

SCIENCE AND TECHNOLOGY

RING NEBULLA

In Context

- Astronomers used the James Webb Space Telescope to capture this striking new image of Messier 57, more popularly known as the Ring Nebula.
- The nebula in the image is actually the glowing remains of a sun-like star and at its centre is the star's hot core, which is called a white dwarf.

Details

- The Ring Nebula, also known as Messier 57 or M57, is one of the most famous and visually striking objects in the night sky.
- Located in the constellation Lyra, approximately 2,000 light-years away from Earth, the Ring Nebula is a planetary nebula formed from the remnants of a dying star.



Formation and Structure of the Ring Nebula

Stellar Evolution

- The Ring Nebula was once a main-sequence star, similar to our Sun, that exhausted its nuclear fuel.
- As the star's core ran out of hydrogen, it underwent a series of nuclear fusion reactions, causing it to expand into a red giant.

Shedding Outer Layers

- In the red giant phase, the star expels its outer layers into space through powerful stellar winds.
- These expelled layers form an expanding shell of ionized gas and dust, creating the iconic ring-like structure.

The Appearance of the Ring Nebula

Visual Observations

- The Ring Nebula appears as a vividly colored, donut-shaped structure with a dark center.
- It is most prominently visible through telescopes with a diameter of 8 inches or more.

Colors and Composition

- The striking colors of the Ring Nebula are due to ionized gases, primarily hydrogen and helium, emitting light at different wavelengths.
- The central dark region is a result of the shadow cast by the dense, cooler dust and gas in the nebula.

Scientific Significance and Study of the Ring Nebula

• **Stellar Evolutionary Insight**

- ✓ Planetary nebulae like the Ring Nebula provide crucial information about the final stages of a star's life.
- ✓ Studying their structures and composition helps astronomers understand the processes that occur during stellar death.

• **Distance Determination**

- ✓ The Ring Nebula has been extensively studied to determine its distance from Earth, helping refine the cosmic distance ladder.
- ✓ Accurate distance measurements to such celestial objects aid in calculating distances to other distant celestial bodies.

Observing the Ring Nebula

• **Amateur Observations**

- ✓ The Ring Nebula is a popular target for amateur astronomers due to its distinct appearance.
- ✓ Observers with moderately-sized telescopes can capture its beauty and learn about the basics of astrophotography.

• **Professional Observations**

- ✓ Advanced telescopes, such as the Hubble Space Telescope, have captured detailed images of the Ring Nebula, revealing intricate structures within the nebula.
- ✓ These high-resolution images help scientists study the complex dynamics and evolution of the nebula.

James Webb Telescope

- The James Webb Space Telescope (JWST) is a revolutionary space observatory and one of NASA's most ambitious and complex missions.

- It is designed to be the successor to the Hubble Space Telescope and promises to significantly enhance our understanding of the universe.
- The JWST is a collaboration between NASA, the European Space Agency (ESA), and the Canadian Space Agency (CSA).

Key Features and Objectives

- **Advanced Technology:** The JWST features state-of-the-art technology, including a large segmented mirror, which is 6.5 meters (21.3 feet) in diameter, and four advanced scientific instruments. The telescope is designed to operate in the infrared range, enabling it to see through dust clouds and observe distant objects with greater clarity.
- **Deep Space Exploration:** The primary objective of the JWST is to explore the distant universe, including the formation of the first galaxies, stars, and planetary systems. It will peer back in time to observe celestial objects that formed shortly after the Big Bang.
- **Studying Exoplanets:** The JWST will study exoplanets, planets orbiting stars beyond our solar system, to characterize their atmospheres and potential habitability. It will help astronomers search for signs of life on other planets and understand the diversity of exoplanetary systems.
- **Understanding Star and Galaxy Formation:** By observing star-forming regions and distant galaxies, the JWST will provide insights into the processes that govern the formation and evolution of stars and galaxies throughout cosmic history.
- **Investigating Solar System Objects:** The telescope will also study objects within our solar system, such as asteroids, comets, and the outer planets. It will contribute to our understanding of the solar system's origins and evolution.

Launch and Deployment

- The JWST was launched on December 25, 2021, aboard an Ariane 5 rocket from the Guiana Space Centre in French Guiana.
- The telescope is currently positioned at the second Lagrange point (L2), located about 1.5 million kilometers (nearly 1 million miles) from Earth.

Conclusion: The Ring Nebula, a stunning cosmic jewel, represents the final stages of a star's life and provides essential insights into stellar evolution. Its colorful and distinct appearance makes it a favorite target for amateur astronomers, while professional observatories offer detailed views of its intricate structure. As one of the most iconic planetary nebulae in the night sky, the Ring Nebula continues to fascinate both scientists and stargazers alike, enriching our understanding of the cosmos.

ENVIRONMENT

Five percentage of birds in India are endemic, reveals Zoological Survey of India publication

In Context: A recent publication by the Zoological Survey of India (ZSI) points out that about 5% of birds found in the country are endemic and are not reported in other parts of the world. The publication, titled 75 Endemic Birds of India, was recently released on the 108th foundation day of the ZSI.

Birds in India:

- India is home to 1,353 bird species, which represents approximately 12.40% of global bird diversity. Of these 1,353 bird species, 78 (5%) are endemic to the country.

Report Findings:

- The publication aims to make information about the country's endemic birds available to everyone and highlight the efforts to conserve species found only in restricted areas.
- One of the authors of the publication said that of the 78 species, three species have not been recorded in the last few decades.
- They are the Manipur Bush Quail (*Perdica manipurensis*), listed as 'Endangered' by the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species with its last recorded sighting in 1907.
- The Himalayan Quail (*Ophrysia superciliosa*), is listed as 'Critically Endangered' with its last recorded sighting in 1876.
- The Jerdon's Courser (*Rhinoptilus bitorquatus*), listed as 'Critically Endangered' with its last confirmed sighting in 2009.
- The publication points out that the 75 bird species belong to 11 different orders, 31 families, and 55 genera, and exhibit remarkable distribution patterns across various regions in India.
- The highest number of endemic species has been recorded in the Western Ghats, with 28 bird species.
- Some of the interesting species recorded in the country's bio-geographic hotspot are:
 - ✓ The Malabar Grey Hornbill (*Ocyroceros griseus*);
 - ✓ Malabar Parakeet (*Psittacula columboides*);
 - ✓ Ashambu Laughing Thrush (*Montecincla meridionalis*);

- ✓ The White-bellied Sholakili (*Sholicola albiventris*).
- 25 bird species are endemic to the Andaman and Nicobar Islands. Endemism in the Andaman group of islands must have developed because of the region's geographical isolation.
- The details of endemic bird species contained in the publication include etymology (meanings of scientific names) and their historical relevance along with vital facts such as subspecies' differences, distinguishing traits, preferred habitats, breeding habits, and food preferences,

What is Endemic Species?

- Endemism is the condition of being endemic, or restricted in geographical distribution to an area or region.
- The area or region can vary in size and is defined or identified in different ways. Endemism is an ecological classification in that it describes the range or distribution of a species or group of species.
- Endemic species are those that are found in just one region and nowhere else in the world.
- The cases where they have been spotted outside their natural habitat are due to humans introducing them when the animal was in captivity.
- Examples: Asiatic Lion in Gir Forest, Lion-tailed Macaque in Western Ghats of India, Nilgiri Tahr, Malabar large spotted civet, Nilgiri Blue Robin, Jerdon's Corser, Nilgai, Nicobar megapode, Black-and-orange Flycatcher (BOF) and the Nilgiri Flycatcher (NIF), two species endemics to the Western Ghats are some of the species of animal's endemic to India.

PRELIM FACTS

1. Minimum Age to Contest Polls

In context: A Parliamentary Standing Committee recently recommended reducing the age for contesting Lok Sabha and Assembly elections to 18 years.

- At present, the minimum age for a person to contest various elections is as follows:
 - ✓ **President and Vice President of India:** Article 58 of the Constitution for President of India and Article 66 for the Vice President of India says no person shall be eligible for election unless he is a citizen of India and has completed the age of 35 Years.
 - ✓ **Lok Sabha and Legislative Assembly polls:** Article 84 of Constitution of India provides that the minimum age for becoming a candidate for Lok Sabha election shall be 25 years. Similar provision exists for a candidate to the Legislative Assemblies vides Article 173 (b).
 - ✓ **Rajya Sabha or the State Legislative Council:** Article 84 of Constitution of India provides that the minimum age for becoming a candidate for Lok Sabha election shall be 30 years. Similar provision exists for a candidate to the Legislative Councils vides Article 173 (b).
 - ✓ **Member of Panchayats and Municipality:** Article 243 provides that the minimum age to contest elections is 21 years.

Arguments in Favor of Lowering the Age

- The Standing Committee on Personnel, Public Grievance, Law and Justice held that young individuals can be "reliable and responsible" political participants.
- Since 18 is the minimum voting age in India, the same age limit should be applied to contesting elections.
- Global practices: In countries such as Canada, the United Kingdom, and Australia, the minimum age for candidacy in national elections is 18 years.
- The Standing Committee also said that the viewpoint for reducing the age was reinforced by a vast amount of evidence, such as, the increasing political consciousness among young people, and the advantages of youth representation.

Arguments Against of Lowering the Age

- The Election Commission of India said it was "unrealistic" to expect 18-year-olds to possess the necessary "experience and maturity" for being Members of Parliament and State legislative bodies.

2. Trachoma

- **In News-**The World Health Organization (WHO) recently announced that Iraq has now eliminated trachoma.

What is Trachoma? Trachoma is a disease of the eye. It is a neglected tropical disease.

- **Cause:** Chlamydia Trachomatis is the bacterium that causes trachoma.
- **Transmission:** The infection is transmitted by direct or indirect transfer of eye and nose discharges of infected people, particularly young children who harbor the principal reservoir of infection. These discharges can be spread by particular species of flies.
- **Impact/Symptoms:** Trachoma is the most common infectious cause of blindness in the world. The eyelashes are being pushed inward into the eye over time as a result. Consequently, it gets rubbed against the eyeball with each blink. Trichiasis is the name of this severe kind of trachoma.

- **Prevention and Treatment (SAFE Strategy by WHO):** They are easy to treat. Elimination programmes in endemic countries are being implemented using the WHO-recommended SAFE strategy. This consists of:
 - ✓ Surgery to treat the blinding stage (trachomatous trichiasis),
 - ✓ Antibiotics to clear the infection, particularly the antibiotic azithromycin, Facial cleanliness and
 - ✓ Environmental improvement, particularly improving access to water and sanitation.
 - ✓ Prevalence / Elimination by Iraq
- Iraq has now joined 17 other countries to eliminate trachoma. Additionally, Iraq is the 50th to receive recognition from the UN office for health for eradicating at least one neglected tropical illness internationally.
- Other countries that have eliminated Trachoma are: Benin, Cambodia, China, Gambia, Ghana, Iran, Laos, Malawi, Mali, Mexico, Morocco, Myanmar, Nepal, Oman, Saudi Arabia, Togo and Vanuatu.
- Africa is the most affected continent. The disease is still known to be endemic in six countries of the WHO's Eastern Mediterranean Region. Although. There has been progress in the number of people in the region requiring antibiotic treatment for 'trachoma elimination purposes', which has fallen from 39 million in 2013 to 6.9 million in April 2023.
- The disease thrives especially in crowded living conditions where there are shortages of water, inadequate sanitation and where numerous eye-seeking flies are present.

3. Manas National Park

- **Context:** Assam's Manas Tiger Reserve is 63% short of sanctioned staff.

About Manas National Park:

- Manas Wildlife Sanctuary is located in Assam and is a biodiversity hotspot.
- The Manas Wildlife Sanctuary is part of the core zone of the Manas Tiger Reserve, and lies alongside the shifting river channels of the Manas River.
- Manas National Park is a national park, Project Tiger reserve, and an elephant reserve.
- It borders the Royal Manas National Park in Bhutan.

Fauna:

- The park is known for its rare and endangered endemic wildlife such as the Assam roofed turtle, hispid hare, golden langur and pygmy hog.
- Manas is also famous for its population of the wild water buffalo.
- Because of its exceptional biodiversity, scenery, and variety of habitats, Manas National Park is a biosphere reserve and a UNESCO World Heritage Site.
- The name of the park is originated from the Manas River.
- The Manas River is a major tributary of Brahmaputra River, which passes through the heart of the national park.

The Milestones of Manas National Park are:

- ✓ The area of Manas was proposed as a Reserve Forest in 1905
- ✓ Manas was declared as a Reserve Forest in 1907
- ✓ In the year 1928, Manas was declared as a Game Sanctuary
- ✓ The Manas Game Sanctuary was declared as a Wildlife Sanctuary in 1950
- ✓ Manas Wildlife Sanctuary was declared as a Project Tiger Reserve in 1973
- ✓ UNESCO declared Manas Wildlife Sanctuary as a World Heritage Site in 1985
- ✓ In 1987, Manas Wildlife Sanctuary was declared as a Biosphere Reserve
- ✓ In 1990, Manas Wildlife Sanctuary was declared as Manas National Park
- ✓ In 2003, Manas National Park was declared as Chirang-Ripu Elephant Reserve under Project Elephant.

4. PM launches revamp of 508 Amrit Bharat stations

In Context-Prime Minister Narendra Modi on Sunday virtually laid the foundation stone for the re development of 508 railway stations across the country at a cost of over Rs.24,470 crore.

- The 508 stations are spread across 27 States and Union Territories-55 each in Uttar Pradesh and Rajasthan (at a cost of Rs.4,000 crore), 49 in Bihar, 44 in Maharashtra (Rs.1,500 crore), 37 in West Bengal, 34 in Madhya Pradesh (Rs.1,000 crore), 32 in Assam, 25 in Odisha, 22 in Punjab, 21 each in Gujarat and Telangana, 20 in Jharkhand, 18 each in Andhra Pradesh and Tamil Nadu, 15 in Haryana, 13 in Karnataka and others.

Amrit Bharat Station Scheme

- The Amrit Bharat Station Scheme (ABSS) aims to transform and revitalize 1,309 railway stations across the nation, enhancing the overall passenger experience and making them world-class travel hubs.
- As part of this initiative, work on 508 stations in various States commenced, with an investment of Rs.25,000 crore.

- It envisages the development of stations continuously with a long-term vision.
- The scheme will subsume all previous redevelopment projects where work is yet to begin.
- The scheme aims to preparation of Master Plans of the Railway stations and the implementation of the Master Plan in phases to enhance the facilities including and beyond the Minimum Essential Amenities.

5. National Handloom Day

InContext: National Handloom Day is observed across India on August 7 every year. The primary goal of celebrating Handloom Day is to promote handloom and to recognize the efforts as well as skills of the community of weavers engaged in the sector.

National Handloom Day 2023:

- The National Handloom Day was first observed in 2015 which was inaugurated by Prime Minister. The day was initiated to spread awareness about the importance of the handloom sector.
- August 7 was chosen for celebrating National Handloom Day to commemorate the launch of the Swadeshi Movement on the same day in 1905 in Calcutta (now Kolkata). The movement was then led by Bal Gangadhar Tilak, Bipin Chandra Pal, and Lala Lajpat Rai.
- The Swadeshi Movement was initiated to improve the usage of India-made goods which prominently involved handlooms. This movement also played a major role in the Independence of the country during British Rule.

National Handloom Day 2023: Significance

- It is essential for all to know the significance of the day as it not only preserves the rich heritage of our country but also promotes the skill set. Reportedly, the handloom sector is one of the major pillars of the economy after the agricultural sector in our country.
- A large section of women contributes their service as weavers and other artistic hands in this industry which is becoming the largest epitome for employment as well.

These artisans and craftsmen as an industry have been supporting the country as a soft power by ensuring a flow of income.

ANSWER WRITING

Q. Discuss the impact of globalization on Indian society. How has it affected the social empowerment of women and marginalized groups? (250 words)

Introduction:

- Globalization is the process of increasing integration and interdependence of the world in terms of economic, political, social and cultural aspects. It has brought about significant changes in the Indian society, both positive and negative, in various dimensions.

Economic:

- Globalization has opened up new opportunities for trade, investment, growth and development in India.
- It has also increased competition, inequality, unemployment and environmental degradation.
- The benefits and costs of globalization have not been evenly distributed among different regions, sectors and classes of the society.

Political:

- Globalization has enhanced India's role and influence in the global arena. It has also exposed India to various challenges such as terrorism, cybercrime, regional conflicts and human rights violations.
- Globalization has also affected the functioning of democracy, federalism and governance in India.

Social:

- Globalization has facilitated the exchange of ideas, values, cultures and lifestyles among people across the world.
- It has also led to the emergence of new social issues such as migration, urbanization, consumerism, individualism and identity crisis. Globalization has also impacted the social empowerment of women and marginalized groups in India in different ways. Some of the effects are:

Women:

- Globalization has provided more opportunities for women to participate in education, employment, entrepreneurship and politics. It has also increased their awareness, mobility and autonomy.
- However, globalization has also exposed women to new forms of exploitation, discrimination, violence and insecurity. It has also created conflicts between traditional and modern roles and expectations of women.

Marginalized Groups:

- Globalization has enabled some of the marginalized groups such as Dalits, Adivasis, minorities and LGBTQ+ to assert their rights, identity and dignity.
- It has also given them access to new resources, networks and platforms.

- However, globalization has also intensified their marginalization, exclusion and oppression by dominant groups. It has also threatened their culture, livelihood and environment.

Conclusion:

- Globalization is a complex and dynamic phenomenon that has both positive and negative impacts on Indian society. It has affected the social empowerment of women and marginalized groups in different ways. The challenge for India is to balance the opportunities and risks of globalization and to ensure that its benefits are inclusive and sustainable for all sections of the society.

MCQ

- The World Health Organization (WHO) recently announced that Iraq has now eliminated trachoma, considered the following statement about trachoma:
 1. It is caused by the bacteria Chlamydia trachomatis
 2. The infection causes roughening and scarring of the inner surface of the eyelids and erosion of the corneal surface.
 3. Trachoma is one of the leading causes of blindness worldwide today
 How many of the above statement is/are correct?
 a) Only 1 b) Only 2
c) Only 3 d) None
- Which of the following best describes the Bhuvision platform, which was recently seen in the news?
 - a) It is a mini satellite.
 - b) It is surface to surface missile.
 - c) It is a submarine.
 - d) It is an Internet of Things (IoT)-based soil testing platform**
- Consider the following statements regarding Manas National Park:
 1. It is located in the foothills of Himalayas in Arunachal Pradesh.
 2. It is listed as UNESCO's Natural World Heritage site.
 Which of the statements given above is/are correct?
 a) 1 only **b) 2 only**
 c) Both 1 and 2 d) Neither 1 nor 2
- Considered the following statement regarding:
 1. National Handloom Day is observed across India on August 7 every year.
 2. The primary goal of celebrating Handloom Day is to promote handloom and to recognize the efforts as well as skills of the community of weavers engaged in the sector.
 Which of the above statement is/are correct?
 a) Only 1 b) Only 2
c) Both 1 and 2 d) Neither 1 nor 2
- With reference to the Aadhar Enabled Payment System (AEPS), consider the following statements:
 1. It is a bank-led model which allows online interoperable financial transactions at PoS (Point of Sale / Micro ATM) using the Aadhaar authentication.
 2. It does not allow for consumer-to-business transactions.
 3. It allows for Aadhaar to Aadhaar funds transfer.
 How many of the statements given above are correct?
 (a) Only one **(b) Only two**
 (c) All three (d) None
- Which of the following nations' democratic governments was recently deposed by a coup?
 - (a) Morocco (b) Ghana
 - (c) Niger** (d) Senegal
- Match the followings:**
Birds IUCN status
 1. Bush Quail - Endangered
 2. The Himalayan Quail -Critically Endangered'
 3. The Jerdon's Courser – Critically Endangered'.
 How many of the above pair is correctly match?
 a) Only 1 b) Only 2
c) Only 3 d) None
- Recently, NEERAKSHI was in the news. What is it?
 - a) A Missile.
 - b) An Autonomous Underwater Vehicle.**
 - c) Abhay class Corvette.
 - d) Smog air Purifier.
- The Ring Nebula, also known as Messier 57 (M57), is a famous planetary nebula located in which constellation?
 - a) Orion **b) Lyra**
 - c) Ursa Major d) Scorpius
- Recently the World Archery Championships 2023 was held in Berlin, Germany. Which of the following nations share its boundary with Germany?
 1. Belgium
 2. Austria
 3. Czech Republic
 4. Netherlands
 How many of the above statements is/are correct?
 a) Only 1
 b) Only 2
 c) Only 3
d) All of the above