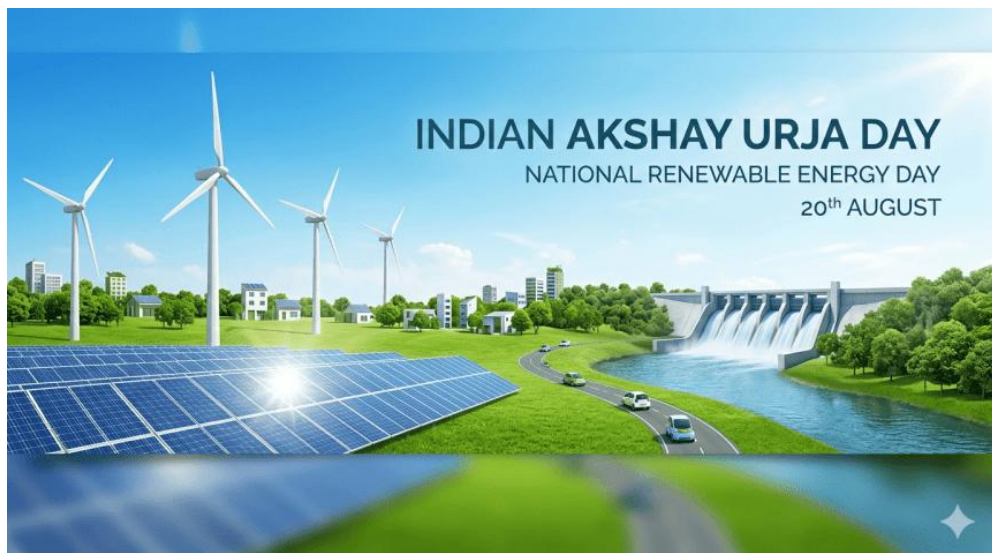


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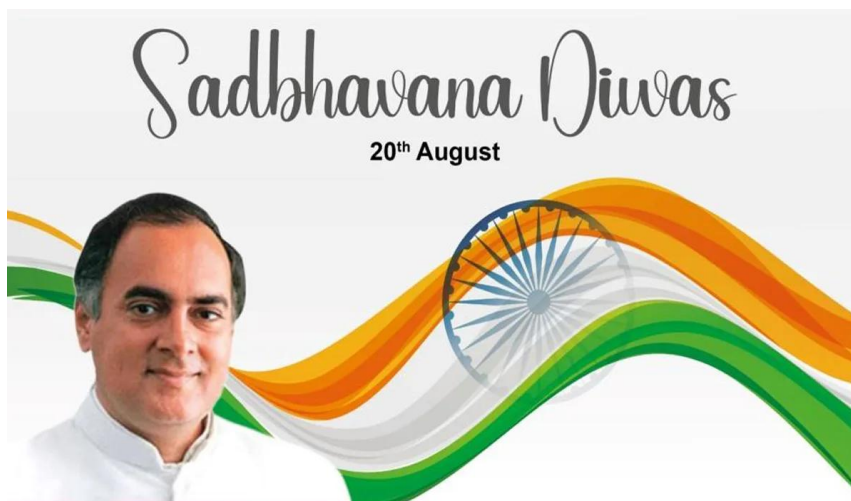
Indian Akshay Urja Day 2026

- The Indian Akshay Urja Day 2026 is celebrated on August 20th, this day raise the awareness about renewable energy and promote the use of clean and sustainable energy sources. The phrase “Akshay Urja” stands for “inexhaustible energy.”
- This term refers to energy that is naturally renewable, such as solar, wind, hydroelectric, biomass, and geothermal energy. The significance of the event is connected with the growing capacity of renewable energy production in India.
- The main goals of Akshay Urja Day 2026 are,
 - Creation of awareness regarding sources of renewable energy.
 - Encouragement to use energy that is sustainable and clean.
 - Stressing the significance of energy conservation.
 - Creating awareness regarding the advancements in the field of renewable-energy technology.
 - Educating young people and students about sustainable energy.



Sadbhavana Diwas 2026

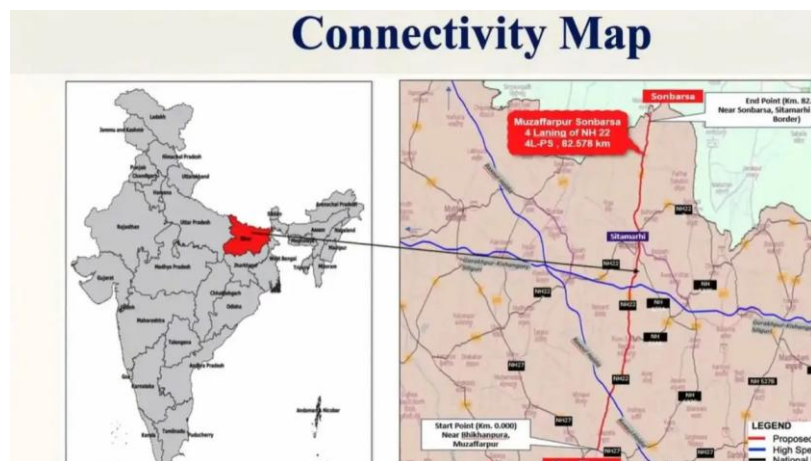
- Sadbhavana Diwas is celebrated every year on August 20 in honor of the birthday of former Prime Minister of India, Rajiv Gandhi. The day is linked with the themes of peace, national unity, harmonious relations between members of various religions and communities.
- Following the death of his mother and former Prime Minister, Indira Gandhi, assassinated on October 31, 1984, Rajiv Gandhi came to power as Prime Minister when he was only 40 years old, making him the youngest Prime Minister of India.
- Initially, Rajiv Gandhi was not a politician. He began his professional career as a pilot. Although his brother was more engaged in politics than him, after the death of his younger brother in 1980, Rajiv became more politically active.
- Rajiv Gandhi became involved in politics and joined the Lok Sabha. In October 1984, his political career underwent drastic changes. On October 31, 1984, the Prime Minister of India Indira Gandhi was assassinated by her own Sikh bodyguards. This led to a serious political and social crisis.



NH-22 Four-Laning: Muzaffarpur-Sitamarhi Project

- NH-22 Four-Laning Project in Bihar is sanctioned by the Cabinet Committee on Economic Affairs under the chairmanship of PM Narendra Modi.

- The project envisages development of a four-lane stretch of NH-22 from Muzaffarpur to Sonbarsa covering 82.578 km at the cost of **₹3,590.73 crore** through Hybrid Annuity Mode (HAM).
- Some of the key infrastructure that will be developed under this project are,
- 7 major bridges
- 3 Railway Over Bridges (ROBs)
- Two flyovers with the length of 1,170 metres and 270 metres
- A major bridge of 340 metres over the perennial Bagmati River.
- NH-22 once improved is likely to reduce travel time, congestion, fuel use and operational costs. Better connectivity may also help to increase efficiency in the transportation of goods such as agricultural produce.
- The corridor will boost access to Punaura Dham, Mata Janki Temple and Baba Garibnath Temple, while enhancing connections with the rest of the highway network in Bihar.



Scientists Discover Mega-Earth GJ 523b

- GJ 523b is an exoplanet identified as a “mega-Earth” with a radius about 2.55 times that of Earth and a mass of 23.5 Earth masses. It orbits a mid-K dwarf star and has an estimated bulk density of about 7.8 grams per cubic centimetre.
- Exoplanets are planets that orbit stars outside the Solar System. A “mega-Earth” is a proposed class of rocky exoplanet with a radius of at least 2.1 Earth radii and a density of at least 5.5 grams per cubic centimetre.

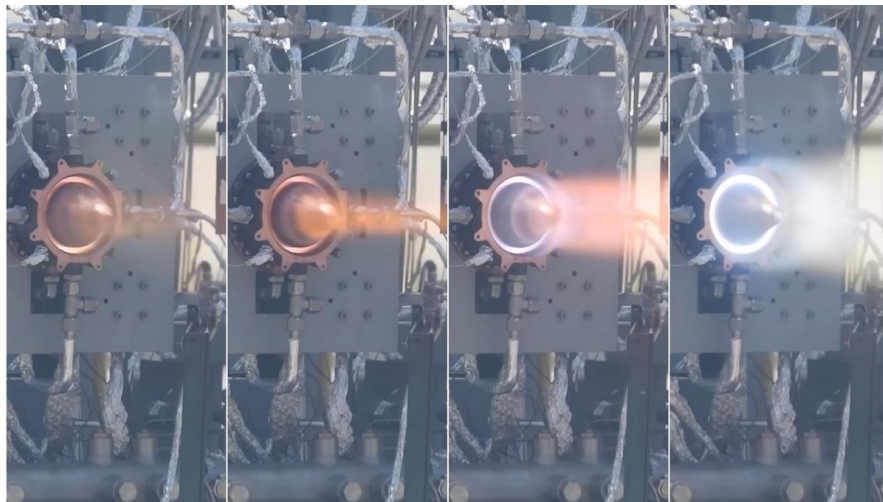
- GJ 523b completes one orbit around its host star in 17.75 days. Its estimated zero-albedo equilibrium temperature is 538 Kelvin, and its minimum orbital obliquity is 71.4 degrees, which places it in a highly tilted polar orbit.
- The planet's properties were derived from transit data and radial velocity measurements. NASA's Transiting Exoplanet Survey Satellite (TESS) provided transit observations, while the NEID spectrograph on the WIYN 3.5-metre Telescope in Arizona supplied radial velocity data.
- GJ 523b is part of a planetary system estimated to be 169 million years old. A rocky core of 23.5 Earth masses would normally be expected to accrete a thick gas envelope and form a gas giant.



Rotating Detonation Engines

- India-based defence start-up D-Propulse successfully demonstrated India's first indigenous 5 kN air-breathing Rotating Detonation Engine (RDE), at a DRDO facility in Hyderabad, achieving Technology Readiness Level-5 (TRL-5).
- The milestone marks a significant step towards strengthening India's indigenous next-generation air-breathing propulsion capabilities.
- **Rotating Detonation Engine (RDE):** A RDE is advanced propulsion technology that uses continuous supersonic detonation waves, potentially offering higher thermodynamic efficiency and a more compact combustor than conventional engines.
- **Conventional Combustors (Deflagration):** The flame front travels at subsonic speeds (below the speed of sound) at constant pressure, allowing the fuel-air mixture to expand as it heats up, resulting in significant heat loss.

- **Detonation Engines (Detonation):** The flame front propagates at supersonic speeds (above the speed of sound), creating a high-energy shock wave at constant volume; this compresses the unburned mixture immediately before combustion, converting significantly more chemical energy directly into pressure and thrust.
- RDEs offer 10% to 25% higher thermodynamic efficiency than traditional rocket engines.
- A 20% gain in thermodynamic efficiency translates to requiring roughly 17% less fuel, which directly lowers launch costs and allows vehicles to carry larger satellite payloads or heavier missile warheads.



REVIEW QUESTIONS

1. Indian Akshay Urja Day is observed every year on:

- A) 15 August
- B) 19 August
- C) 20 August
- D) 22 August

Answer: C) 20 August

2. The term “Akshay Urja” refers to:

- A) Nuclear energy
- B) Inexhaustible energy
- C) Thermal energy
- D) Fossil-fuel energy

Answer: B) Inexhaustible energy

3. Sadbhavana Diwas is associated with the birth anniversary of:

- A) Jawaharlal Nehru
- B) Rajiv Gandhi
- C) Indira Gandhi
- D) Sardar Vallabhbhai Patel

Answer: B) Rajiv Gandhi

4. What is the sanctioned length of the NH-22 four-laning project between Muzaffarpur and Sonbarsa?

- A) 72.578 km
- B) 82.578 km
- C) 92.578 km
- D) 102.578 km

Answer: B) 82.578 km

5. What is the estimated cost of the NH-22 Muzaffarpur–Sonbarsa four-laning project?

- A) ₹2,590.73 crore
- B) ₹3,090.73 crore
- C) ₹3,590.73 crore
- D) ₹4,590.73 crore

Answer: C) ₹3,590.73 crore

6. Which exoplanet has been identified as a “mega-Earth”?

- A) GJ 523b
- B) Kepler-22b
- C) Proxima b
- D) TOI-700 d

Answer: A) GJ 523b

7. Which NASA mission provided transit observations of GJ 523b?

- A) James Webb Space Telescope
- B) TESS
- C) Hubble Space Telescope
- D) Chandra X-ray Observatory

Answer: B) TESS

8. GJ 523b has approximately how many times Earth's mass?

- A) 12.5 times
- B) 18.5 times
- C) 23.5 times
- D) 28.5 times

Answer: C) 23.5 times

9. Which Indian defence start-up demonstrated a 5 kN indigenous air-breathing Rotating Detonation Engine?

- A) Agnikul Cosmos
- B) Skyroot Aerospace
- C) D-Propulse
- D) Bellatrix Aerospace

Answer: C) D-Propulse

10. The indigenous Rotating Detonation Engine demonstrated by D-Propulse achieved which Technology Readiness Level?

- A) TRL-3
- B) TRL-4
- C) TRL-5
- D) TRL-6

Answer: C) TRL-5