CROSS & CLIMB ROHTAK

Current Affairs : 14 December 2022

INDIA INTERNET GOVERNANCE FORUM (IGF)

The India Internet Governance Forum (IGF), a multi stakeholder platform, is conducted a three-day hybrid event from December 9 to December 11, 2022.

About:

- The India Internet Government Forum is an initiative associated with the UN Internet Governance Forum (UN-IGF).
- The Internet Governance Forum (IGF) is a multi-stakeholder platform bringing representatives together from various groups, all at par to discuss public policy issues related to the Internet.
- The event's goal is to discuss the roadmap to digitization and to reaffirm India's place on the global stage by emphasising its role and importance in international policy development on internet governance.
- **Theme of IIGF 2022:** 'Leveraging Techade for Empowering Bharat'.
- India Internet Governance Forum(IIGF) has been constituted in conformance to IGF-Paragraph 72 of the Tunis Agenda of the UN-based Internet Governance forum (IGF).

TRAMJATRA (TRAM'S JOURNEY)

The Tramjatra is a travelling carnival to celebrate 150 years of Kolkata's iconic tram.

About:

- It seeks to educate the younger generation about climate change, air pollution and sustainable development.
- It will also call upon the West Bengal government to preserve the historic mode of transport.
- It is a moving tram carnival that was started back in 1996 jointly by enthusiasts from Melbourne and Kolkata.

- At the time, Kolkata, the only Indian city where the tram still runs, was home to about two dozen routes. Today, the number of routes that remain operational has shrunk to just two.
- **The theme of the 2023** Tramjatra will be Heritage, Clean Air and Green Mobility.

LINE OF ACTUAL CONTROL (LAC)

Indian and Chinese soldiers suffered "minor injuries" after they were engaged in a face-off along the Line of Actual Control (LAC) in Tawang sector of Arunachal Pradesh on December 9.

About:

- India shares 3488 Km of border with China that runs along the States of Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh.
- The border is not fully and officially demarcated.
- The Line of Actual Control (LAC) is a demarcation line that separates Indian-controlled territory from Chinese-controlled territory.
- LAC is currently the de-facto border between the two countries, and the process of clarifying and confirming the Line of Actual Control (LAC) is in progress.
- **The Line of Actual Control (LAC), is divided into three sectors: western, middle and eastern.**

Areas under LAC:

- **The LAC traverses three areas** —
  - Western (Ladakh, Kashmir),
  - middle (Uttarakhand, Himachal) and
  - eastern (Sikkim, Arunachal).
- As LAC is not fully and officially demarcated, it has led to differing perceptions regarding the alignment, with China making territorial claims in at following areas.

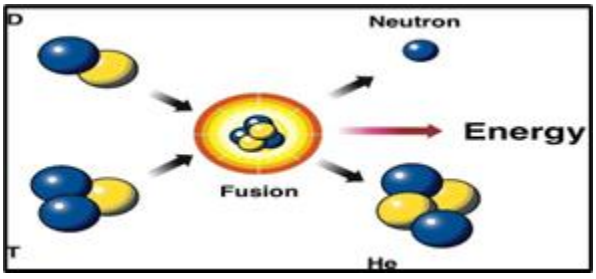
- The countries disagree on the exact location of the LAC in various areas, so much so that India claims that the LAC is 3,488 km long while the Chinese believe it to be around 2,000 km long.
- The two armies try and dominate by patrolling the areas up to their respective perceptions of the LAC, often bringing them into conflict.

US SCIENTISTS ANNOUNCE FUSION ENERGY BREAKTHROUGH

In News:

- Scientists in the United States have, for the first time, achieved a net gain in energy from a nuclear fusion reaction.

About Nuclear Fusion Reactions:



- Nuclear Fusion reactions power the Sun and other stars.
- 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.
  - Albert Einstein's equation, **$E=mc^2$**, says in part that mass and energy can be converted into each other, explains why this process occurs.
- If scientists can harness nuclear fusion, it promises to provide a near-limitless source of clean energy.
- Sun is a giant nuclear fusion reactor. In Sun, the nuclear fusion process occurs mainly between **hydrogen** and **helium**, since that is the bulk of its composition.

Difference Between Fission and Fusion:

- **Fission**:
  - Fission occurs when a neutron slams into a larger atom, forcing it to excite and spilt into two smaller atoms—also known as fission products.
  - When each atom splits, a tremendous amount of energy is released.
  - Uranium and plutonium are most commonly used for fission reactions in nuclear power reactors because they are easy to initiate and control.
  - The energy released by fission in these reactors heats water into steam. The steam is used to spin a turbine to produce carbon-free electricity.
- **Fusion**:
  - Fusion occurs when two atoms slam together to form a heavier atom, like when two hydrogen atoms fuse to form one helium atom.
  - This is the same process that powers the Sun and creates huge amounts of energy—several times greater than fission.
  - Fusion reactions are being studied by scientists, but are difficult to sustain for long periods of time because of the tremendous amount of pressure and temperature needed to join the nuclei together.

How is Fusion better than Fission?

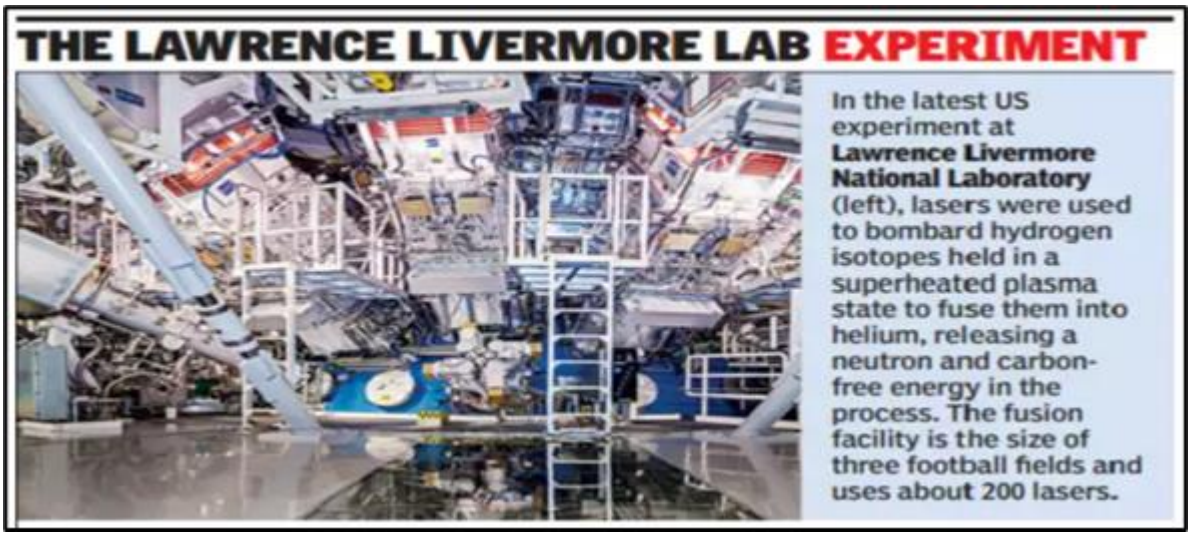
- Both fission and fusion use the binding energy of protons and neutrons in the nuclei of atoms to release an enormous amount of energy.
- The biggest problem with fission is that some of its by-products remain radioactive for years, and have to be disposed of in special facilities.
  - Also, reactor accidents can release radioactive material into the environment, as happened at Three Mile Island in 1979 and at Chernobyl in 1986.
- Nuclear fusion reactors require only universally abundant hydrogen, they could be set up anywhere – unlike **fission reactors that require rare radioactive substances like uranium**.
- Also, the amount of energy produced from fusion is very large— four times as much as nuclear fission reactions — and fusion reactions can be the basis of future fusion power reactors.

- Once fusion energy is commercialised, the world would be able to produce virtually carbon-free electricity without any radioactive by-products.

Why is Fusion Energy so challenging to achieve?

- The Sun's massive gravitational force naturally induces fusion, However, without that force, a higher temperature is needed for the reaction to take place.
- On earth, **we need temperatures exceeding 100 million degrees Celsius and intense pressure to make nuclear fusion work**, and sufficient confinement to hold the plasma and maintain the fusion reaction long enough for a net power gain.
- While conditions that are very close to those required in a fusion reactor are now routinely achieved in experiments, improved confinement properties and stability of the plasma are needed.

News Summary:



- Scientists in the United States have, for the first time, achieved a net gain in energy from a nuclear fusion reaction.
- In simple terms, this is the **first time a fusion reaction has produced more energy than it consumes**.

Significance of this breakthrough:

- Fission-based power plants have been around since the 1950s, and India has several of its own.

- But scientists have been working for years to develop a reactor based on nuclear fusion, which is touted as a clean, abundant and safe source of energy.
  - Nuclear fusion reactor could eventually allow humanity to break its dependence on fossil fuels that are driving a global climate crisis.
- Net energy gain has been an elusive goal because **fusion happens at such high temperatures and pressures that it is incredibly difficult to control**.
- The success of researchers at the Lawrence Livermore National Laboratory in California, USA can be seen as a big step forward in the decades-old endeavour to master a technology that is considered the most dependable source of energy in future.

GEMINIDS METEOR SHOWER

In 2022, the Geminids will peak around December 13-14.

About Geminids Meteor Shower:

- Geminids comes from the constellation Gemini, from whose location in the sky the meteor shower appears to originate.
- The constellation for which a meteor shower is named only serves to aid viewers in determining which shower they are viewing on a given night.
- The constellation is not the source of the meteors.
- If their peak coincides with the new moon, and if the weather is clear, **the Geminids can produce approximately 100-150 meteors per hour for viewing.**
- This year however, the moon is bright, and so only 30-40 meteors per hour will be visible in the Northern Hemisphere.
- **The Geminids are unique because unlike most meteor showers, they originate not from a comet, but from an asteroid, the 3200 Phaethon.**

3200 Phaethon:

- The 3200 Phaethon was discovered on October 11, 1983.
- It is named after the Greek mythology character Phaethon, son of the Sun God Helios.
- It takes 1.4 years to complete one round of the Sun.

- As the 3200 Phaethon moves close to the Sun while orbiting it, the rocks on its surface heat up and break off.
- When the Earth passes through the trail of this debris, the Geminids are caused.

What causes meteor showers?

- Meteors are usually fragments of comets.
- As they enter the Earth's atmosphere at high speed, they burn up, creating a spectacular "shower".
- Meteors come from leftover comet particles and bits from asteroids.
- When these objects come around the Sun, they leave a dusty trail behind them.
- Every year Earth passes through these debris trails, which allows the bits to collide with our atmosphere where they disintegrate to create fiery and colorful streaks in the sky.

GREEN HYDROGEN ELECTROLYSERS

According to India's G20 Sherpa Amitabh Kant, India can transform and become the global leader, exporter, producer of electrolyzer and global champion of green hydrogen.

About Green Hydrogen Electrolysers:

- Hydrogen electrolysers are devices that use electricity to split water into hydrogen and oxygen.
- When electricity input to the electrolyser is obtained from renewable sources like wind and solar, then the hydrogen produced is called **green hydrogen.**
- Typically, electrolysers consume 50-55 kilowatt-hours or units of electricity to produce one kilogram of hydrogen.
- Electrolysers produce hydrogen at about 50-90 degree Celsius and at a pressure of 30-50 bar.
- Electrolysers are commercially available at a size of a few kilowatts (kW) to megawatts (MW).

What are the different electrolyser technologies?

- There are various electrolyser technologies available currently.

- Alkaline electrolysers and polymer electrolyte membrane (PEM) electrolysers are commercially available technologies.
- Alkaline electrolysers use liquid alkaline electrolyte solution of sodium or potassium hydroxide while PEM electrolysers are based on solid polymer membrane.
- In addition to these, there are other proprietary technologies like electrochemical, thermally-activated chemical (E-TAC) and anion exchange membrane (AEM) that claim to be more efficient than existing technology options.