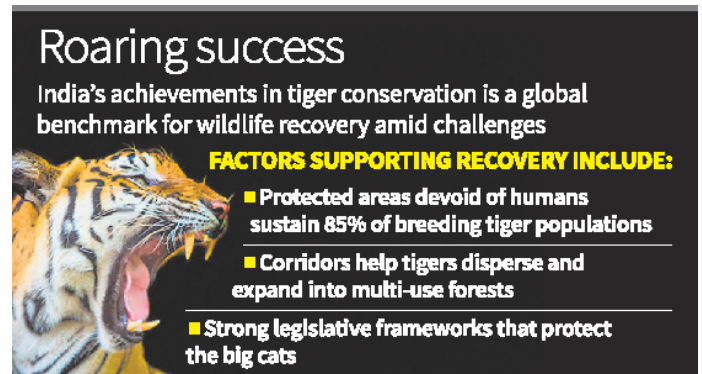
India's Tiger Population Increases by 30% in Two Decades

Context

According to a new study, published in *Science*, led by senior scientist Yadvendradev Jhala has found that **India's tiger population has increased by 30% over the past two decades.**

Key Findings of the Study

- **Tiger population growth:** 30% increase in the past two decades.
- **India's global share:** 70% of the world's wild tigers live in India.
- **Global wildlife decline:** 73% decline in wildlife populations globally, but India has successfully conserved its tiger population.
- **Protected areas' role:** 85% of breeding tiger populations are found in human-free protected areas.
- **Coexistence with humans:** 66 million people share space with tigers, proving that coexistence is possible.



Factors Behind India's Tiger Recovery

- **Legislative Support:** India's strong **conservation laws** played a major role:
 - Wildlife Protection Act, Forest Conservation Act & National Tiger Conservation Authority (NTCA)
- **Economic and Cultural Influence:**
 - **Higher recolonization rates** in **economically stable regions** with less forest dependence.
 - **Tiger decline in poorer regions** with high human-wildlife conflict, such as **Naxal-affected Chhattisgarh and Jharkhand.**
- **Land-Sparing & Land-Sharing Strategies:**
 - **Land-Sparing (Human-Free Areas):** Protected areas with no human presence sustain 85% of breeding tigers.
 - **Land-Sharing (Coexistence with Humans):** Tigers **disperse into multi-use forests and coexist with 66 million people.** Sustainable land-use practices and corridors facilitate their movement and expansion.

Source:

- [The Hindu - 'India's tiger population rose 30%](#)

India to build its own foundational AI chatbot

Context

The Union Minister for Electronics & Information Technology has announced that India is all set to launch its own safe & secure indigenous AI model at an affordable cost.

Features of Indian AI model - Safe, Secure & Affordable

- **Graphics Processing Units(GPUs)** : It will be initially launched with 10,000 GPUs with plans to expand to 18,693 GPUs.

Graphic Processing Unit (GPU)

It is a computer chip that rapidly calculates mathematical operations to display graphics and images. It is used in Creative content creation, video editing, high-performance computing (HPC), and artificial intelligence (AI).

- **Cost effective:** ₹100 per GPU hour (post 40% government subsidy) vs. global cost of \$2.5–\$3 per hour.
- **Focus Sectors:** Create scalable and impactful AI solutions across sectors such as healthcare, education, agriculture, climate, and governance

IndiaAI Mission

- It is a government initiative to promote artificial intelligence (AI) innovation in India.
- **Aim:** To create a robust AI ecosystem in India by democratising access to computing resources, improving data quality and fostering industry partnerships.
- **Focus areas:** Healthcare, education, agriculture, smart cities and infrastructure.
- **Implementing Agency:** 'IndiaAI' Independent Business Division (IBD) under Digital India Corporation (DIC)
- **Key initiatives:**
 - **IndiaAI Application Development Pillar:** This initiative promotes AI solutions in critical sectors by developing, scaling and promoting AI applications.
 - **IndiaAI FutureSkills:** This initiative aims to break down barriers to AI education by offering fellowships to students in top engineering colleges.
- **INDIAai Platform:** This platform serves as a one-stop portal for AI-related development in India. It provides resources such as articles, news, interviews and investment funding news and events. It also offers AI courses, both free and paid.
- **Lead agencies for the mission:** NITI Aayog, the Department of Science and Technology (DST), the Ministry of Electronics and Information Technology (MeitY) and the Department of Biotechnology (DBT).

Source:

- [Indian Express - India braces for AI challenge](#)

China's Artificial Sun (EAST) Sets New Fusion Record

Context

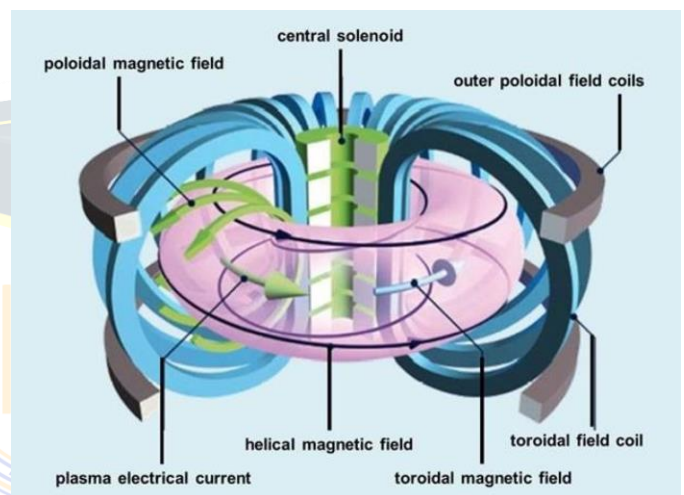
Recently China's artificial sun, known as EAST, burned for over 1000 seconds, creating a new record.

About EAST (Experimental Advanced Superconducting Tokamak)

- **EAST** is China's artificial sun, designed to conduct fusion-related experiments.
- It has been operational since **2006** and serves as an **open test platform** for both **Chinese and international** scientists.
- **New Fusion Record:** 1066 Seconds of High-Confinement Plasma
- EAST successfully maintained a **steady-state high-confinement plasma operation for 1066 seconds**.
- This is the **longest duration ever recorded** in fusion research. Plasma temperature reached **100 million degrees Celsius**.
- The previous record held by EAST was **403 seconds**.

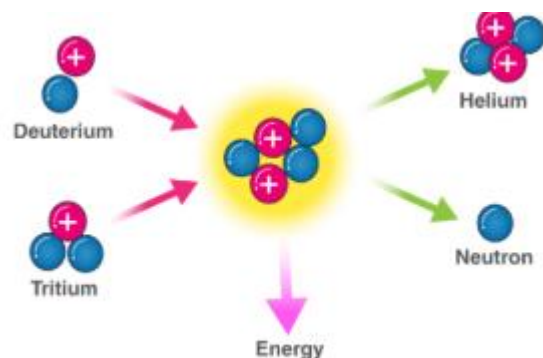
Tokamak

- A **Tokamak** is a device designed to create **controlled nuclear fusion** by confining hot plasma using powerful **magnetic fields**.
- It is the **most widely used experimental reactor type** for studying fusion energy.
- **Major Tokamak Projects Around the World:**
 - **EAST (China's Artificial Sun)**, **ITER** (International Thermonuclear Experimental Reactor) - France, **KSTAR** (Korea Superconducting Tokamak Advanced Research)



Nuclear Fusion

- Fusion is the source of energy for the **Sun and stars**.
- **Fusion Process:**
 - Two **light nuclei** merge to form a single, **heavier nucleus**.
 - The mass of the resulting nucleus is **less than the original two nuclei**, with the leftover mass converted into **energy** ($E=mc^2$).
- **Fusion Fuel:**
 - **Hydrogen isotopes (Deuterium and Tritium)** are used in the reaction.
 - Deuterium is extracted from **seawater**, making it an **abundant and sustainable fuel source**.
- The most efficient fusion reaction in the laboratory setting would be the reaction between two hydrogen isotopes, deuterium (D) and tritium (T).
- **Conditions for nuclear fusion:**
 - Very high temperature (about **150,000,000° Celsius**)
 - Sufficient plasma particle density (to increase the

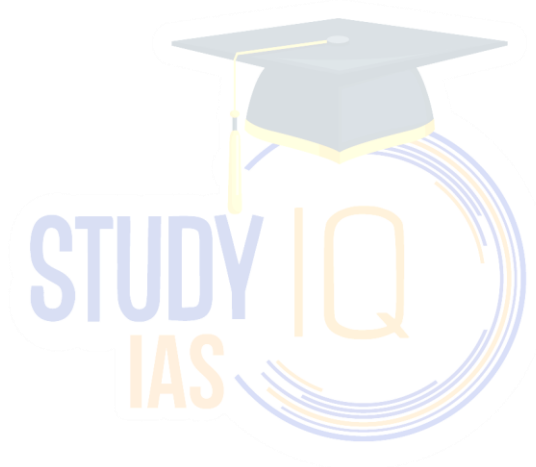


likelihood of collisions)

- Sufficient time of confinement (to hold the plasma)
- **Benefits of nuclear fusion energy:** No radioactive waste, High efficiency, Inexpensive fuel, No greenhouse gases are emitted, No risk of reactor meltdown.

Source:

- [Indian Express - Promise of Nuclear Fusion](#)



Places in News

Kara Sea

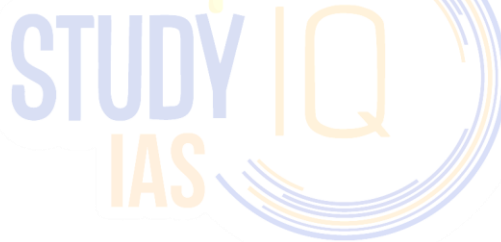
- Recently, a Russian Nuclear-powered vessel '50 Let Pobedy' collided with a cargo vessel in the Kara Sea.



- Location:** It is a marginal sea of the **Arctic Ocean**, located to the **north of Siberia, Russia**.
- Bordering Waterbodies:** Barents Sea (west) and Laptev Sea (East).
- The Kara Strait and the Novaya Zemlya archipelago separate the Kara Sea from the Barents Sea in the west.
- It is regarded as **one of the coldest seas in the world**.
- Rivers draining into Kara Sea:** Kara, Ob, Pyasina, Yenisei.
- Important Islands:** Bely, Dikson, Kamennyye, Oleni, and Taymyr Islands

Source:

- [Eurasian times - Kara Sea](#)



Editorial Summary

Economic Survey 2024-25

Context

Recently, Union Minister of Finance and Corporate Affairs Nirmala Sitharaman tabled the Economic Survey 2024-25 before the parliament.

Economic Survey 2024-25: Key Highlights



- **GDP & Growth Estimates**
 - India's GDP expected to grow between 6.3% - 6.8% in FY26.
 - Real GDP growth estimated at 6.4% in FY25, aligning with its decadal average.
 - Real GVA projected to grow by 6.4% in FY25.
- **Investment & Infrastructure**
 - Capital expenditure (Capex) grew by 8.2% (July–November 2024) and is expected to accelerate further.
 - ₹50,000 crore 'Self-Reliant India Fund' launched to support MSMEs.

- Economic Survey recommends **deregulation and sustained infrastructure investment** over the next two decades for high growth.
- **Inflation & External Sector**
 - **Retail headline inflation declined to 4.9%** (April–December 2024).
 - India's **consumer price inflation projected to stabilize at ~4%** in FY26.
 - **Overall exports increased by 6.0% YoY** (April–December 2024).
 - **Services exports surged by 12.8%** (April–November FY25) from **5.7% in FY24**.
 - **Gross FDI inflows rose by 17.9% YoY to \$55.6 billion** (first 8 months of FY25).
 - **Forex reserves at \$640.3 billion** (December 2024), covering **10.9 months of imports** and **90% of external debt**.
- **Stock Market & Financial Sector**
 - **BSE stock market capitalization to GDP ratio at 136%** (December 2024), surpassing **China (65%)** and **Brazil (37%)**.
 - Renewable Energy & Sustainability
 - **Capacity addition in solar & wind energy grew by 15.8% YoY** (December 2024).
- **Agriculture & Rural Economy**
 - **Agricultural sector expected to grow at 3.8%** in FY25.
 - **Kharif foodgrain production projected at 1647.05 LMT**, marking a **rise of 89.37 LMT** over the previous year.
 - Growth in agriculture driven by **horticulture, livestock, and fisheries**.
- **Industrial & Social Sectors**
 - **Industrial sector projected to grow by 6.2%** in FY25.
 - **Social services expenditure grew by 15% annually** between FY21 and FY25.
 - **Government health expenditure increased from 29% to 48%** (FY15-FY22).
 - **Out-of-pocket health expenses reduced from 62.6% to 39.4%** during the same period.
- **Employment & AI Regulation**
 - **Unemployment rate dropped to 3.2%** in 2023-24 from **6.0% in 2017-18**.
 - Collaborative efforts between **government, private sector, and academia** needed to mitigate AI's societal impact.

Source: [PIB: SUMMARY OF ECONOMIC SURVEY 2024-25](#)