James Webb Telescope's first images

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In news—NASA has recently released the first full-colour images and spectroscopic data of the universe taken by the James Webb Space Telescope.

Images by James Webb Space Telescope-

- Images give us a chance to see faint distant galaxies as they were more than 13 billion years ago.
- **The first five images released are**:
    1. **The deep field image of the SMACS 0723 cluster of galaxies** which date back to times when the first stars were born.
    2. The **Carina Nebula** vividly shows the birth of new stars.
    3. The **Southern Ring Nebula** which details a dying star.
    4. The **Stephan's quintet** where we can see the cataclysmic cosmic collision of galaxies and
    5. The **WASP-96 b**, an exoplanet (a planet orbiting a distant star).
- The **spectroscopic observation of JWST reveals that there is a considerable amount of water vapour in the WASP-96 b's atmosphere**. However due to the blistering heat, WASP-96 is unlikely to host life.
- These **images also raise interesting points about how the expansion of the Universe factors** into the way we calculate distances at a cosmological scale.
- These first images from the world's largest and most powerful space telescope demonstrate Webb at its full power, ready to begin its mission to unfold the infrared universe.

More details of the images-

Cluster of galaxies-

- The SMACS 0723 is a noted **cluster of galaxies around 5.12 billion light-years away.**
- **Situated in the direction of the southern constellation of Volans**, the **image is as it appeared 4.6 billion years ago, about the same time when the Sun and the Earth evolved**.
- The cluster has been **previously studied by Hubble, Planck and Chandra space telescopes.**

Carina Nebula-

- A stellar nursery booming with new stars is a **giant interstellar gas cloud in our galaxy** called NGC 3324, **located in the direction of the Carina Nebula.**
- The stunning image of an edge of the NGC 3324, dubbed Cosmic Cliff, **located approximately 7,600 light-years from Earth**, is **home to many more massive and young stars than our Sun.**

A star on its deathbed-

- **The Eight-Burst Nebula, also known as the Southern Ring Nebula or NGC 3132, is a well-known planetary nebula in the constellation Vela**, located approximately 2,500 light-years from Earth.
- Despite their name, planetary nebulae have nothing to do with planets. **They are gas shells formed from the cast-off outer layers of a dying star.**

Cosmic waltz-

- **Situated in the direction of the constellation Pegasus**, around 290 million light-years away from Earth, is the clutch of five galaxies, each bound with the other called the Stephan's Quintet.
- Two of them are currently in the process of merging into

one another.

WASP-96 b-

- Located around 1,150 light-years from Earth, WASP-96b **is an exoplanet** (a planet that orbits another star) orbiting a star named WASP-96.
- **The planet has a mass half that of Jupiter** and goes around the central star every 3.4 days.
- The spectroscopic observation of JWST reveals, for example, that there is a considerable amount of water vapour in the WASP-96 b's atmosphere.
- With blistering heat, WASP-96 is unlikely to host life.

About James Webb Space Telescope-

- The $10 billion telescope is a space telescope is a **joint venture of NASA, European Space Agency (ESA), and the Canadian Space Agency.**
- It was launched on 25 December 2021 on an Ariane 5 rocket from Kourou, French Guiana, and arrived at the Sun–Earth L2 Lagrange point in January 2022.
- It succeeded the Hubble Space Telescope as NASA's flagship astrophysics mission.
- **It will observe in near-infrared light rather than light in the visible part of the spectrum (unlike Hubble) and** thus it will have a much greater capacity to see obscure stars and galaxies.
- **Webb has two primary scientific missions,** which together will account for more than 50 percent of its observation time.
    - First, **explore the early phases of cosmic history, looking back in time to only a few hundred million years after the Big Bang.**
    - Its second major goal is the **discovery of exoplanets, meaning planets outside the solar system. It will also investigate the potential for life on those worlds** by studying their

atmospheres.

- **It was formerly known as the “Next Generation Space Telescope” (NGST) and it was renamed in 2002 after a former NASA administrator, James Webb.**
- Unlike Hubble, the current premier space telescope that revolves around the planet, Webb will orbit the Sun.
- **It will remain directly behind Earth, from the point of view of the Sun,** allowing it to remain on our planet’s night side.
- The broad range of infrared wavelengths detectable by JWST allow it to see galaxies Hubble never could.
- Using the JWST, scientists will be able to capture extremely distant galaxies as they were only 100 million years after the Big Bang – which happened around 13.8 billion years ago.