KEYS

1. Answer: B

The European Space Agency's Solar Orbiter recently captured the most detailed image of the Sun's full disc and outer atmosphere, the corona, to date.

About Solar Orbiter:

- It is a Sun-observing satellite with 10 science instruments, all designed to provide unprecedented insight into how the sun works.
- It is conceived to perform close-up study of our Sun and inner heliosphere the uncharted innermost regions of our Solar System.
- It is a joint mission of the European Space Agency (ESA) and NASA.
- It is the most complex scientific laboratory ever to have been sent to the Sun.
- It will take images of the Sun from closer than any spacecraft before and, for the first time, look at its uncharted polar regions.
- The mission, launched on February 10, 2020, released its first images in June of that year.
- After multiple gravitational assist manoeuvres at Earth and Venus, it started its full science operations in December 2021.
- It follows an elliptical orbit around the sun, with the closest point, the perihelion, at about 25 million miles (40 million kilometers) from the sun, which is closer than the orbit of Mercury.
- Instruments: It carries six remote-sensing instruments to observe the Sun and the solar corona and four in-situ instruments to measure the solar wind, energetic particles, and electromagnetic fields.
- The mission is scheduled to last until at least 2027.

2. Answer: C

Researchers are reporting that in the years leading up to a diagnosis of multiple sclerosis, individuals were more likely to have depression, constipation, urinary tract infections, and sexual problems.

About Multiple Sclerosis:

- It is a long-lasting (chronic) disease of the central nervous system.
- In people with MS, the immune system.
- In people with MS, the immune system attacks cells in the myelin, the protective sheath that surrounds nerves in the brain and spinal cord.
- Damage to the myelin sheath interrupts nerve signals from your brain to other parts of your body. The damage can lead to symptoms affecting your brain, spinal cord, and eyes.
- Eventually, the disease can cause permanent damage or deterioration of the nerve fibers.

- MS affects women more than men. The disorder is most commonly diagnosed between ages 20 to 40, but it can be seen at any age.
- There are many possible causes of MS, including:
- Autoimmune disorders;
- Infectious agents, such as viruses;
- Environmental factors;
- Genetic factors;

Signs and symptoms:

- It varies widely between patients and depends on the location and severity of nerve fiber damage in the central nervous system.
- Some people have mild symptoms, such as blurred vision, and numbness, and tingling in the limbs.
- In severe cases, a person may experience paralysis, vision loss, and mobility problems.
- Treatment: There's no cure for multiple sclerosis. However, there are treatments to help speed the recovery from attacks, modify the course of the disease, and manage symptoms.

3. Answer: A

A pregnant megamouth shark, a rare and elusive deepwater species, was recently discovered washed up on a beach in the Philippines.

About Megamouth Shark:

- It is an extremely rare and unusual species of deep-water shark.
- Scientific Name: Megachasma pelagios.

Distribution:

- Their range is believed to span the region between latitudes 40°N and 40°S.
- These sharks inhabit the Atlantic, Indian, and Pacific oceans.
- Habitat: They are found in deep, warm oceanic water.
- This species has only been observed in the wild a few times, and less than 60 individuals are known by scientists to have ever been captured or observed.

Features:

- It is a large species, reaching weights of 2700 pounds (1215 kg).
- They are typically 425-515 cm long. Females are larger than males.
- They are easily recognised by their huge, soft head and large mouth, which is positioned at the anterior margin of the head.
- The colour varies from grey to bluish-black above and is pale grey below. The tips of most of the fins are usually white.
- They have a series of small, hooked teeth along their top and bottom jaws.

- They are filter feeders, and they swim with their mouths constantly wide open in order to filter out their preferred planktonic prey.
- The inside of their mouths is covered with light-producing organs that may be used to attract pelagic crustaceans and other potential prey.

Conservation Status:

- IUCN Red List: Least Concern

4. Answer:C
Using the Australian Square Kilometer Array Pathfinder (ASKAP), astronomers have recently discovered a new pulsar, which has received the designation PSR J1032−5804
About Pulsars:

- Pulsars are rotating neutron stars observed to have pulses of radiation at very regular intervals that typically range from milliseconds to seconds.
- Pulsars have very strong magnetic fields, which funnel jets of particles out along the two magnetic poles. These accelerated particles produce very powerful beams of light.
- Often, the magnetic field is not aligned with the spin axis, so those beams of particles and light are swept around as the star rotates.
- When the beam crosses our line of sight, we see a pulse; in other words, we see pulsars turn on and off as the beam sweeps over Earth.
- Pulsar masses range between 1.18 and 1.97 times that of the Sun, but most pulsars have a mass 1.35 times that of the Sun.

What is a Neutron Star?

- It is an extremely dense and compact celestial object that forms when a massive star runs out of fuel and collapses under its own gravity.
- The very central region of the star, the core, collapses, crushing together every proton and electron into a neutron.
- If the core of the collapsing star is between about 1 and 3 solar masses, these newly-created neutrons can stop the collapse, leaving behind a neutron star. (Stars with higher masses will continue to collapse into stellar-mass black holes.)
- Since neutron stars began their existence as stars, they are scattered throughout the galaxy in the same places where we find stars. And like stars, they can be found by themselves or in binary systems with a companion.

5. Answer: D
A Constitution Bench of the Supreme Court recently held that an arbitration agreement can bind non-signatories as per the "group of companies" doctrine.
About 'Group of Companies'
Doctrine:

- The "group of companies" doctrine states that a company that is a non-signatory to an arbitration agreement would be bound by the agreement if such a company is a member of the same group of companies that signed the agreement.
- The doctrine deems that the parties to the arbitration agreement mutually intended for such a non-signatory to be bound by it.
- Arbitration is a mechanism to resolve disputes between parties without going to court. A neutral person is appointed to adjudicate the dispute, and the judgment of an arbitrator is legally enforceable.
- The "group of companies" concept, unlike other non- signatory theories that are based on domestic law principles, is based on international arbitration jurisprudence.
- The doctrine was first recognised by the Indian Supreme Court in ChloroControls India Private Limited vs. Severn Trent Water Purification Inc. (2013). Since then, Indian courts have applied the doctrine to bind group companies of signatories to arbitration agreements.
- The Supreme Court in ONGC Ltd. vs. Discovery Enterprises (P) Ltd. came up with certain factors to be considered in order to decide whether the Doctrine would find application or not, being:
- The mutual intent of the parties
- The relationship of a non- signatory to a party which is a signatory to the agreement
- The commonality of the subject-matter • the composite nature of the transaction
- The performance of the contract
- The main purpose behind bringing the 'group of companies' doctrine in India was to prevent fragmentation of disputes in composite transactions i.e., disputes consisting of several parties and multiple contracts.

Recent Supreme Court Ruling:

- The Court held that it is not necessary that only persons who are signatories to the arbitration agreement will be bound by the arbitration agreement.
- The requirement of a written arbitration agreement does not mean that non-signatories will not be bound by it, provided there is a defined legal relationship between the signatories and the non-signatories and that the parties intended to be bound by it by the act of conduct.
- Non-signatories, by virtue of their relationship with the signatory parties and their commercial involvement in the subject matter, are not total strangers to the arbitration agreement.

6. Answer C

Recently, Garba of Gujarat' has been inscribed in the Representative List of Intangible Cultural Heritage (ICH) of Humanity by UNESCO.

- It is a l dance performed throughout the State of Gujarat, and across India.
- It is celebrated for nine days during the festival of Navaratri.
- The festival is dedicated to the worship of the feminine energy or Shakti.

- The cultural, performative, and visual expressions of this feminine energy are expressed through the Garba dance.
- The performative and visual celebration of Garba takes place within homes and temple courtyards, public spaces in villages, urban squares, streets, and large open grounds. Garba thus becomes an all-encompassing participatory community event.
- In addition to being a religious ritual, Garba fosters social equality by diluting socio- economic, gender, and rigid sect structures.
- It continues to be inclusive and participative by diverse and marginalized communities, strengthening community bonds.
- This dance form is the 15th cultural item from India to make it to the UNESCO list.

7. Answer C

Recently, the ICAR-Indian Veterinary Research Institute (ICAR-IVRI), Izatnagar, Bareilly has found the exact status of elephant endotheliotropic herpesvirus subtypes (EEHV) and its subtypes circulating among Asian elephant population in India.

- It is a double-stranded DNA virus that is classified in the family Herpesviridae.
- It causes acute, fatal haemorrhagic disease in wild and captive juvenile Asian and African elephants.
- It is lethal for young elephants between the ages of one and 12.
- The disease is usually fatal, with a short course of 28-35 hours.
- Transmission: Direct contact with body fluids of infected elephants (saliva, shedding from skin lesions, etc.)
- Symptoms: Some elephants show symptoms such as reduced appetite, nasal discharge and swollen glands.
- Treatment: It includes a combination of anti-viral therapy, aggressive fluid therapy (to counter haemorrhaging) immuno- stimulant drugs (selenium and Vitamins C, E), anti-pyretics and analgesics (to bring down fever)
- There is no true cure for herpesviruses in animals or in humans because herpes viruses go latent.

8. Answer B

Recently, researchers at the Indian Institute of Science Education and Research, Bhopal (IISER Bhopal), have completed the first- ever genome sequencing of the jamun tree (Syzygium cumini).

- It is also known as jambolan, or black plum tree is a Myrtaceae plant family tropical tree.
- Its natural range includes the Indian sub-continent and South-East Asia.
- The genus Syzygium contains 1,193 recognised species, including jamun.

Soil

- It can be grown on a wide range of soils.

- However, for high yield potential and good plant growth, deep loam and a well drained soil are needed.
- It can grow well under salinity and waterlogged conditions too.

Climate

- It prefers to grow under tropical and subtropical climate.
- It is also found growing in lower ranges of the Himalayas up to an altitude of 1300 meters.
- It requires dry weather at the time off towering and fruit setting.
- In subtropical areas, early rain is considered to be beneficial for ripening of fruits and proper development of its size, colour and taste.
- Benefits: In Ayurveda the black plum is used to treat ailments such as stomach discomfort, arthritis, cardiac problems, flatulence, asthma, diarrhoea, and stomach spasms.

Highlights of the genome sequencing

- The aim of this research was to gain new functional and evolutionary insights from the jamun genome, which could be responsible for the wide range of pharmacological properties of this species conferred by the bioactive compounds that act as nutraceutical agents in modern medicine.
- The jamun genome has a higher number of coding genes resulting from gene duplication or neopolyploidy events, compared to the other two sequenced species from this genus.
- The analyses revealed the key genes involved in facilitating the adaptive evolution of Jamun.
- Among these, 14 genes allow for the biosynthesis of terpenoids, which are a diverse class of metabolites responsible for plant defence responses. They also contribute significantly to antioxidant and anti- inflammatory properties.
- Alkaloids, another type of metabolite, are also found abundantly in different plant parts and offer curative properties against many diseases.
- This combination of alkaloids and flavonoids gives the plant its anti-arthritic properties.
- To explain the anti-diabetic properties of this plant, the researchers discovered the presence of glucosides, another class of metabolites that prevent the conversion of starch into sugar.

9. Answer C

Recently, Google announced the launch of its latest, most powerful Al model, Gemini.

- It is a new multimodal general Al model, which means it can understand, and work with different formats, including text, code, audio, image, and video, at the same time.
- It is now available to users across the world through Bard, some developer platforms and even the new Google Pixel 8 Pro devices.
- It can understand, explain and generate high-quality code in the world's most popular programming languages, like Python, Java, C++ and Go.
- It comes in three sizes - the yet-to-be-launched Ultra, Pro and Nano.
- Gemini Ultra, the largest and most capable model, will be meant for highly complex tasks.

- It is available now only to select customers, developers, partners and safety and responsibility experts for early experimentation and feedback.
- Gemini Pro will be best at scaling across a wide range of tasks and is now available in Bard for regular users across the world.
- Gemini Nano will manage on- device tasks and is already available on Pixel 8 Pro, powering new features like Summarise in the Recorder app and Smart Reply via Gboard.

10. Answer A

Recently, in a groundbreaking discovery, researchers from the Indian Institute of Geomagnetism (IIG) have identified seismogenic liquefaction features in the active Kopili Fault (KF) zone.

- It is a 300 km long and 50 km wide lineament situated in the northeastern region (NER) of India.
- It extends from the western part of Manipur to the tri-junction of of Manipur to the tri-junction of Bhutan, Arunachal Pradesh, and Assam.
- It is closer to Himalayan Frontal Thrust.
- This is a seismically active area falling in the highest Seismic Hazard Zone V.
- It is associated with collisional tectonics because of the Indian Plate subducting beneath the Eurasian Plate.
- The fault itself is a transpressional fracture that generates lower crustal dextral strike-slip earthquakes.
- A tectonic depression filled up by the alluvium of the Kopilli river and its tributaries, the Kopili fault zone has witnessed many seismic activities in the past including the 1869 earthquake (7.8 magnitude) and the 1943 earthquake (7.3 magnitude).