Jupiter Like Protoplanet

Why in News?

Recently, the **Hubble Space Telescope** has photographed a **Jupiter**-like **protoplanet** forming through a process that researchers have described as **intense and violent.**

- The Hubble Space Telescope is a project of international cooperation between **National Aeronautics and Space Administration (NASA)** and ESA (European Space Agency).

What is the Newly Forming Planet?

- The **newly forming planet** captured by Hubble is called **AB Aurigae b** and embedded in a protoplanetary disk with distinct spiral structures swirling around and surrounding a young star that is estimated to be about 2 million years old.
    - That is also about the **same age our solar system** was when planet formation was underway.
    - It is **531 light-years away from our sun.**
- This protoplanet is probably around **nine times the size of Jupiter** and orbits its **host star at a distance of 8.6 billion miles,** over two times the distance between our Sun and **pluto.**

What is a Protoplanet?

- Protoplanets are small celestial objects that are the size of a moon or a bit bigger. They are small planets, like an even smaller version of a **dwarf planet.**
    - Astronomers believe that these objects form during the creation of a solar system.
- The most popular theory of how a solar system is formed says that a **giant cloud of molecular dust collapsed, forming one or more stars.**
- Then a cloud of gas forms around the new star. As a result of gravity and other forces, **the dust and other particles in this cloud collide and stick together** forming larger masses.
- While **some of these objects break apart on impact, a number of them continue to grow.**
- Once they reach a certain size – around a kilometre – these objects are large enough to attract particles and other small objects with their gravity. **They continue to get larger until they form protoplanets.**

What is NASA's Disk Instability Theory?

- According to NASA, this discovery supports a long-debated theory called **"disk instability,"** which tries to explain how planets similar to Jupiter are formed.
    - The model is for giant planet formation where a protoplanetary disk becomes dense and cool enough to be unstable to gravitational collapse and thereby resulting in the formation of a gaseous protoplanet.
- According to the Disk Instability theory, **matter slowly moves inwards in this disc as dust particles grow to centimetre-sized pebbles.**
- This is seen as the first step towards the formation of **kilometre-sized planetesimals** that

eventually come together to form planets.

- **Planetesimals** are solid objects thought to exist in protoplanetary disks and debris disks.

Source: IE