WHAT IS A NUCLEAR FUSION REACTION?

U.S. scientists have repeated a major scientific breakthrough - a nuclear fusion reaction that gave off more energy than went into it for a second time.

About Nuclear Fusion Reaction:

- Nuclear fusion reaction **involves combining two atomic nuclei to form a single heavier one, releasing an enormous amount of energy.**
- Such reactions **do not occur at room temperature** and **large amounts of energy are required to create conditions** conducive to generating fusion-powered energy.
- It is the **same fundamental reaction that powers the sun and other stars**.

What is Nuclear Fission?

- Nuclear Fission is **a type of nuclear reaction** in which the **nucleus of an atom is split into two or more** smaller nuclei, along with the **release of a significant amount of energy.**
- **Process**:
  - It occurs when a **large, heavy atomic nucleus**, **typically of elements like uranium-235 or plutonium-239, absorbs a neutron.**
  - The **nucleus becomes unstable and splits into two or more smaller nuclei**, **releasing additional neutrons, gamma rays,** and a vast amount of **energy** in the form of kinetic energy.
  - The **additional neutrons can further cause fission** in nearby nuclei, **leading to a chain reaction.**

Nuclear Reactors:

- **Nuclear fission is employed in nuclear reactors to generate electricity**.
- In these reactors, **controlled fission reactions take place within fuel assemblies**, typically **using enriched uranium or plutonium**.
- The **heat produced** during fission **is used to generate steam**, which **drives turbines to produce electricity.**

- **Issues with Nuclear Fission Reactors:**
  - **Radioactive Waste:** Nuclear fission **produces radioactive waste** that remains hazardous for thousands of years.
  - **Nuclear Accidents:** The potential for **nuclear accidents**, although rare, **is a significant concern.**
  - **High Initial Costs:** Building nuclear fission reactors **involves substantial upfront costs**, making it a **capital-intensive energy option.**
  - **Limited Fuel Supply:** Most nuclear fission reactors **use enriched uranium as fuel**, which **is a finite resource**. While there is plenty of uranium in the world, the **high-grade, economically viable deposits are limited.**

Advantages of Nuclear Fusion Reactors:

- **Nuclear Fusion produces more energy** than fission does. This means that a given amount of fuel yields much greater amounts of energy with fusion than with fission.
- It also **doesn't produce radioactive byproducts** that need to be stored, **or harmful carbon emissions**; it simply **produces inert helium and a neutron.**
- **Unlimited Fuel supply: The fuel** to make fusion happen **is simply heavy hydrogen atoms, which can be found in** something that Earth has in abundance: **No mining of uranium is required.**
- It is **much safer than nuclear fission**, **since fusion can't create runaway reactions.**

SHALIGRAMS

Shaligrams, worshipped by Hindus and Buddhists for over 2,000 years, are becoming rarer because of climate change

About Shaligrams:

- For more than 2,000 years, **Hinduism, Buddhism and the shamanic Himalayan religion** of Bon have venerated Shaligrams.
- These are **ancient fossils of ammonites**, a class of extinct sea creatures related to modern squids.

- Originating from a single remote region in northern Nepal in the **Kali Gandaki River Valley of Mustang.**
- These stones are viewed primarily as manifestations of the Hindu god Vishnu.
- Because they are not human-made, but created by the landscape, they are believed to have an intrinsic consciousness of their own.
- As a result, Shaligrams are kept in homes and in temples, where they are treated as both living gods and active community members.

Impacts of climate change

- Climate change, faster glacial melting, and gravel mining in the Kali Gandaki are changing the course of the river, which means **fewer Shaligrams are appearing each year.**
- This is mainly because the **Kali Gandaki is fed by meltwater from the Southern Tibetan** Plateau.
- But with the glacier disappearing, the river is becoming smaller and shifting away from the fossil beds that contain the ammonites needed to become Shaligrams.

EXERCISE MALABAR

The 31st edition of the Malabar multilateral exercise will be held off Sydney from August 11-21.

About Exercise Malabar:

- It was **started in 1992 as a bilateral naval exercise** between India and US navy.
- The first Malabar Exercise in the Bay of Bengal took place in 2007.
- It was expanded into a **trilateral format with the inclusion of Japan in 2015.**
- In 2020, the Australian Navy joined the Malabar Exercise, making it a quadrilateral naval exercise.
- The aim of the Malabar Exercise of India, the US, Japan and Australia is to coordinate for a free, open, and inclusive Indo-Pacific.

- It takes place **annually in the Indian Ocean and Pacific Oceans alternatively.**
- This exercise includes a diverse range of activities such as fighter combat operations and maritime interdiction operations.

Other Joint Maritime Exercises of India

- **IBSAMAR** It is a maritime exercise held by India, South Africa, and Brazil.
- **SIMBEX** India and Singapore.
- **SLINEX** India and Sri Lanka.

CENTRE TO LOOK INTO 'HAVANA SYNDROME'

Why in news?

- The Central government has told the Karnataka High Court that it will look into the matter of the 'Havana Syndrome' in India.

What is Havana Syndrome?

- Havana Syndrome refers to a set of mental health symptoms that are said to be experienced by US intelligence and embassy officials in various countries.
- It typically involves symptoms such as
  - hearing certain sounds without any outside noise being present;
  - nausea, vertigo and headaches, memory loss and issues with balance.

Background:

- In late 2016, US diplomats and other employees stationed in Havana reported feeling ill after hearing strange sounds and experiencing odd physical sensations.
- The symptoms included nausea, severe headaches, fatigue, dizziness, sleep problems, and hearing loss, which have since come to be known as "Havana Syndrome".

What are the causes of Havana Syndrome?

- No one is entirely sure. Initially, it was speculated to be a sonic attack done by Cuban intelligence agencies.
- Later, the National Academy of Sciences noted in its report that the best explanation for the syndrome would be **pulsed, directed microwaves**.
  - Microwaves are a type of electromagnetic radiation with wavelengths longer than those of visible light but shorter than those of radio waves.
- The report suggested that the victims may have been subjected to high-powered microwaves that either damaged or interfered with the nervous system.
- It is suspected that beams of high-powered microwaves are sent through a special gadget known as "microwave weapon".

Havana Syndrome in India

- In India, the first such case was reported in September 2021, when a US intelligence officer travelling to New Delhi with CIA director William Burns reported symptoms of Havana Syndrome.
- As of July 2023, the 2021 incident was the only reported occurrence of the syndrome in India.

What are microwave weapons?

- Microwave weapons are supposed to be a type of direct energy weapons.
- It uses beams of high-frequency electromagnetic radiation to heat the water in a human target's skin, causing pain and discomfort.
- A number of countries are thought to have developed these weapons to target both humans and electronic systems.
  - China had put on display its "microwave weapon", called Poly WB-1, at an air show in 2014.
  - The United States has also developed a prototype microwave-style weapon, which it calls the "Active Denial System".

GOVERNMENT OF NATIONAL CAPITAL TERRITORY OF DELHI (AMENDMENT) BILL, 2023

Why in News?

- The Government of National Capital Territory of Delhi (Amendment) Bill, 2023, which replaces the ordinance on control of services in Delhi, has been passed by both the Houses of the Parliament.

Central & Delhi Government's Arguments:

- The Delhi government has argued that in the interest of federalism, the elected representatives must have power over transfers and postings.
- On the other hand, the Central Government has consistently maintained that because Delhi is the national capital and the face of the country, it must have control over administrative services, which include appointments and transfers.

News Summary:

- The **Government of National Capital Territory of Delhi (Amendment) Bill, 2023**, which replaces the ordinance on control of services in Delhi, has been passed by both the Houses of the Parliament.
- **Key Features of the Bill –**
  - **National Capital Civil Services Authority (NCCSA)** –
    - The Bill establishes the National Capital Civil Services Authority to make recommendations to the LG on certain matters related to services.
    - These include: (i) transfers and postings, (ii) matters related to vigilance, (iii) disciplinary proceedings, and (iv) prosecution sanctions of Group A of All India Services (except Indian Police Service), and DANICS.
    - The Authority will consist of the: (i) Chief Minister of Delhi as Chairperson, (ii) Principal Home Secretary of the Delhi government as Member Secretary, and (iii) Chief Secretary of the Delhi government as member.
    - The central government will appoint both the Principal Home Secretary and Chief Secretary.
    - All decisions of the Authority will be based on a majority vote of the members present and voting.
  - **Powers of the LG –**

- Under the Act, matters where the LG may act on his discretion are: (i) matters outside the legislative competence of the Delhi Legislative Assembly but which have been delegated to the LG, or (ii) matters where he is required by a law to act in his discretion or exercise any judicial or quasi-judicial functions.
- The Bill specifies that in these matters, the LG will act in his sole discretion.
- It expands the discretionary role of the LG by giving him powers to approve the recommendations of the Authority, or return them for reconsideration.
- **In the case of a difference of opinion between the LG and the Authority, the former's decision will be final**.

- **Disposal of Matters by Ministers –**

- A Minister of the Delhi government may issue standing orders for the disposal of matters brought to his attention.
- The order should be issued in consultation with the concerned Department Secretary.
- Certain matters must be submitted to the LG, through the Chief Minister and the Chief Secretary, for his opinion prior to the issue of any order.

- **Duties of Secretaries –**

- Additionally, the concerned Department Secretary must bring certain matters to the notice of the LG, the Chief Minister, and the Chief Secretary.
- These include matters which may bring the Delhi Government into controversy with the central or any state government, the Supreme Court, or High Court of Delhi.

RAHUL GANDHI'S MP STATUS RESTORED

Why in news?

- Congress leader Rahul Gandhi, whose conviction in a defamation case over remarks on the Modi surname was stayed by the Supreme Court, returned to the Lok Sabha.
- The Lok Sabha Secretariat has notified the restoration of Rahul's membership.

What are the legal provisions regarding the disqualification of MPs/MLAs?

- Disqualification of a lawmaker is prescribed in three situations.

- First is through the **Articles 102(1) and 191(1)** for disqualification of a member of Parliament and a member of the Legislative Assembly respectively.
  - The grounds here include holding an office of profit, being of unsound mind or insolvent or not having valid citizenship.
- The second prescription of disqualification is in the **Tenth Schedule of the Constitution**.
  - This provides for the disqualification of the members on grounds of defection.
- The third prescription is under **The Representation of the People Act (RPA), 1951**.
  - This law provides for disqualification for conviction in criminal cases.

What does the RPA say?

- There are several provisions that deal with disqualification under the RPA.
- **Section 8 of the RPA** deals with disqualification for conviction of offences.
  - **Section 8(1A) of the act** includes specific offences such as promoting enmity between two groups, bribery, and undue influence or personation at an election.
  - **Section 8(2A)** lists offences that deal with hoarding or profiteering, adulteration of food or drugs and for conviction and sentence of at least six months for an offence under any provisions of the Dowry Prohibition Act.
  - **Section 8(3A)** disqualifies a convicted person who has been sentenced to imprisonment for not less than two years.
  - He is disqualified from the date of such conviction and shall continue to be disqualified for a further period of six years since his release.
- **Section 9** deals with disqualification for corruption or disloyalty, and for entering into government contracts while being a lawmaker.
  - **Section 9(A):** Disqualification for Government contracts, etc.
- **Section 10**: Disqualification for office under Government company.
  - Section 10(A). Disqualification for failure to lodge account of election expenses.
- **Section 11:** Removal or reduction of period of disqualification.
  - Section 11(A): Disqualification arising out of conviction and corrupt practices.
  - Section 11(B): Removal of disqualifications.

WHAT IS PERSEID METEOR SHOWER?

The NASA All Sky Fireball Network is already detecting the first meteors of this year's Perseid meteor shower

What is a Meteor Shower?

- A **meteor is a space rock that comes into Earth's atmosphere.**
- **As it falls, the air makes it really hot because of the friction**.

- **The bright streak** we see **is not the rock itself, but the hot air around it.**
- **When many space rocks hit** the atmosphere over Earth together, **we call it a meteor shower.**
- These **meteors travel at incredible speeds**, reaching tens of thousands of kilometers per hour **before disintegrating due to the intense heat generated by friction** with the atmosphere.

About Perseid Meteor Shower:

- It is one of the **most popular and well-known meteor showers** that **occurs annually**.
- It usually **takes place in August**, specifically around **August 11th to 13th,** with **its peak occurring around August 12th.**
- These meteors **are fast and bright**, **leaving trails of light and color behind them** as they move through the sky.
- During the Perseids, **you can see around 50 to 100 meteors every hour.**
- They **usually show up when the weather is warm and the nights are comfortable** for watching the sky.
- The Perseids are **special because they often generate fireballs.**
- **Fireballs are big bursts of light and color that last longer than a regular shooting star.**
- This **happens because fireballs come from larger pieces of material from comets.**