

Fusion Energy New Record

❖ Context

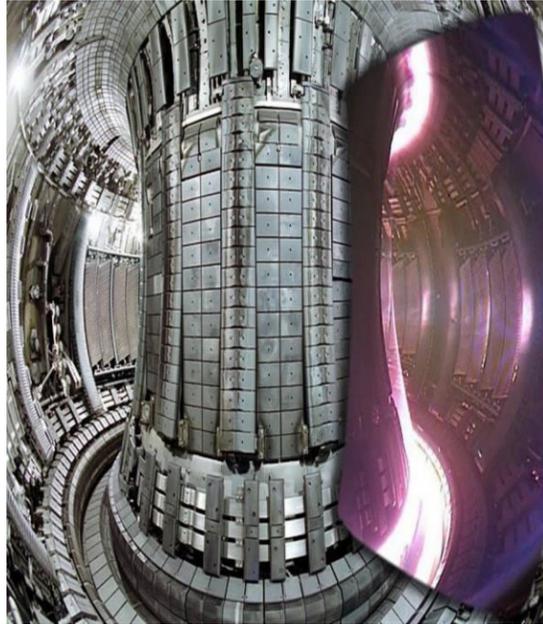
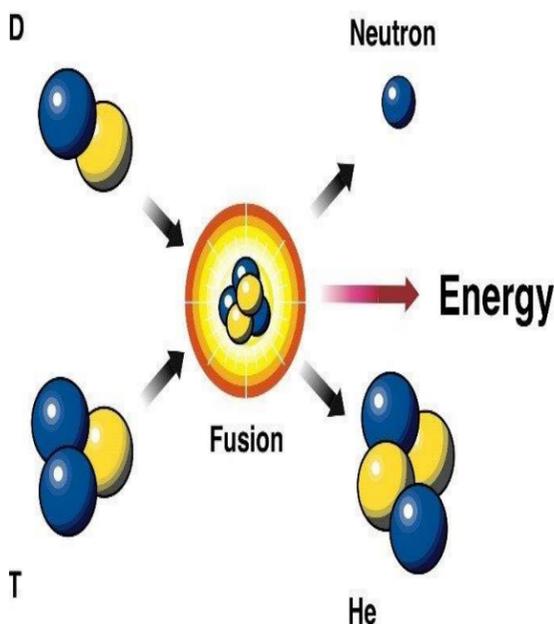
- Scientists in the UK have achieved a new milestone in producing nuclear fusion energy, or imitating the way energy is produced in the sun.

❖ Key Highlights

- A team at the **Joint European Torus (JET)** facility near Oxford in central England generated **59 megajoules of sustained energy** during an experiment in December, **more than doubling a 1997 record**
- **A kilogram of fusion fuel** contains about **10 million times** as much **energy** as a kilogram of **coal, oil or gas**.
- The energy was produced in a machine called a **tokamak**, a doughnut-shaped apparatus.
- The JET site is the largest operational one of its kind in the world.
- **Deuterium and tritium**, which are isotopes of hydrogen, are heated to **temperatures 10 times hotter than the centre of the sun** to create plasma.
- This is held in place using **superconducting electromagnets** as it spins around, fuses and releases tremendous energy as heat

❖ Fusion reaction

- In a fusion reaction, two light nuclei merge to form a single heavier nucleus. The process releases energy because the total mass of the resulting single nucleus is less than the mass of the two original nuclei. The leftover mass becomes energy.



❖ Plasma

- At extreme temperatures, electrons are separated from nuclei and a gas becomes a plasma—an **ionized state of matter** similar to a gas.
- Composed of **charged particles (positive nuclei and negative electrons)**, plasmas are very tenuous environments, nearly **one million times less dense** than the **air** we breathe.

- **Three conditions** must be fulfilled to achieve fusion in a laboratory: **very high temperature** (to provoke high-energy collisions); **sufficient plasma particle density** (to increase the likelihood that collisions do occur); and **sufficient confinement time** (to hold the plasma, which has a propensity to expand, within a defined volume).

❖ International Thermonuclear Experimental Reactor (ITER)

- The ITER is a **fusion research mega-project** supported by seven members — **China, the EU, India, Japan, South Korea, Russia and the U.S.**, based in Cadarache, the south of France. The **EU** is contributing **45%** of the cost with the rest 9% each.
- It seeks to further demonstrate the scientific and technological feasibility of fusion energy. **The first plasma operation is to be started in 2025**
- **India** became a full seventh partner of ITER in **December 2005**. India is **contributing resources worth about Rs 20,000 crore** or about **\$2.2 billion** (in cash & kind) but will get access to **100% of the intellectual property** related to ITER.
- **ITER-India**, a specially empowered project of the **Institute for Plasma Research (IPR)**, is the **Indian domestic agency** to design, build and deliver the Indian in-kind contribution to ITER.
- **In-kind contributions of India** are: **Cryostat**(the giant vacuum vessel), **In-wall Shielding**, **Cooling Water System**, **Cryogenic System**, **Ion-Cyclotron RF Heating System**, **Electron Cyclotron RF Heating System**, **Diagnostic Neutral Beam System**, **Power Supplies** and some **Diagnostics**.
- IPR works under administrative control of **DAE**, located in Gandhinagar
- The institute **owns two operational tokamaks** - **ADITYA** and **Steady State Tokamak (SST) - 1**

Pradhan Mantri Kisan Sampada Yojana (PMKSY)

❖ Context

- Recently, the **Food Processing Ministry** said its flagship scheme '**Pradhan Mantri Kisan Sampada Yojana (PMKSY)**' has been **extended till March 2026**.
- The Central government has allocated Rs **4,600 crore** for the scheme.

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❖ About PMKSY

- In May 2017, the Centre had launched **SAMPADA (Scheme for Agro-Marine Processing and Development of Agro-Processing Clusters)** with an allocation of Rs 6,000 crore.
- Later, it was **renamed the 'Pradhan Mantri Kisan Sampada Yojana' (PMKSY)** to be implemented by the **Ministry of Food Processing Industries (MoFPI)**.
- It's a **Central Sector Scheme**.
- **Objectives:**
 - To create modern infrastructure for food processing, mega food parks/clusters and individual units
 - To link farmers, processors and markets
 - To create robust supply chain infrastructure for perishables.
- **Schemes under PMKSY**
 - Mega Food Parks
 - Integrated Cold Chain and Value Addition Infrastructure
 - Creation/ Expansion of Food Processing/Preservation Capacities (Unit Scheme)
 - Infrastructure for Agro-processing Clusters
 - Creation of Backward and Forward Linkages
 - Food Safety and Quality Assurance Infrastructure
 - Human Resources and Institutions
 - **Operation Green**

❖ Impacts

- The implementation of PMKSY will result in **creation of modern infrastructure** with efficient supply chain management from farm gate to retail outlet.
- It will provide a **big boost to the growth of the food processing sector** in the country.
- It will help in providing **better prices to farmers** and is a big step towards **doubling farmers' income**.
- It will create **huge employment opportunities** especially in the rural areas.
- It will also help in **reducing wastage of agricultural produce**, increasing the processing level, availability of safe and convenient processed foods at affordable price to consumers
- It will **enhance the export of processed foods**.



Solar Storms/Flares

❖ Context

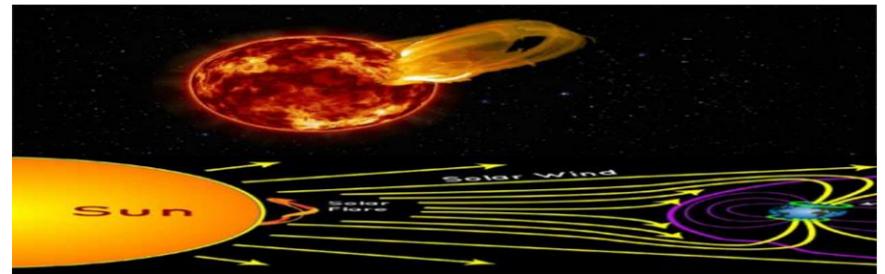
- Recently, Elon Musk's Starlink has **lost dozens of satellites** that were caught in a **geomagnetic storm** a day after they were launched on February 3

❖ Key Highlights

- Up to **40 of the 49 satellites** were impacted causing them to fall from orbit before they could be commissioned.
- The satellites were **designed to burn up on reentry into the Earth's atmosphere**, and did not create debris in space.
- However, the loss of 40 satellites — most of a launch batch — in a single solar event has been described as **“unheard of” and “huge”**.

❖ About Solar Storms/Flares

- Solar storms are **magnetic plasma** ejected at great speed from the **solar surface**.
- They occur during the release of magnetic energy associated with sunspots.
 - **Sunspots**- 'dark' regions on the Sun that are cooler than the surrounding photosphere.
- They **can last for a few minutes or hours**.
- The solar storm that deorbited the satellites occurred on February 1 and 2, and its powerful trails were observed on February 3.
- Current models are **capable of predicting a storm's** time of arrival and its speed. But the storm's structure or orientation still cannot be predicted.



❖ Effect on Earth

- Not all solar flares reach Earth, but solar flares/storms, **solar energetic particles (SEPs)**, high-speed solar winds, and **coronal mass ejections (CMEs)** that come close can impact space weather in near-Earth space and the upper atmosphere.
- Solar storms can hit operations of space-dependent services like **global positioning systems (GPS), radio, and satellite communications**.
- Geomagnetic storms interfere with **high-frequency radio communications** and GPS navigation systems.
- **Aircraft flights, power grids, and space exploration programmes** are vulnerable.
- CMEs, with ejectiles loaded with matter traveling at millions of miles an hour, can potentially create disturbances in the magnetosphere, the protective shield surrounding the Earth.
- **Astronauts** on spacewalks face health risks from possible exposure to solar radiation outside the Earth's protective atmosphere.

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News in Between the Lines

Kawal Tiger Reserve (KTR)



❖ Context

- The Forest Department's Jannaram and Khanapur divisions will jointly host the maiden **bird walk in several parts of the Kawal Tiger Reserve (KTR)**.
- This will be done in order to **expose its biodiversity to nature lovers**, wildlife photographers and birders on February 12 and 13.

❖ About KTR

- The Kawal Tiger Reserve (KTR) is **located at Jannaram mandal of Adilabad district in Telangana**.
- The reserve covers a core area of 892.23 sq km and a buffer zone of 1,123.21 sq km.
- **Flora:-**
 - There are more than 600 kinds of trees with various compositions such as pure teak, bamboo with teak, pure bamboo and so on.
- **Fauna:-**
 - It is home to many mammal species such as tiger, leopard, gaur, cheetal, sambar, nilgai, barking deer, chowsingha, sloth bear, etc.
 - There are around 300 bird species.
 - **Green-winged teal, northern pintail, painted stork, river lapwing, painted storks**, and many other bird species were spotted in KTR.
 - Rare birds such as the **grey-headed fish eagle, crested-tree swift, river-lap wing, white-rumped munia, black stork**, and others also can be seen.

Powerthon-2022



❖ Context

- Recently, the Union Power Minister launched a hackathon, named Powerthon-2022, to **find tech-driven solutions for quality power supply**.

❖ Key Highlights

- It is an **Initiative under the Revamped Distribution Sector Scheme (RDSS)**.
 - The RDSS is a reform-based and result-linked scheme introduced by the ministry of power.
 - The key objectives of RDSS are
 - Reducing AT&C (aggregate technical and commercial) losses to 12-15 per cent.
 - Eliminating the ACOS-ARR (actual cost of supply and actual revenue realised) gap by 2024-25 .
 - Improving the quality and reliability of the power supply.
- The competition will **bring together qualified mentors with TSPs (Technology Solution Providers)**, innovators, and other participants to create teams for efficient electricity networks.
- The hackathon will task participants to find **innovative solutions based on advanced emerging technologies** like artificial intelligence, machine learning, blockchain and the Internet of Things on nine themes that have been identified after various discussions with 14 discoms across nine states.

SAMRIDH Initiative

❖ Context

- Recently, The **Atal Innovation Mission (AIM), NITI Aayog, and the U.S. Agency for International Development (USAID)** announced a new partnership under the Sustainable Access to Markets and Resources for Innovative Delivery of Healthcare (**SAMRIDH**) initiative.

❖ Key Highlights

- This partnership aims to **improve access to affordable and quality healthcare for vulnerable populations** in tier-2 and tier-3 cities, and rural and tribal regions.
- **USAID, IPE Global, and stakeholders from the Indian government, private sector and academia** developed the innovative **SAMRIDH blended finance**





facility in 2020, for combining **philanthropic and public funds with commercial capital**, in a bid to create and rapidly scale market-based health solutions.

- This partnership will enhance SAMRIDH's efforts for reaching vulnerable populations and leveraging expertise of AIM in innovation and entrepreneurship.
- **AIM and SAMRIDH** will leverage public sector resources and philanthropic capital for offsetting barriers for commercial investments across small and medium health enterprises for investing in and scale healthcare solutions.
- This collaboration will also focus on **innovations across the healthcare landscape** with a common goal to mount an effective response towards the ongoing third wave of COVID-19.

ABVKY

❖ Context

- **Atal Beemit Vyakti Kalyan Yojana (ABVKY)** is being implemented by the **Employees' State Insurance Corporation (ESIC)**

❖ Key Highlights

- The scheme is covered under **Section 2(9) of ESI Act, 1948**, in the form of relief payment **upto 90 days, once in a lifetime**.
- The **unemployment benefit** under the ABVKY **has been enhanced to 50% from 25%** of the average daily earning, payable upto 90 days, along with **relaxation of eligibility conditions** to claim the benefit for insured workers who have lost employment due to **COVID-19**.
- The scheme came into force on 01.07.2018 and extended twice from 01.07.2020 to 30.06.2021 and again from 01.07.2021 to 30.06.2022.
- The major eligibility conditions are
 - The Insured Person should have been in **insurable employment for a minimum period of two years** immediately before her/his unemployment
 - He should have **contributed for not less than 78 days in the contribution period** immediately preceding to the unemployment
 - The relief shall become **due for payment after 30 days** from date of unemployment

अटल बीमित व्यक्ति
कल्याण योजना



❖ Context

- 7th Centenary Celebrations of Sri Madhwacharya on the occasion of Madhwa Navami.

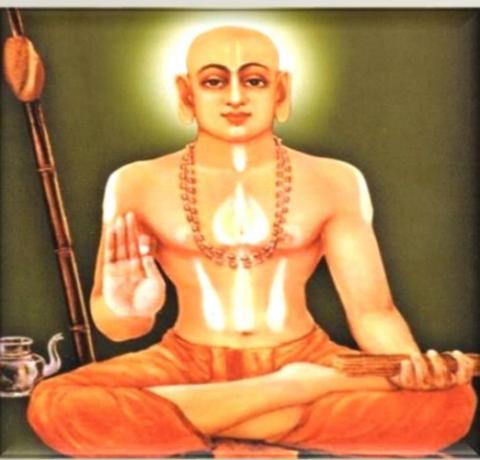
❖ Key Highlights

- He was also known as **Purna Prajna** and **Anand Tirtha**
- Born in Pajaka, **near Udupi**, Karnataka in the **13th century**, he became a monk in teenage years and joined Advaita monastery under Achyuta Preksha. However, unconvinced of Advaita philosophy, he left the monastery.
- He was the chief proponent of **Dvaita** in contrast to **Advait & Vishishtadvaita** schools of thoughts of Shankaracharya and Ramunaja respectively.
- He called his philosophy - **Tattvavada** - arguments from a realist viewpoint
- He accepted three correct means of knowledge - **Pratyaksha** (perception) , **Anuman** (inference) & **Sabda** (testimony of past experts) .
- His greatest work is considered to be **Anuvyakhyana** - a philosophical supplementary in poetic form to his commentary on Brahma sutras.
- The Dvaita thought influenced **Bhakti Movement** of medieval period.

❖ Dvaita Philosophy

- There are two **tattvas** (reality) primarily - independent and dependent
- **Brahman** is the cause of universe and the **independent reality** while the created universe, consisting of **Jiva** (sentient soul) and **Jada** (non-sentient matter), is the **dependent reality**.
- For liberation, **mere intellectual conceptualization** of Brahman as creator is **not enough**, the individual soul must feel attraction, love, attachment and devotional surrender to Him, and **only his grace leads to redemption** and liberation .

Madhavacharya



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