### Batch Test Series-06-04-2024

### Q 1. Consider the following:

- 1. Energy
- 2. Rainfall
- 3. Temperature
- 4. Atmosphere

How many of the above is/are abiotic components of ecosystem?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Explanation:

Ans (d)

### Components of ecosystem:

Abiotic components	Biotic components
Energy Rainfall	Primary producers Consumers
Temperature	
Atmosphere	
Substratum	

### Q 2. Which of the following are major causes of biodiversity losses?

- 1. Habitat loss and fragmentation
- 2. Over-exploitation
- 3. Alien species invasion
- 4. Co-extinctions
- Select the correct answer using the code given below.
- (a) Only 1 and 2
- (b) Only 1, 2 and 3
- (c) Only 1, 3 and 4
- (d) 1, 2, 3 and 4

Explanation:

### Ans:(d)

The accelerated rates of species extinctions that the world is facing now are largely due to human activities. There are four major causes:

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Habitat loss and fragmentation: This is the most important cause driving animals and plants to extinction. When large habitats are broken up into small fragments due to various human activities, mammals and birds requiring large territories and certain animals with migratory habits are badly affected, leading to population declines.

Over-exploitation: Humans have always depended on nature for food and shelter, but when 'need' turns to 'greed', it leads to over-exploitation of natural resources.

Alien species invasions: When alien species are introduced unintentionally or deliberately for whatever purpose, some of them turn invasive, and cause the decline or extinction of indigenous species. Examples- are carrot grass (Parthenium), Lantana and water hyacinth (Eicchornia).

Co-extinctions: When a species becomes extinct, the plant and animal species associated with it in an obligatory way also become extinct. **So, option (d) is correct.** 

### Q 3. Arrange the following gases in increasing order regarding their relative contribution to total global warming:

- 1. Carbon dioxide
- 2. Methane
- 3. Chlorofluorocarbons
- 4. Nitrous oxide

### Select the correct answer using the code given below.

- (a) 4, 3, 1, 2
- (b) 4, 3, 2, 1
- (c) 3, 4, 2, 1
- (d) 4, 2, 3, 1

### Explanation:

### Ans:(b)

The increasing order of the gases in terms of their relative contribution to total global warming is Nitrous oxide < Chlorofluorocarbons < Methane < Carbon dioxide.

### Q 4. Consider the following pairs:

Ramsar SiteState1. Sirpur wetlandMaharashtra2. Vembannur WetlandAndhra Pradesh3. Vaduvur Bird SanctuaryTamil Nadu

### How many of the pairs given above is/are correctly matched?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Ans: (a) Explanation:

**Pair 1 is incorrect: The** Sirpur wetland is situated in Indore, Madhya Pradesh. The Sirpur wetland is an important historical lake commonly named Pakshi Vihar (bird sanctuary). It is a man-made wetland but over the centuries it has acquired all the natural characteristics.

Pair 2 is incorrect: Vembannur wetland is a human-made inland tank situated near Vembannur, a small hamlet in Kanniyakumari, Tamil Nadu.

**Pair 3 is correct:** Vaduvur Bird Sanctuary is composed of small man-made reservoirs interconnected by an ancient network of canals and fed by the Mettur reservoir, in the semi-arid district of Thiruvarur, Tamil Nadu.

### **Q 5.** With reference to The Intergovernmental Panel on Climate Change (IPCC), consider the following statements:

1. The IPCC is the United Nations body for assessing the science related to climate change.

2. The IPCC is an organization of governments that are not members of the World metrologoical organization.

### Which one of the statements given above is/are correct?

(a) Only 1

- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans:(a) Explanation:

**Statement 1 is correct:**The objective of the IPCC is to provide governments at all levels with scientific information that they can use to develop climate policies. It was created in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP).

**Statement 2 is incorrect:** The IPCC is an organization of governments that are members of the United Nations or World Meteorological organization (WMO). The IPCC currently has 195 members.

### Q 6. Consider the following:

- 1. Strengthening environmental governance and law
- 2. Safeguarding ecosystems
- 3. Transition to low-carbon economies

### How many of the above task is/are focused by United Nations Environment Programme (UNEP)?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Ans:(c)

Explanation:

- UNEP's work is focused on helping countries
- To transition to low-carbon and resource-efficient economies,
- Strengthening environmental governance and law,
- Safeguarding ecosystems, and
- Providing evidence-based data to inform policy decisions.

### Q 7. Consider the following statements:

- 1. Vast quantities of methane are trapped beneath the frozen soil of Alaska.
- 2. Methane is colourless, odourless gas that is only slightly soluble in water.

### Which one of the statements given above is/are correct?

- (a) 1 Only
- (b) 2 Only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans :(c) Explanation:

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**Statement 1 is correct:** Vast quantities of methane are trapped beneath the frozen soil of Alaska. When the permafrost melts the methane, it will be released and can accelerate the process of global warming.

**Statement 2 is correct**: Methane is colourless, odourless gas that occurs abundantly in nature and as a product of certain human activities.

It is the simplest member of the paraffin series of hydrocarbons and is among the most potent of the greenhouse gases. Its chemical formula is  $CH_4$ .

It is only slightly soluble in water. It burns readily in air, forming carbon dioxide and water vapour; the flame is pale, slightly luminous, and very hot.

### Q 8. With reference to Halons, consider the following statements:

- 1. They are similar in structure to the CFCs.
- 2. They are less dangerous to the ozone layer than CFCs.

### Which one of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans:(a)

Explanation:

Statement 1 is correct: Halons are similar in structure to the CFCs but contain bromine atoms instead of chlorine. Statement 2 is incorrect: They are more dangerous to the ozone layer than CFCs.

The CFCs and the halons migrate into the upper atmosphere after they are released. As they are heavier than air, they carried by air currents up to just above the lower atmosphere and then they slowly diffuse into the upper atmosphere. This is a slow process and can take as long as five to fifteen years.

### Q 9. Consider the following characteristics:

- 1. Harmful
- 2. Toxic
- 3. Flammable
- 4. Stable

### How many of the given above is/are characteristics of CFCs (chloro-fluorocarbons)?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: (a) Explanation:

CFCs (chloro-fluorocarbons) are extremely stable, non-flammable, non-toxic, and harmless to handle. This makes them ideal for many industrial applications like aerosols, air conditioners, refrigerators, and fire extinguishers.

CFCs are also used in making foams for mattresses and cushions, disposable Styrofoam cups, glasses, packaging material for insulation, cold storage etc. However, their stability also gives them a long life span in the atmosphere. **So, option (a) is correct.** 

### Q 10. Consider the following statements:

1. Carbon monoxide is a persistent pollutant.

2. Natural processes can convert carbon monoxide to other compounds that are not harmful.

### Which of the given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans: (b) Explanation:

**Statement 1 is incorrect:** Carbon monoxide is not a persistent pollutant. Carbon monoxide is a colorless, odorless, and toxic gas produced when organic materials such as natural gas, coal, or wood are incompletely burnt.

**Statement 2 is correct:** Natural processes can convert carbon monoxide to other compounds that are not harmful. Therefore, the air can be cleared of its carbon monoxide if no new carbon monoxide is introduced into the atmosphere.

### Q 11. Consider the following:

- 1. Sulphur oxides
- 2. Nitric acid
- 3. Sulfuric acid
- 4. Nitrogen oxides

### How many of the given above is/are primary pollutants?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: (b) Explanation:

Pollutants that are emitted directly from identifiable sources and are produced both by natural events and human activities are called primary pollutants. There are five primary pollutants and these are carbon oxides (CO and CO2), nitrogen oxides, sulfur oxides, volatile organic compounds (mostly hydrocarbons) and suspended particulate matter.

Pollutants that are produced in the atmosphere when certain chemical reactions take place among the primary pollutants are called secondary pollutants. E.g.: sulfuric acid, nitric acid, carbonic acid, etc. **So, option (b) is correct.** 

### Q 12. Consider the following statements:

- 1. Bioaccumulation refers to the increase in concentration of the toxicant at successive trophic levels.
- 2. Biomagnification is the gradual accumulation of substances in an organism.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 Nor 2

Ans:(d) Explanation:

**Statement 1 is incorrect:** Biomagnification refers to an increase in the concentration of the toxicant at successive trophic levels. This happens because a toxic substance accumulated by an organism cannot be metabolized or excreted, and is thus passed on to the next higher trophic level.

**Statement 2 is incorrect:** Bioaccumulation is the gradual accumulation of substances, such as pesticides or other chemicals, in an organism. It occurs when an organism absorbs a substance at a rate faster than that at which the substance is lost or eliminated by catabolism and excretion.

Q 13. Decomposition is the process of breaking down complex organic matter into inorganic substances by decomposers. The process of decomposition involve are:

- 1. Fragmentation
- 2. Leaching
- 3. Catabolism
- 4. Humification
- 5. Mineralisation

### Select the correct answer using the code given below.

- (a) Only 1, 2 and 4
- (b) Only 1, 2, 4 and 5
- (c) Only 1, 2, 3 and 4
- (d) 1, 2, 3, 4 and 5

### Ans:(d)

Explanation:

- Decomposers break down complex organic matter into inorganic substances like carbon dioxide, water and nutrients and the process is called decomposition. Dead plant remains such as leaves, bark, flowers and dead remain of animals, including fecal matter, constitute detritus, which is the raw material for decomposition.
- The important steps in the process of decomposition are fragmentation, leaching, catabolism, humification and mineralisation.
- So, option (d) is correct.

### Q 14. Consider the following statements:

- 1. The pyramid of numbers in a pond or grassland ecosystem is an inverted pyramid.
- 2. The pyramid of energy is always upright.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans:(b) Explanation:

**Statement 1 is incorrect:** The pyramid of numbers in a pond or grassland ecosystem is upright. The upright pyramid has the largest number of producers at the base and their numbers keep on declining with each passing level.

**Statement 2 is correct:** The ecological pyramid formed by determining the flow of energy from one trophic level to another is known as the pyramid of energy. The pyramid of energy is always upright. The base of this pyramid, i.e. producers have the most amount of energy acquired from the sun and fixed by the help of photosynthesis.

### Q 15. Consider the following statements:

- 1. Genetic diversity can be defined as the variety of living organisms on earth.
- 2. Species diversity can be defined as the ratio of one species' population over a total number of organisms across all species in the given biome.

### Which of the above statements is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Explanation:

**Statement 1 is incorrect:** Genetic diversity concerns gene variation within a particular species. It allows species to adapt to changing environments.

**Statement 2 is correct:** Species diversity is the ratio of one species' population over a total number of organisms across all species in the given biome.

### Q 16. Consider the following pairs:

LIST I	LIST II
Alpha diversity	Measure of the overall diversity of the different ecosystems within a region.
Beta diversity	comparison of diversity between ecosystems
Gamma diversity	Diversity within a particular area or ecosystem

How many of the above pairs is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

#### Ans: (a) Explanatio

Explanation:

**Pair 1 is incorrect:** Alpha diversity refers to the diversity within a particular area or ecosystem and is usually expressed by the number of species (i.e., species richness) in that ecosystem.

**Pair 2 is correct:** Beta diversity is a comparison of diversity between ecosystems, usually measured as the change in the number of species between the ecosystems.

Pair 3 is incorrect: Gamma diversity is a measure of the overall diversity of the different ecosystems within a region.

### Q 17. Consider the following:

- 1. Botanical Garden
- 2. Reserved forests
- 3. Seed banks
- 4. National parks
- 5. Recreational Garden

Which of the given above is/are part of ex-situ conservation?

- (a) Only 1, 2 and 3
- (b) Only 2, 3 and 4
- (c) Only 1, 3 and 5
- (d) Only 2, 4 and 5

Ans: (c)

Explanation:

Ex-situ conservation means conserving biodiversity outside the areas where it naturally occurs is known as ex-situ conservation. Seed banks, botanical, horticultural, and recreational gardens are important centers for ex-situ conservation. In-situ conservation means conserving the animals and plants in their natural habitats is known as in-situ conservation. The established natural habitats are national parks, sanctuaries, biosphere reserves, reserved forests, and protected forests. **So, option (c) is correct.** 

### Q 18. Consider the following:

- 1. Contribution to climate stability
- 2. Breeding stocks
- 3. Soil formation and protection
- 4. Medicinal resources
- 5. Recovery from unpredictable events

### Which of the above are biological services provided by Biodiversity?

- (a) Only 1 and 2
- (b) Only 2 and 4
- (c) Only 1 and 3
- (d) Only 1 and 5

Ans: (b) Explanation:

- Biological services provided by Biodiversity:
- Food
- Medicinal resources and pharmaceutical drugs
- Wood products
- Ornamental plants
- Breeding stocks
- Diversity in genes, species, and ecosystem
   So, option (b) is correct.

### Q 19. Consider the following pairs:

Biosphere reserve	State
Cold desert	Jammu and Kashmir
Simlipal	Jharkhand
Nokrek	Meghalaya
Nanda Devi	Himachal Pradesh

### How many of the above is/are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

Ans: (a) Explanation:

Pair 1 is incorrect: Cold desert is located in Himachal Pradesh. It is noted for the preservation of the snow leopard.

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**Pair 2 is incorrect:** Similal biosphere is located in Odisha. The biosphere reserve has the largest zone of Sal in all of India. In addition, the tropical monsoon climate provides ideal circumstances for the development of a distinctive biodiversity, highlighted by 1,076 species of vascular plants.

**Pair 3 is correct:** The Nokrek Biosphere Reserve is located in the northeast of India on the Tura Range, which forms part of the Meghalaya Plateau.

**Pair 4 is incorrect:** Nanda Devi Biosphere Reserve is located in Uttarakhand. Nanda Devi National Park has remained more or less intact because of its inaccessibility.

# Q 20. Which of the following tiger reserves of India have attained the distinction of becoming India's inaugural Dark Sky Park and the fifth in Asia?

- (a) Pench Tiger Reserve
- (b) Pakke Tiger Reserve
- (c) Nameri Tiger Reserve
- (d) Namdapha Tiger Reserve

### Ans: (a)

Explanation:

- The Pench Tiger Reserve (PTR) in Maharashtra has attained the distinction of becoming India's inaugural Dark Sky Park and the fifth in Asia.
- For the unversed, the Pench Tiger Reserve, also known as Pench National Park, stands as one of India's premier tiger reserves and the first to span two states Madhya Pradesh and Maharashtra.
   So, option (a) is correct.

### Q 21. Consider the following statements:

- 1. Wildlife sanctuaries enjoy greater protection than National parks.
- 2. Grazing of livestock is permitted in wildlife sanctuaries.

### 3. A wildlife sanctuary can be created for a particular species.

### How many of the statements given above is/ are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

### Ans: (b) Explanation:

Statement 1 is incorrect: National Parks enjoy a greater degree of protection than sanctuaries.
 Statement 2 is correct: Certain activities, such as grazing of livestock are permitted in wildlife santuries, These are prohibited in National Parks.

**Statement 3 is correct:** Wildlife sanctuary can be created for a particular whereas the national park is not primarily focused on a particular species.

### Q 22. Consider the following statements:

- 1. Conservation Reserve and Community Reserves are declared under the Environmental Protection Act, of 1986.
- 2. A conservation reserve is an area owned by the State Government.
- 3. The state government cannot declare private land as a community reserve under any circumstances.

### How many of the statements is/are correct?

- (a) Only one
- (b) Only two

- (c) All three
- (d) None

Ans: (a) Explanation:

**Statement 1 is incorrect:** Conservation Reserve and Community Reserves are the outcomes of Amendments to the Wildlife Protection Act in 2003. It provided a mechanism to provide recognition and legal backing to the community-initiated efforts in wildlife protection.

**Statement 2 is correct:** Conservation Reserves is an area owned by the State Government adjacent to National Parks and sanctuaries for protecting the landscape, seascape, and habitat of fauna and flora.

**Statement 3 is incorrect:** The State Government may notify any community land or private land as a Community Reserve, provided that the members of that community or individuals concerned are agreeable to offer such areas for protecting the fauna and flora, as well as their traditions, cultures, and practices.

### Q 23. Which of the following defines the zone of junction between two or more diverse ecosystems?

- (a) Niche
- (b) Ecotone
- (c) Ecosystem
- (d) Edge Effect

### Ans:(b) Explanation:

- Ecotone is a zone of junction between two or more diverse ecosystems. For e.g. the mangrove forests represent an ecotone between marine and terrestrial ecosystem. Other examples are grassland, estuary and river bank
- A niche is the unique functional role or place of a species in an ecosystem. It is a description of all the biological, physical and chemical factors that a species needs to survive, stay healthy and reproduce.
- Sometimes the number of species and the population density of some of the species is much greater in this zone than either community. This is called edge effect. **So, option (b) is correct.**

### Q 24. Consider the following statements about Coniferous forests:

- 1. They grow in the coastal region, where the temperatures are moderate.
- 2. These forests have small stately trees.
- 3. The leaves of these forests are needlelike and downward-sloping branches so that the snow can slip off the branches. How many of the statements given above are not correct?
- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Ans:(b) Explanation:

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Statement 1 is incorrect: Coniferous forests grow in the Himalayan Mountain region, where the temperatures are low. Statement 2 is incorrect: These forests have some of the tallest plants in the world. They are able to get very tall and strong because of the heavy-duty xylem that hardens and makes them sturdy.

**Statement 3 is correct:** These forests have tall stately trees with needle-like leaves and downward-sloping branches so that the snow can slip off the branches. They have cones instead of seeds and are called gymnosperms. These adaptations help conifers survive in areas that are very cold or dry. Some of the common conifers are spruces, pines, and firs.

### Q 25. Consider the following statements about Evergreen forests:

- 1. They grow in the high rainfall areas of the Western Ghats, North Eastern India and the Andaman and Nicobar Islands.
- 2. The forest is rich in orchids and ferns.
- 3. Trees shed their leaves only during the winter.

### How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

### Ans:(b) Explanation:

Statement 1 is correct: These forests grow in areas where the monsoon lasts for several months. Some even get two monsoons, such as in Southern India. They grow in areas of the Western Ghats, North Eastern India, and the Andaman and Nicobar Islands. Statement 2 is correct: The forest is rich in orchids and ferns. The barks of the trees are covered in moss. The trees in Evergreen forests overlap with each other to form a continuous canopy. Thus, very little light penetrates down to the forest floor. Only a few shade-loving plants can grow in the ground layer in areas where some light filters down from the closed canopy. Statement 3 is incorrect: Evergreen plants shed a few of their leaves throughout the year. There is no dry leafless phase. An evergreen forest thus looks green throughout the year.

- Q 26. The aerial roots derived from subterranean roots that enable plants to access air in waterlogged soil habitats are known as:
  - (a) Prop roots
  - (b) Pneumatophores
  - (c) Tap roots
  - (d) Fibrous roots

### Ans:(b) Explanation:

Respiratory or knee roots (pneumatophores) are characteristic of many species; they project above the mud and have small openings (lenticels) through which air enters, passing through the soft spongy tissue to the roots beneath the mud. So, option (b) is correct.

### Q 27. Consider the following statements:

- 1. Nitric oxide and nitrogen dioxide are greenhouse gases.
- 2. Nitrous oxide substantially contributes to global warming.
- 3. Nitrous oxide is emitted during the treatment of wastewater.

### How many of the statements given above is/are incorrect?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Ans:(a) Explanation: **Statement 1 is incorrect:** Nitrous oxide (N<sub>2</sub>O) gas should not be confused with nitric oxide (NO) or nitrogen dioxide (NO<sub>2</sub>). Neither nitric oxide nor nitrogen dioxide are greenhouse gases, although they are important in the process of creation of tropospheric ozone which is a greenhouse gas.

**Statement 2 is correct:** Nitrous oxide only makes up 6% of greenhouse gas emissions, nitrous oxide is 300 times stronger than CO<sub>2</sub>. It takes 114 years to break down.

**Statement 3 is correct:** Nitrous oxide is emitted during agricultural, land use, and industrial activities; combustion of fossil fuels and solid waste; as well as during treatment of wastewater.

### Q 28. Which of the following is/are greenhouse gases:

- 1. Hydrofluorocarbons
- 2. Perfluorocarbons
- 3. Nitrogen trifluoride
- 4. Sulphur hexafluoride

### Select the correct answer using the code given below:

- (a) Only 1 and 4
- (b) Only 1 and 2
- (c) Only 3 and 4
- (d) 1, 2, 3 and 4

### Ans: (d) Explanation:

- Perfluorocarbons (PFCs) are very potent and long-lived greenhouse gases in the atmosphere, released predominantly during aluminum production and semiconductor manufacture. They have been targeted for emission controls under the United Nations Framework Convention on Climate Change.
- Nitrogen trifluoride (NF<sub>3</sub>) is also an extremely strong and long-lived greenhouse gas. NF<sub>3</sub> is widely used in the manufacture of semiconductors, photovoltaic (PV) cells, and flat panel displays.
- Hydrofluorocarbons (HFCs) are a group of synthetic gases primarily used for cooling and refrigeration. Many HFCs are very
  powerful, short-lived climate pollutants with an average atmospheric lifetime of 15 years. Though HFCs currently
  represent around 2% of total greenhouse gases, their impact on global warming can be hundreds to thousands of times greater
  than that of carbon dioxide (CO2) per unit of mass.
- Sulphur hexafluoride (SF<sub>6</sub>) is a greenhouse gas and has a very high radiative forcing effect and a GWP of 22,800 compared with a figure of 1 for carbon dioxide. Emissions occur due to its use in a small number of applications. **So, option (d) is correct.**

### Q 29. Consider the following statements regarding the Central Pollution Control Board (CPCB):

- 1. This board was constituted under the Environment Protection Act 1986.
- 2. This board advises the central government on any matter concerning prevention and control of water pollution.

### Which of the above-given statements is/are correct:

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans: (a) Explanation:

• Statement 1 is incorrect: The Central Pollution Control Board (CPCB), statutory organisation, was constituted in September, 1974 under the Water (Prevention and Control of Pollution) Act, 1974. Further, CPCB was entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981.

• Statement 2 is correct: The Central Pollution Control Board (CPCB) advises the Central Government on any matter concerning the prevention and control of water and air pollution and the improvement of the quality of air.

# Q 30. On August 23, 2023, the world witnessed the successful landing of India's Chandrayaan-3 on Moon. In this context, consider the following statements:

- 1. This landing made India the first country to do so successfully on moon's south pole.
- 2. The Chandrayaan-3's landing site near the moon's south pole has been named Tiranga point.
- 3. The Pragyan rover of Chandrayaan-3 mission has confirmed the presence of Mica mineral on the lunar surface.
- 4. The mission life of the Lander and Rover of Chandrayaan-3 equals to 14 lunar days.

### Which of the statements given above is/are correct?

- (a) 1 Only
- (b) 2 & 3 Only
- (c) 1, 2 and 4 Only
- (d) 1, 2, 3 and 4

### Ans: a Explanation:

- Statement 1 is correct: Chandrayaan-3 was launched aboard an LVM3-M4 rocket on 14 July 2023 from Satish Dhawan Space Centre in Sriharikota, Andhra Pradesh. On August 23, 2023, the world witnessed the successful landing of India's Chandrayaan-3 on Moon. This made India the first country to do so successfully on moon's south pole.
- Statement 2 is incorrect: The Tiranga Point is a location on the Moon near the lunar south pole where Chandrayaan-2's lander Vikram crashed. Chandrayaan-3's landing site near the moon's south pole has been named Shiv Shakti Point.
- Statement 3 is incorrect: Chandrayaan-3's Vikram rover made a groundbreaking discovery by confirming the presence of sulphur on the lunar surface.
- Statement 4 is incorrect: The lunar lander of Chandrayan-3 mission was named Vikram and the lunar rover named as Pragyan. The mission life of the Lander and Rover was equal to one lunar day, which is equivalent to 14 earth days.

### Q 31. In the context of space technology, which of the following best describes the Armstrong limit or Armstrong's line?

- (a) Altitudes till which the pressure of oxygen is sufficient to sustain human life
- (b) conventional boundary between Earth's atmosphere and outer space.
- (c) altitude at which near space starts.
- (d) Altitude till which white light is capable of dispersing into monochromatic lights of seven different wavelength.

#### Ans: c Explanation:

• Near Space starts from the line above the earth's surface where the atmospheric pressure reduces to 1/16th of the normal atmospheric pressure at the sea level. The normal atmospheric pressure at sea level is 101.325 kilopascals. Therefore, we can say that near space starts from the line above the earth's surface where the atmospheric pressure is below 6.3 kilopascals (i.e 1/16th of normal atmospheric pressure at sea level). The altitude at which near space starts is called

Armstrong Limit. The exact altitude of the Armstrong Line or Limit depends on weather conditions in the stratosphere, but usually, it lies between 18 and 19 km. **So, option (c) is the correct.** 

# Q 32. India has recently signed the Artemis Accords thereby becoming the 27th country to do so. Which one of the following best describes the Artemis accords?

- (a) commitment towards the long-term goal of reaching net-zero emission by 2050
- (b) a US-led international partnership on planetary exploration and research
- (c) avoiding border coercion and advocating for dialogue and diplomacy to resolve international border disputes
- (d) Ceasing fossil fuel exploration by 2030 and shifting to green energy production on larger scale

#### Ans: b Explanation

- Explanation:
  - The Artemis Accords has been built upon the foundation of the Outer Space Treaty of 1967 (OST). It constitutes a comprehensive framework of guidelines that aim to govern the exploration and utilization of space in the modern era. India became the 27th country to sign the nonbinding Artemis Accords. This will involve joint participation of ISRO and NASA in space exploration programmes in near future.
  - The Artemis Accords is closely linked to the Artemis Program, which aims to return astronauts to the lunar surface, build a space camp there, and carry out deep space exploration. The upcoming Artemis-III mission by NASA will land the first woman and first person of color on the Moon, using innovative technologies to explore more of the lunar surface. In 2024, Orion will deliver its crew to lunar orbit. The commercially developed lander that will take the crew to the lunar surface. So, option (b) is correct.
- Q 33. Which of the following supercomputers of India has been ranked at No. 75 in the world at the International Supercomputing Conference (ISC 2023) in Germany and has also become the fastest supercomputer of India?
  - (a) Mihir
  - (b) Pratyush
  - (c) PARAM Ganga
  - (d) AIRAWAT

### Ans: d Explanation:

• National Supercomputing Mission was introduced by the Ministry of Electronics and Information Technology in 2015 to install large number of supercomputers in India to meet the complex computational challenges. Several supercomputers have been installed till date under the mission. Recently, supercomputer named AIRAWAT have been ranked 75th fastest in the world in global top 500 list of supercomputers. Also, it is the fastest supercomputer of India at present. AIRAWAT has been installed at the Centre for Development of Advanced Computing (C-DAC) in Pune. The United States' Frontier is the most powerful supercomputer on earth currently.

So, option (d) is correct.

### Q 34. The Covid-19 event led to the development of mRNA and DNA vaccines at record pace to replace the traditional vaccines. In what way(s) is/are the mRNA and DNA vaccines different from traditional vaccines?

- 1. While traditional vaccines are prepared by using weakened or inactive versions of that virus, DNA and RNA vaccines use part of the virus' own genes to stimulate an immune response.
- 2. While Covishield is a type of traditional vaccine, ZyCoV-D and Covaxin are examples of DNA and m-RNA vaccine.

### Select the correct answer using the code given below:

- (a) 1 Only
- (b) 2 Only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans: a

Explanation:

- Statement 1 is correct: The Covid-19 event led to the development of mRNA and DNA vaccines at record pace to replace the traditional vaccines. Both DNA and RNA vaccines are used to create an immune response against a specific pathogen. However, traditional vaccines are different from vector vaccines like m-RNA and DNA. Unlike conventional vaccines that stimulate the immune system through the use of a weakened or inactivated version of a pathogen (virus or bacteria), DNA and mRNA vaccines use genetic materials that code for the pathogen's spike protein to trigger an immune response. Specifically, DNA vaccines use small DNA molecules, while mRNA vaccines use the pathogen's messenger RNA to do the job.
- Statement 2 is incorrect: Bharat Biotech's Covaxin is India's first indigenous vaccine against COVID-19. It is a traditional vaccine developed with Whole-Virion Inactivated Vero Cell-derived technology, which uses a dead virus, incapable of infecting the host cell or replicating. ZyCoV-D is a DNA plasmid-based COVID-19 vaccine developed by Indian pharmaceutical company Cadila Healthcare, and Covishield is a m-RNA vaccine Serum Institute of India Pvt Ltd.
- Q 35. At the recently concluded COP 28 of UNFCCC, nearly 200 countries adopted deal that called for a "transition away from fossil fuels". In this context, consider the following statements:
  - 1. A fund named 'loss and damage' fund has been proposed for the first time at COP 28
  - 2. COP 28 allows for continuing usage of transitional fuels like natural gas, while rapidly phasing down unabated coal.
  - 3. COP 28 sets the target for tripling of renewable energy capacity and a doubling of energy efficiency, both by 2030.
  - 4. The next COP 29 is scheduled to take place in Azerbaijan.

### Which of the statements given above are correct?

- (a) 1 and 2 Only
- (b) 2, 3 and 4 Only
- (c) 2 and 3 Only
- (d) 3 and 4 Only

### Ans: b

Explanation:

• Statement 1 is incorrect: The 'Loss and Damage' (L&D) fund was first proposed at Sharm el-Sheikh Climate Change Conference (COP 27) and not at COP 28. The fund is a financial mechanism designed to address the irreversible consequences of climate change . The aim is to provide financial assistance to poorer nations.

- Statement 2 is correct: The final draft of COP28 called for a "transitioning away from fossil fuels in energy systems, so as to achieve net zero by 2050. The exclusive focus has been on rapidly phasing down unabated coal, though it allows transitional fuels like methane to continue.
- Statement 3 is correct: The agreement calls for a tripling of renewable energy capacity and a doubling of energy efficiency, both by 2030.
- Statement 4 is correct: COP29 is set to take place in Baku, Azerbaijan.

### Q 36. Consider the following statements with respect to the ISRO's Venus orbiter mission Shukrayaan-1:

- 1. ISRO has become the first space agency in the world to schedule a mission to Venus.
- 2. The mission aims to study the Venusian clouds.

### 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

### Ans: b Explanation:

- Statement 1 is incorrect: Shukrayaan will be ISRO's first mission to Venus, however, it is not the first agency to plan a mission on Venus. Earlier to this, US space agency NASA and space agency of Japan have already sent missions to study Venus. Nasa, have more than 40 spacecraft launched for Venus and one spacecraft Japan's Akatsuki is currently in Venus's orbit.
- Statement 2 is correct: The mission involves a spacecraft to orbit Venus to study
- Venusian clouds that are thick and are composed mainly (75–96%) of sulfuric acid droplets.
- Nasa's Mariner 2 was the first spacecraft to visit any planet beyond Earth when it flew past Venus on December 14, 1962. It revealed Venus as a runaway global hothouse. ISRO's Venus mission Shukrayaan was expected to be launched in December 2024, however, as per latest update the mission may be rescheduled in 2031.
- Q 37. Carbon nanotube nowadays on account of its light weight and a tensile strength of over 100 times that of steel is replacing steel in several applications. What is the basic structural building block of carbon nanotubes?
  - (a) Diamond
  - (b) Graphite
  - (c) Fullerene
  - (d) Graphene
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### Ans: d Explanation:

• Carbon nanotubes are very light in weight and are said to possess a tensile strength that is over 100 times that of steel. They are replacing steel in many applications. Graphene is the basic structural building block of carbon nanotubes. Graphene is a single layer (monolayer) of carbon atoms, tightly bound in a hexagonal honeycomb lattice. It is an allotrope of carbon. Graphite is an allotrope of carbon having a high number of carbon sheets whereas the graphene is a single carbon sheet of graphite. Carbon nanotubes are extremely robust and difficult to break, but they are still light. **So, option (d) is the correct.** 

### Q 38. Consider the following statements about Sun-synchronous orbit (SSO):

- 1. It is a particular kind of geostationary orbit.
- 2. A satellite in a Sun-synchronous orbit generally remains at an altitude of between 600 to 800 km.
- 3. It is mainly used for communication satellites.

### Which of the statements given above is correct?

- (a) 1 Only
- (b) 2 Only
- (c) 3 Only
- (d) None of the above

Ans: b

Explanation:

- Statement 1 is incorrect: Sun-synchronous orbit (SSO) is a particular kind of polar orbit. Satellites in polar orbits usually travel past Earth from north to south rather than from west to east. These pass roughly over Earth's poles. Polar orbits are a type of low Earth orbit.
- Statement 2 is correct: Since sun-synchronous orbit (SSO) is a polar orbit, a satellite in a sun-synchronous orbit would usually be at an altitude of between 600 to 800 km.
- Statement 3 is incorrect: sun-synchronous orbit means they are synchronized to always be in the same 'fixed' position relative to the Sun. Due to this, the satellite always visits the same spot at the same local time. This is why sun-synchronous satellites are used as weather satellites.

### Q 39. Consider the following statements about spacecrafts and launch vehicles used for the same:

- 1. The launch vehicle used for Chandrayaan-1 was PSLV-C11.
- 2. The launch vehicle used for Chandrayaan-2 was the Geosynchronous Satellite Launch Vehicle Mark III (GSLV MK3).
- 3. The launch vehicle used for the Chandrayaan-3 is LVM3 M4.

### Which of the statements given above are correct?

- (a) 1 and 2 Only
- (b) 2 and 3 Only
- (c) 1 and 3 Only
- (d) 1, 2 and 3

### Ans: d

### Explanation:

- Space launch vehicles are meant for launching satellites or certain payloads into space or into spacecraft.
- Statement 1 is correct: The launch vehicle used for Chandrayaan-1 was PSLV-C11.
- Statement 2 is correct: The launch vehicle used for Chandrayaan-2 was the Geosynchronous Satellite Launch Vehicle Mark III.
- Statement 3 is correct: The launch vehicle used for the Chandrayaan-3 is LVM 3 M4.

### Q 40. Consider the following statements:

- 1. Small satellites are those with a mass less than 180 kilograms
- 2. Nanosatellite are those satellite with mass between 1 to 10 nanograms.

### 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

### Ans: a

Explanation:

- **Statement 1 is correct:** Small satellites are those with a mass less than 180 kilograms and about the size of a large kitchen fridge.
- Statement 2 is incorrect: Nanosatellite" or "nanosat" is applied to an artificial satellite with a wet mass between 1 and 10 kg. A nanogram is one-billionth of a gram.
- Q 41. Identify the Indian scientist with the help of given information:
  - 1. He is best known for his work in solid-state and structural chemistry.
  - 2. He is the first Indian to reach the h-index (Hirsch index).
  - 3. He is one of three Indian scientists to receive the Bharat Ratna award.

### Select the correct answer using the options given below:

- a) Har Gobind Khorana
- b) C.N.R. Rao
- c) Satyendra Nath Bose
- d) C.V. Raman

### Ans: b Explanation

C.N.R. Rao is best known for his work in solid-state and structural chemistry. C.N.R Rao is the first Indian to reach the hindex (The H-index measures the productivity and impact of the published work of a scientist or scholar) of 100. He has
also made immense contributions to nano-materials research besides working on hybrid materials including nanotubes
and graphene. On 16 November 2013, the Government of India announced his selection for Bharat Ratna, the highest
civilian award in India, making him the third scientist after C.V. Raman and A. P. J. Abdul Kalam to receive the award. So
option (b) is correct.

Q 42. Who amongst the following was a renowned Indian origin biochemist and won the Nobel Prize in Physiology or Medicine for showing how genetic information is translated into proteins?

- (a) Meghnad Saha
- (b) C.N.R. Rao
- (c) Har Gobind Khorana
- (d) Jagadish Chandra Bose

### Ans: c Explanation

• Har Gobind Khorana was a renowned biochemist and won the Nobel Prize (1968) in Physiology or Medicine for showing how genetic information is translated into proteins, which carry out the functions of a living cell. So option (c) is the correct answer.

### Q 43. Consider the following statements about Navigation with Indian Constellation (NavIC):

- 1. Its positional accuracy is currently more than USA's Global Positioning System (GPS).
- 2. It is a constellation of seven satellites placed in polar orbits.
- 3. Not all the smartphones and navigational gadgets available in India are currently compatible with NavIC.

### Which of the statements given above are correct?

- (a) Only 1 and 3
- (b) Only 2 and 3
- (c) 1, 2 and 3
- (d) None of the above

#### Ans: a Explanatio

- Explanation
  - Statement 1 is correct: GPS is owned and operated by United States government while NavIC is owned and operated by India. NavIC covers all of Indian subcontinent and offers a positional accuracy of 5 metres which is better compared to 15-20 metres of GPS.
  - Statement 2 is incorrect: NavIC is a satellite-based navigation system, developed by Indian Space Research Organization (ISRO). It comprises a constellation of seven satellites orbiting high above in geostationary and geosynchronous orbits.
  - Statement 3 is correct: Not all smartphones and navigational gadgets are compatible with NavIC. To use and decode NavIC signals, a navigating gadget should have a NavIC compatible chipset or microchip incorporated inside it. Ministry of Science & Technology and Ministry of Electronics & Information Technology, have recently jointly collaborated with a Hyderabad based firm, Manjeera Digital Systems Private Limited, to facilitate the designing and commercial production of chips which when installed in mobile phones will make navigation possible through NavIC.

### Q 44. The terms 'Virgin Galactic', and 'Blue Origin', sometimes seen in the news, are what?

- (a) Space tourism companies
- (b) Exoplanets
- (c) Titanic tourist submersibles
- (d) Newly discovered moons of Jupiter

### Ans: a Explanation

• "Virgin Galactic" was founded by Sir Richard Branson and "Blue Origin" is backed by Amazon's Jeff Bezos. These are space tourism companies. Space tourism refers to the commercial activity of sending people to space and bring them safely to earth. **So, option (a) is correct.** 

### Q 45. Which one of the following statements best describes the term Gravitational Lensing?

- (a) A region of space where gravity is so strong that nothing, including light has enough energy to escape it.
- (b) The effect of gravity from planets or galaxies that bends light coming to earth
- (c) Interaction of plasma with magnetic fields to form space hurricanes
- (d) The energy possessed or acquired by an object due to a change in its position when it is present in a gravitational field.

### Ans: b

Explanation

• Gravitational lensing occurs when a massive celestial body such as planet or galaxy cluster causes a sufficient curvature of spacetime for the path of light around it to be visibly bent, as if by a lens. The body causing the light to curve is accordingly called a gravitational lens. **So, option (b) is correct.** 

# Q 46. Millimetre waves is the backbone for the 5G or 5<sup>th</sup> Generation of the cellular technology. Which Indian scientist is acknowledged for his landmark discoveries related to millimetre waves?

- (a) Subrahmanyan Chandrasekhar
- (b) Meghnad Saha
- (c) C V Raman
- (d) Jagadish Chandra Bose

### Ans: d Explanation

- The first science experiment with millimetre waves was conducted by Indian scientist Jagadish Chandra Bose in 1897. He was the first to demonstrate radio communication with millimetre wavelengths falling in the 30GHz to 300GHz spectrum. He generated 5mm electromagnetic waves, 60GHz, before instruments even evolved to measure frequencies that low. The millimetre wave that Jagadish Chandra Bose worked on is the backbone of 5G technology we use today. So, option (d) is correct:
- Q 47. The PM PRANAM scheme by the government aims to reduce the use of chemical fertilizers and promote use of biofertilizers in the country. With reference to this, consider the following statements:
  - 1. Biofertilizers are N, P, K fertilizers in nanometre scale that promote colonization of the rhizosphere and increase the primary nutrient uptake of plants.
  - 2. Algal microflora is a true bio-based fertilizer.
  - 3. The scheme aims to reduce import and subsidies on chemical fertilizers.

### Which of the statements given above is/ are correct?

- (a) Only 1 and 3
- (b) Only 3
- (c) Only 2 and 3
- (d) 1, 2 and 3

Ans: c Explanation

- Statement 1 is incorrect: Biofertilizers contains living microorganisms, which when applied to seed, plant surface, or soil, colonizes the rhizosphere and promotes growth by increasing the supply or availability of primary nutrients to the host plant. Nano fertilizers are in the nanometre scale, and are different from biofertilizers.
- Statement 2 is correct: Algal microflora is a true bio-based fertilizer for agricultural techniques that are both environmentally favourable and pollution-free.
- Statement 3 is correct: PM PRANAM stands for PM Promotion of Alternate Nutrients for Agriculture Management Yojana. The main objective of the scheme is to encourage the balanced use of fertilisers in conjunction with bio fertilisers and organic fertilisers. The PM PRANAM scheme focuses on reduced subsidies in states. As per the initiative, states will get 50 percent of that of subsidy savings as a grant. The savings in subsidy will be used on new technology in the fertiliser sector.

### Q 48. Which of the following Genetically Modified (GM) crops is currently allowed for commercial cultivation in India?

- 1. Cotton
- 2. Maize
- 3. Soybean
- 4. Mustard
- 5. Brinjal
- 6. Canola

### Select the correct answer using the code given below:

- (a) Only 1
- (b) Only 1 and 6
- (c) Only 1, 4 and 5
- (d) 1, 2, 3, 4, 5 and 6

#### Ans: a Explanation

• A total of 16 GM crops are cultivated in various countries out of which corn, soybean, cotton and canola are the four largest acreages. In India, Bt cotton is the only GM crop approved for cultivation. In India, only Cotton is currently commercially cultivated as a GM crop. **So, option (a) is correct.** 

### Q 49. Which of the following is the main objective of the UNNATI programme being run by ISRO?

- (a) Agricultural biotechnology
- (b) Internet of Things (IoT) solutions
- (c) Nanosatellite technology
- (d) Quantum computing

### Ans: c Explanation

- UNNATI stands for the UNispace Nanosatellite Assembly & Training by ISRO. The primary objective of the programme is to provide theoretical course on nanosatellite technology. Recently, the third batch of training under the UNNATI programme has been completed. **So, option (c) is correct.**
- Q 50. The sub-atomic particle 'boson' has been named after which Indian personality?
  - (a) Jagdish Chandra Bose
  - (b) Satyendra Nath Bose

- (c) Pramath Nath Bose
- (d) Subhash Chandra Bose

### Ans: b Explanation

Boson is one of the two fundamental classes of subatomic particle, the other being fermions. In a 'quantum' leap in physics, CERN scientists today claimed to have spotted a sub-atomic particle "consistent" with the Higgs boson or 'God particle', believed to be a crucial building block that led to the formation of the universe. The particle was earlier named Boson on the name of great Indian scientist Satyendra Nath Bose. The name later became Higgs Boson from a British scientist Peter Higgs and Bose. The work done by Bose and Albert Einstein, was later carried forward by Higgs. So, option (b) is correct.

### Q 51. Which of the following countries have built either global or regional satellite navigation system?

- 1. Japan
- 2. Russia
- **3.** India
- 4. Australia
- 5. China
- 6. Israel

### Select the correct answer using the code given below:

- (a) Only 2 and 5
- (b) Only 2, 3 and 5
- (c) Only 1, 2, 3 and 5
- (d) 1, 2, 3, 4, 5 and 6

### Ans: c Explanation

As of 2023, four global systems are operational: the United States's Global Positioning System (GPS), Russia's Global Navigation Satellite System (GLONASS), China's BeiDou Navigation Satellite System, and the European Union's Galileo. The Quasi-Zenith Satellite System (QZSS) is a regional navigation satellite system commissioned by the Japanese government. Similarly, India has NavIC as a Regional Navigation Satellite System. Australia and Israel have not built either global or regional navigation satellite systems, as of now. So, option (c) is correct.

Q 52. One of the effective ways of increasing the cooling efficiency of our cooler is by adding ice to the water in the tank. Which one of the falling steps can further enhance the cooling degree of the cooler in quick time?

- (a) Wrapping ice in aluminium foils
- (b) Adding salt to ice
- (c) Adding ice to the coolers water
- (d) Adding soda with ice to cooler water

• Adding the ice to the cooler water makes the pads cooler, resulting in cool air passing through them. However, when the same ice is crushed then surface area of ice gets increased by crushing. This results in increase in degree of cooling by cooler. Cooling from ice occur due to convection process which is proportional to area. **So, option (c) is correct.** 

### Q 53. Consider the following statements:

- 1. When a gas is changed to a liquid phase, it absorbs energy.
- 2. A closed system does not allow the exchange of either energy or matter with the surroundings.
- 3. When heat is added to boiling water, the water temperature increases.

### Which of the statements given above is/are correct?

- (a) Only 1 and 3
- (b) Only 3
- (c) 1, 2 and 3
- (d) None of the above

### Ans: d Explanation:

- Statement 1 is incorrect: when a gas is changed to a liquid phase, it releases energy.
- Statement 2 is incorrect: Isolated system does not allow the exchange of either energy or matter with the surroundings. Closed system does not allow mass to exchange but energy can be exchanged.
- **Statement 3 is incorrect:** when heat is added to boiling water, the water temperature remains same as that of boiling point of water. Addition of further heat is used to change the phase of water from liquid water to vapor.

# Q 54. We absorb that food cooked in a pressure cooker takes less time and uses lesser amount of water than other conventional methods. Why?

- (a) Latent heat of vaporization increases inside the pressure cooker.
- (b) More heat is required to reach boiling point of water in pressure cooker.
- (c) Latent heat of sublimation increases inside the pressure cooker.
- (d) Atmospheric pressure inside the pressure cooker is low and the water boils very fast.

Ans: b Explanation

- A pressure cooker is a pot with a special lid that seals. The sealing ring, typically a rubber gasket, prevents steam and air from escaping as they expand. Pressure cooker acts as an isolated system. This causes the pressure in the vessel to build as the temperature rises. Increase in pressure increases the boiling point of water due to which a greater amount of heat transfer occur inside the cooker before the water gets boiled and gets converted to gas. This higher amount of heat transfer to water and then to food inside the cooker is responsible for fast cooking of food and lesser amount of water being required. **So, option (b) is correct.**
- Q 55. The Indian government in its efforts to reshape governance and public services in the country has decided to set up three Centre of Excellence (CoEs) in three crucial sectors. The three sectors are:
  - 1. Agriculture

- 2. Defence
- 3. Sustainable Cities
- 4. Health
- 5. Environment and Clean Energy

### Select the correct option using the code given below:

- (a) Only 1, 4 and 5
- (b) Only 2, 3 and 4
- (c) Only 1, 3 and 4
- (d) Only 1, 2 and 5

### Ans (c)

Explanation

- Artificial intelligence (AI) is the simulation of human intelligence processes with the help of machines. India is embracing artificial intelligence (AI) to reshape governance and public services. The government has decided to set three Centre of Excellence (CoEs). These three CoEs are to be set up as one Centre of Excellence in each of the three crucial sectors, namely, 1) Agriculture 2) Health, and 3) Sustainable Cities.
- Agriculture: The CoE in Agriculture will involve the creation of a unified platform that would be available on the cloud and can be accessed publicly. It would allow the capturing of in-situ field data such as yield, proximally sensed images, crops, and a variety of growing information.
- **Health:** The CoE in Health would involve setting up a digital platform to capture and analyze health records, creating a test bed for early-disease prediction and diagnosis, and a pandemic or endemic prediction at different places in our country.
- Sustainable Cities: The CoE in Sustainable Cities would involve resolving issues about city planning, traffic management, water and sewage network systems, effective distribution of gas and electricity, etc. So, option (c) is correct.

### Q 56. Consider the following countries:

- 1. India
- 2. Mexico
- 3. Brazil
- 4. China
- 5. New Zealand

### Which of the above are founding members of the Global Partnership on Artificial Intelligence (GPAI)?

- (a) Only 1, 2 and 3
- (b) Only 2, 3 and 4
- (c) Only 1, 2 and 5
- (d) Only 1, 3 and 5

### Ans (c)

- Explanation
  - The Global Partnership on Artificial Intelligence (GPAI) is a multi-stakeholder initiative that engages minds and experts from science, industry, civil society, governments, international organizations, and academia. It aims to bridge the gap between theory and practice on AI by supporting cutting-edge research and applied activities on AI-related priorities.
  - The 2023 Global Partnership on Artificial Intelligence (GPAI) Summit took place in New Delhi, from 12th to 14th December. The 29 existing GPAI Members have reaffirmed their commitment to promoting responsible and trustworthy AI through GPAI.
  - The government of India has also joined the GPAI as its founding member.
  - GPAI was officially launched on June 15, 2020, with fifteen founding members. The members are Australia, Canada, France, Germany, India, Italy, Japan, Mexico, New Zealand, the Republic of Korea, Singapore, Slovenia, the United Kingdom, the United States, and the European Union. **So, option (c) is correct.**

### Q 57. Consider the following statements about Quantum Computing:

- 1. Quantum Computing is the ability to learn from data without being explicitly programmed.
- 2. India's first quantum computing-based telecom network link has been started in Bengaluru.
- 3. 'First International Quantum Communication Conclave' was held in Hyderabad.

### How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

### Ans (d) Explanation

• Statement 1 is incorrect: Quantum Computing is related to the speed of a computer. While a conventional computer stores and processes information in bits i.e. 0 and 1; a quantum computer does the same through 'qubits' or 'quantum bits. A quantum computer is several million times faster than the most sophisticated conventional computer. Machine Learning is the ability to learn without being explicitly programmed.

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- Statement 2 is incorrect: India's first quantum computing-based telecom network link is operational in New Delhi. It lies between Sanchar Bhawan and the National Informatics Centre office.
- Statement 3 is incorrect: Recently, the Department of Telecom organized the First International Quantum Communication Conclave in New Delhi. It was launched in collaboration with CDOT, TSDSI, and IEEE Communications Society. The conclave provides an excellent opportunity to learn about the latest advancements in quantum communication technologies.

# Q 58. The Laser Interferometer Gravitational-Wave Observatory (LIGO) being built in India aims to study the Gravitational waves. In this context, consider the following statements:

- 1. The LIGO India observatory is being built in the Theni District in Tamil Nadu.
- 2. Gravitational waves are generated due to the acceleration of electric charges propagating in space and time.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans (d) Explanation

- **Statement 1 is incorrect:** The Union Cabinet has approved LIGO-India, the gravitational-wave detector to be built in Maharashtra. It is being built in the Hingoli district of Maharashtra.
- Statement 2 is incorrect: Gravitational waves are different from electromagnetic waves. While the acceleration of electric charges in space creates electromagnetic waves, gravitational waves are created by the acceleration of different masses in space.
- The Laser Interferometer Gravitational-Wave Observatory (LIGO) is a large-scale physics experiment and observatory designed to detect cosmic gravitational waves.
- The LIGO-India project is being built by different institutions viz. the Department of Atomic Energy (DAE) and the Department of Science and Technology (DST), Government of India, with a Memorandum of Understanding (MoU) with the National Science Foundation (NSF), USA.

- Q 59. Recently, the Union Science and Technology Minister unveiled two new products named 'Namoh 108' and 'NBRI-Nihar' developed by the National Botanical Research Institute (NBRI). The two products are new varieties of which of the following?
  - (a) Lotus and Turmeric
  - (b) Basmati Rice and Sharbati Wheat
  - (c) Lotus and Aloe Vera
  - (d) Mango and Tea

### Ans (c) Explanation

- Recently a new variety of Lotus was unveiled by the Union Science and Technology Minister. The new variety of lotus flower with 108 petals has been named "Namoh 108". It has been developed by the National Botanical Research Institute (NBRI) located in Lucknow, Uttar Pradesh.
- The "NBRI Namoh 108" lotus variety flowers from March to December and is the first flower whose genome is completely sequenced for its characteristics.
- Also, the S&T Minister released a new variety of Aloe vera named 'NBRI-Nihar'. The new variety has approximately 2.5 times higher gel yield in comparison to normal Aloe vera. **So, option (c) is correct.**

### Q 60. Consider the following statements about the OSIRIS-Rex Mission:

- 1. It is a joint mission of the European Space Agency (ESA) and the Indian Space Research Organisation (ISRO).
- 2. The mission aims to study the tropical atmosphere and climate-related aspects such as monsoons and cyclones.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

#### Ans (d) Explanation

- Statement 1 is incorrect: OSIRIS-Rex Mission was launched on Sept. 8, 2016, by the National Aeronautics and Space Administration (NASA). OSIRIS-Rex stands for Origins, Spectral Interpretation, Resource Identification, and Security-Regolith Explorer.
- Statement 2 is incorrect: Under this mission, the spacecraft visited a near-Earth asteroid named Bennu and collected a sample of rocks and dust from the surface. OSIRIS-REx is the first U.S. mission to collect a sample from an asteroid. It returned to Earth on Sept. 24, 2023, to drop off material from asteroid Bennu.

### Q 61. Consider the following statements about the India's Chandrayaan-3 Mission:

- 1. India is the fourth country to reach the moon after the US, China, and the Soviet Union.
- 2. Chandrayaan-3 was launched using an LVM3-M4 rocket.
- 3. Through this mission, ISRO aimed to conduct in-situ scientific experiments on the moon.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2 and 3
- (c) Only 3
- (d) 1, 2 and 3

Ans (d) Explanation

- Statement 1 is correct: On August 23, 2023, the world witnessed the successful landing of India's Chandrayaan-3 on the south pole of the Moon. This made India the first country to do so successfully. However, India is the fourth country to reach the moon after the US, China, and the Soviet Union.
- Statement 2 is correct: Chandrayaan-3 was launched aboard an LVM3-M4 rocket on 14 July 2023 from Satish Dhawan Space Centre in Sriharikota, Andhra Pradesh.
- Statement 3 is correct: The mission had three objectives. First, to demonstrate the ability to soft-land on the moon. The second objective is to demonstrate the rover Vikram's ability to move on the moon. Thirdly, ISRO aims to conduct in-situ scientific experiments.

### Q 62. Consider the following statements about the Lagrange points:

1. The gravitational forces between multiple massive bodies in space create Lagrange points.

2. Currently, there are only five Lagrange points discovered for the Sun-Earth system.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans (c) Explanation

- Statement 1 is correct: The gravitational forces that exist between multiple massive bodies in space create Lagrange points. Lagrange Points are positions in space where the gravitational forces of a two-body system like the Sun and the Earth produce enhanced regions of attraction and repulsion. In the context of sun and earth of our solar system, Lagrange point is the balanced gravitational location between the Earth and the Sun.
- Statement 2 is correct: Currently, we have the five Lagrange points discovered in the Sun-Earth System. Of the five, three are unstable and two are stable. The unstable Lagrange points have been labelled L1, L2, and L3, while the stable Lagrange points have been labelled L4 and L5.

### Q 63. As of now, which of the following countries/organizations have successfully sent missions to explore Mars?

- 1. China
- 2. India
- 3. European Space Agency (ESA)
- 4. Japan Aerospace Exploration Agency (JAXA)

Select the correct answer using the code given below:

- (a) Only 1 and 2
- (b) Only 1, 2 and 3
- (c) Only 2 and 3
- (d) 1, 2, 3 and 4

Ans (b) Explanation:

- China launched the Tianwen-1 mission in July 2020 and the mission had a rover, named Zhurong. The rover touched down on the Red Planet in May 2021. The duo explored Mars smoothly until May 2022, when Zhurong was put into hibernation, hunkering down for the harsh winter.
- Mars Orbiter Mission (MOM) was ISRO's first mission to red planet Mars. It was an unmanned mission. The Mangalyaan spacecraft successfully entered Mars orbit on September 23, 2014.
- The success of the mission made ISRO only the fourth space agency in the world to do so. Before India, only the United States, the Soviet Union and the European Space Agency (ESA) had successfully explored Mars.
- In December 2003, the European Space Agency's (ESA) Mars Express successfully arrived in orbit around Mars.
- Mangalyaan operated for seven and a half years, observing Martian landscapes and studying their composition using its five science instruments. In April 2022, ISRO lost contact with Mangalyaan after it passed into Mars' shadow for an extended period.
- Japan Aerospace Exploration Agency (JAXA) has yet not explored Mars through a successful mission. It has planned its first mission to Mars in the year 2026 to explore the moons of Mars. **So, option (b) is correct.**

### Q 64. With reference to the report titled 'Fostering Effective Energy Transition 2023', consider the following statements:

- 1. The report has been released by the Greenpeace International.
- 2. India ranked 67<sup>th</sup> in the Index.
- 3. Finland leads the global rankings, followed by New Zealand and Norway.
- Among all the considered economies, currently only India and Australia, are showing sustained momentum in building energy equity.

### How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

### Ans (a) Explanation:

- Statement 1 is incorrect: The report titled 'Fostering Effective Energy Transition 2023' was published by the World Economic Forum (WEF).
- Statement 2 is correct: The report ranked 120 countries based on energy transition. In the Energy Transition Index (ETI) so released, WEF has placed India at 67th position.
- Statement 3 is incorrect: Sweden leads the global rankings, followed by Denmark and Norway.
- **Statement 4 is incorrect:** Only two major economies, India and Singapore, are showing sustained momentum in building energy equity, sustainability, and security. The rest of the world's energy transition momentum is insufficient.
- Other features of the report are:
- This edition also evaluated countries' "transition momentum" for the first time to highlight the urgency of consistent progress on timely and effective transition.
- Among the world's 10 largest economies, only France features in the top 10.
- The top 10 accounts for 2% of energy-related CO2 emissions, 4% of the total energy supply, and 2% of the global population.
- Notably, large emerging centers of demand, such as China, India, and Indonesia, have seen strong improvements.

# Q 65. Recently, India decided to crash its satellite Megha-Tropiques-With reference to this, consider the following statements:

1. Megha-Tropiques-1 was developed jointly by the Indian Space Research Organisation and the European Space Agency.

- 2. It was placed in the geostationary orbit.
- 3. ISRO crashed the satellite as part of its commitment to the United Nations Inter-Agency Space Debris Coordination Committee.

### How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

### Ans (a) Explanation:

- Statement 1 is incorrect: Megha-Tropiques-1 was developed jointly by the Indian Space Research Organisation (ISRO) and the French space agency, CNES.
- Statement 2 is incorrect: Megha-Tropiques-1 was launched into Low Earth Orbit (LEO) on October 12, 2011. It was launched for monitoring tropical weather and climate studies. Megha in Sanskrit is 'cloud' and Tropiques in French means 'tropics. The mission was initially planned to operate for three years, but it was extended later as it continued to deliver key data about the climate for a decade.
- Statement 3 is correct: The Megha-Tropiques-1 (MT1) was decommissioned by ISRO and so ISRO decided to crash the satellite as part of its commitment to the United Nations Inter-Agency Space Debris Coordination Committee (UNIADC). The satellite was allowed to re-enter Earth's atmosphere where it got burned in the skies.

### Q 66. India has recently signed the Artemis Accords. In this context, consider the following statements:

- 1. The Artemis Accord has been built upon the foundation of the Outer Space Treaty of 1967 (OST).
- 2. The accord provides for the exploration of outer space for military purposes.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans (a) Explanation:

- Statement 1 is correct: The Artemis Accord has been built upon the foundation of the Outer Space Treaty of 1967 (OST). It constitutes a comprehensive framework of guidelines that aim to govern the exploration and utilization of space in the modern era. India became the 27<sup>th</sup> country to sign the nonbinding Artemis Accords. This will involve the joint participation of ISRO and NASA in space exploration programs.
- Statement 2 is incorrect: Artemis Accord is a non-binding set of principles designed to guide civil space exploration and use in the 21st century. The Artemis Accord is closely linked to the Artemis Program, which aims to return astronauts to the lunar surface, build a space camp there, and carry out deep space exploration. The upcoming Artemis-III mission by NASA will land the first woman on the Moon.

### Q 67. Consider the following statements about the 5th-generation mobile network technology:

- 1. It is a wireless technology that increases the speed and latency in the network.
- 2. Vidisha district of Madhya Pradesh became the first-ever district in India for on-ground deployment of innovative 5G services.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans (b) Explanation:

- **Statement 1 is incorrect:** 5G is the fifth generation of cellular technology. It is designed to increase speed and reduce latency, thereby improving the flexibility of wireless services.
- Statement 2 is correct: Vidisha, an aspirational district of Madhya Pradesh became the first-ever district in India for onground deployment of innovative 5G services.
- 5G is much faster and more reliable than the currently popular 4G networks and has the potential to transform the way we use the internet to access applications, social networks, and information.
- 5G is based on OFDM (Orthogonal frequency-division multiplexing)

### Q 68. Consider the following

- 1. Adoption of Loss and Damage Fund
- 2. First Global Stocktake
- 3. "Land, Life and Legacy" Declaration

### Which of the above are the outcomes from the 28th Session of the UN Climate Change Conference (COP 28)?

- (a) Only 1 and 2
- (b) Only 2 and 3
- (c) Only 1 and 3
- (d) 1, 2 and 3

### Ans (a) Explanation:

- The 'Loss and Damage' (L&D) fund was first proposed at Sharm el-Sheikh Climate Change Conference (COP 27) and was adopted at COP 28 or 28th Session of the UN Climate Change Conference.
- The fund is a financial mechanism designed to address the irreversible consequences of climate change. The aim is to provide financial assistance to poorer nations.
- The Global Stocktake is a periodic review mechanism established under the Paris Agreement in 2015. The stocktake takes place every five years, with the first-ever stocktake concluded at the UN Climate Change Conference (COP28) at the end of 2023.
- The "Land, Life and Legacy" Declaration is part of the 15th Conference of Parties (COP15) of the United Nations Convention to Combat Desertification (UNCCD), which concluded on May 20, 2022, in Abidjan. **So, option (a) is correct.**

# Q 69. Recently, India decided to formally join the Square Kilometre Array (SKA) project. In this context, consider the following statements:

- 1. The project is related to the construction of a single extremely large telescope (ELT) in the Hawaiian Islands in the USA.
- 2. The SKA cores are being built in the Southern Hemisphere.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2

(d) Neither 1 nor 2

### Ans (b) Explanation:

- Statement 1 is incorrect: The Square Kilometer Array (SKA) project is an intergovernmental international radio telescope project being built in Australia (low-frequency) and South Africa (mid-frequency). The Square Kilometer Array is not a single large telescope, but a collection of thousands of dish antennas operating as a single unit.
- **Statement 2 is correct:** The SKA cores are being built in the southern hemisphere. The reason is that the clear view of the Milky Way galaxy least radio interference in the southern hemisphere.
- India has approved Rs 1,250 crore for the project, which includes its funding contribution for the construction phase.
- Q 70. The Facility for Antiproton and Ion Research (FAIR) is an international accelerator facility under construction for the research of antiprotons and ions. This project is located in which country?
  - (a) USA
  - (b) China
  - (c) Russia
  - (d) Germany

### Ans (d) Explanation:

- The Facility for Antiproton and Ion Research (FAIR) is an international accelerator facility under construction.
- It is being built in Darmstadt, Germany.
- It will use antiprotons and ions to perform research in the fields of nuclear, hadron, and particle physics, atomic and antimatter physics, and high-density plasma physics.
- At FAIR, a matter that usually only exists in the depth of space will be produced in a lab for research. So, option (d) is correct.

### Q 71. Consider the following statements about AstroSat:

- 1. It enables the simultaneous multi-wavelength observations of various astronomical objects with a single satellite.
- 2. It is the first dedicated Indian Astronomy Mission for studying celestial sources.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans (c) Explanation:

- Statement 1 is correct: It allows to study of sources in X-ray, optical, and UV spectral bands simultaneously. The payloads cover the energy bands of Ultraviolet (Near and Far), and limited optical and X-ray regimes. The mission enables the simultaneous multi-wavelength observations of various astronomical objects with a single satellite.
- Statement 2 is correct: AstroSat is the first dedicated Indian astronomy mission for studying celestial sources.

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- Other Scientific objectives of AstroSat:
- To understand high energy processes in binary star systems containing neutron stars and black holes.

- Estimate magnetic fields of neutron stars.
- Study star birth regions and high energy processes in star systems lying beyond our galaxy. Detect new briefly bright X-ray sources in the sky.
- Perform a limited deep-field survey of the Universe in the Ultraviolet region.

### Q 72. Consider the following statements about SARAL (Satellite with Argos and Altika):

- 1. It is a joint mission of ISRO and NASA.
- 2. It has placed the first radar-imaging weather satellite into polar orbits.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans (d)

Explanation:

- **Statement 1 is incorrect:** SARAL (Satellite for ALTIKA and ARGOS) is a joint mission of ISRO with France.
- Statement 2 is incorrect: The SARAL (Satellite for ALTIKA and ARGOS) aims at studying ocean from space using altimetry. It is not the first radar imaging weather satellite.
- ALtiKa is the altimeter and prime payload of the SARAL mission. It is the first spaceborne altimeter to operate at Ka-band.
- ARGOS is related to Advanced-Data Collection System from ocean buoys and transmit the same.
- Q 73. On which planet/celestial body, scientists have recently detected phosphine gas, thereby predicting the possibility of life on the same?
  - (a) Mars
  - (b) Venus
  - (c) Moon
  - (d) Makemake

#### Ans (b) Explanati

- Explanation
  - Scientists have detected phosphine gas in the clouds of Venus. Since phosphine is a molecule associated with biological activity on Earth, the discovery of the same over Venus has led to sparking debate about the possibility of life on the planet.
  - Jane Greaves and her team have detected phosphine at deeper level in Venus' atmosphere than before using the James Clark Maxwell Telescope (JCMT) at Mauna Kea Observatory, Hawaii. **So, option (b) is correct.**

### Q 74. Consider the following statements:

- 1. The World's first Artificial Intelligence Safety Summit was held recently in the USA.
- 2. The world's first graduate research university dedicated to Artificial Intelligence (AI) has been opened in UAE. Which of the statements given above is/are correct?
- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans (b) Explanation

- Statement 1 is incorrect: The World's first Artificial Intelligence Safety Summit was held recently at Buckingham in the United Kingdom. Union Minister of State for Skill Development & Entrepreneurship and Electronics & IT- Rajeev Chandrasekhar addressed the inaugural plenary session of the 'AI Safety Summit 2023'.
- Statement 2 is correct: The Mohamed bin Zayed University of Artificial Intelligence (MBZUAI) was inaugurated recently in ABU DHABI, UAE. The university offers courses for undergraduate students.

### Q 75. Consider the following statements about the Lunar Polar Exploration Mission (LUPEX):

- 1. It is a planned joint lunar mission by the Indian Space Research Organisation (ISRO) and the Russian Space Agency.
- 2. The mission aims to send a crew of four astronauts to venture around the Moon.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans (d) Explanation

**Statement 1 is incorrect:** The Lunar Polar Exploration Mission (LUPEX)[6] is a planned joint lunar mission by the Indian Space Research Organisation (ISRO) and Japan Aerospace Exploration Agency (JAXA).

**Statement 2 is incorrect:** The mission aims to send an uncrewed lunar lander and rover to explore the south pole region of the Moon in 2026.

In this mission, while JAXA aims to provide the launch vehicle and the rover, ISRO would be providing the lander.

- Q 76. The Ministry of Mines under the Government of India has recently decided to develop five lithium blocks with an investment of 200 crores. In which country the lithium blocks are being developed?
  - (a) Brazil
  - (b) Chile
  - (c) Argentina
  - (d) Bolivia

Ans (c) Explanation

- The Lithium Triangle refers to an area in the Andes, straddling Argentina, Bolivia, and Chile, known for its abundant lithium deposits.
- The *Ministry of Mines* is responsible for the survey and exploration of all minerals, other than natural gases, petroleum and atomic minerals.
- Recently, the *Ministry of Mines* has decided to develop five lithium blocks in Argentina with an investment of 200 crores.
- So, option (c) is correct.

### Q 77. Which of the following are submarines included under Project 75?

- 1. INS Khanderi
- 2. INS Karanj
- 3. INS Sindhughosh

- 4. INS Sumedha
- 5. INS Vagir
- 6. INS Vagsheer

### Select the correct answer using the code given below:

- (a) Only 1, 2, 3 and 4
- (b) Only 2, 3, 4 and 5
- (c) Only 1, 2, 5 and 6
- (d) Only 3, 4, 5 and 6

### Ans (c) Explanation:

- Project 75 is a significant initiative undertaken by the Indian government in collaboration with foreign manufacturers to build advanced submarines for the Indian Navy.
- It is an ambitious submarine acquisition program of the Indian Navy.
- It aims to design and build six advanced conventional submarines
- The six submarines are namely INS Kalvari, INS Khanderi, INS Karanj, INS Vela, INS Vagir and INS Vagsheer. So, option (c) is correct.
- Q 78. In which city of India, the country's first Artificial Intelligence & Robotics Technology Park (ARTPARK) was launched recently?
  - (a) Mumbai
  - (b) Chennai
  - (c) New Delhi
  - (d) Bengaluru

### Ans (d) Explanation

- The country's first Artificial Intelligence & Robotics Technology Park (ARTPARK) was launched recently in Bengaluru, Karnataka.
- The park has the objective of channelizing innovations to create a societal impact by executing ambitious missionmode R&D projects in healthcare, education, mobility, infrastructure, agriculture, retail, and cyber-security aiming to solve problems unique to India. **So, option (d) is correct.**

### Q 79. Consider the following statements about "Kilonovas", a term sometimes seen in news:

1. Burst of light created due to the clash of neutron stars is called Kilonova.

2. The Laser Interferometer Gravitational-Wave Observatory (LIGO) detected gravitational waves caused due to kilonova.

### Which of the statements given above is/are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

### Ans (c) Explanation

• Statement 1 is correct: A kilonova (also called a macronova) is a transient astronomical event that occurs in a compact binary system when two neutron stars or a neutron star and a black hole merge. These are considered the most violent and powerful events in the known universe.

 Statement 2 is correct: On 17 August 2017, the Laser Interferometer Gravitational-Wave Observatory (LIGO) and the Virgo Interferometer both detected gravitational waves from the collision between two neutron stars. A kilonova sent light and gravitational waves across the Universe.

### Q 80. Consider the following pairs with reference to "types of plant":

Туре	Meaning	
Oxylophyte	Plants of acidic soil	
Psammophytes	Plants growing on the sand	
Sclerophytes	Plants of shrubland/Mediterranean	

### How many of the above pairs is/are correctly matched?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

#### Ans: (c) Explanation

Explanation:

- All the three pairs are correct.
- Oxylophytes are plants that grow in acidic soils. Some of the examples are bog mosses, cotton grass, etc.
- Plants growing on the sand are called Psammophytes . Psammophytes are referred to as extremophiles too. Psammophytes grow in regions all over the world for example, in China's autonomous Inner Mongolia region, psammophytic woodlands are found in steppe habitats.
- Sclerophytes-This type of vegetation characterized by hard, leathery, evergreen foliage that is specially adapted to prevent moisture loss. Sclerophyllous plants occur in many parts of the world like in Mediterranean Biomes. Vegetation cover of the Mediterranean Basin dominated by evergreen sclerophyllous shrubs and trees.

### Q 81. Consider the following statements with reference to "National Board for Wildlife"

- 1. It is non constitutional Body.
- 2. The Minister in charge of the Ministry of Environment, Forests, and Climate Change acts as its chairman.
- 3. No alteration of the boundaries of a sanctuary shall be made by the State Government except on a recommendation of the National Board for Wildlife.

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### How many of the above statements is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Ans: (b) Explanation:

• Statement 1 is correct: National Board for Wildlife is a statutory body constituted under Section 5A of the Wildlife (Protection) Act, 1972 (WLPA).

- Statement 2 is incorrect: The National Board for Wildlife has 47 members with the Prime Minister as its Chairman, while the Minister in charge of the Ministry of Environment, Forests, and Climate Change in GOI is the Vice-Chairperson.
- Statement 3 is correct: No alteration of the boundaries of a sanctuary shall be made by the State Government except on a recommendation of the National Board for wildlife. The board is advisory in nature and advises the Government of India in conservation and development related matters of wildlife and forests.

### Q 82. Consider the following feature of a region:

- 1. It has diversity of ecosystems that range from alluvial grass lands to subtropical broad leaf forests.
- 2. The region is geologically young.
- 3. It acts as transition zone between the Palearctic and Indo-Malayan realms.

Above mentioned feature represents which of the following "Hot spot"?

- (a) The Himalayas
- (b) Indo-Burma region
- (c) The Western Ghats
- (d) Sundaland

### Ans:(a) Explanation:

- **Biodiversity hot spot-These are the places on Earth that are both biologically rich and deeply threatened**. Over 50 percent of the world's plant species and 42 percent of all terrestrial vertebrate species are endemic to the 35 biodiversity hot spots. There are **4 biodiversity hot spots present in India**. They are:
- The Himalayas
- Indo- Burma
- The western Ghats & Sri Lanka
- Sundaland.
- The Himalayas: It includes the entire Indian Himalayan region (and that falling in Pakistan, Tibet, Nepal, Bhutan, China and Myanmar). It has a diversity of ecosystems that range, in only a couple of hundred kilometers, from alluvial grasslands (among the tallest in the world) and subtropical broadleaf forests along the foothills to temperate broadleaf forests in the mid hills, mixed conifer and conifer forests in the higher hills, and alpine meadows above the tree line. The region is geologically young and acts as transition zone between the Palearctic and Indo-Malayan realms.

### Q 83. Consider the following statements:

- 1. The largest tiger population is in Karnataka among all states in India.
- 2. The largest elephant population is in Assam among all states in India.
- 3. The largest leopard population is in Madhya Pradesh among all states in India.

### How many of the above statements is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Ans:(a) Explanation:

- Statement 1 is incorrect: India currently harbors almost 75% of the world's wild tiger population. The largest tiger population of 785 is in Madhya Pradesh, followed by Karnataka (563) & Uttarakhand (560), and Maharashtra (444).
- Statement 2 is incorrect: Karnataka had the highest number of elephants (6,049), followed by Assam (5,719) and Kerala (3,054).
- Statement 3 is correct: The largest leopard population of 3,907 is in Madhya Pradesh, followed by Maharashtra (1,985), Karnataka (1,879) and Tamil Nadu (1,070).

### Q 84. Consider the following statements with reference to a National Park/Wildlife sanctuary:

- 1. It is located near Hirakund dam
- 2. During the freedom struggle of India, the place acted as the base of famous freedom fighter "Veer Surendra Sai"
- 3. The four-horned antelope, or Chousingha, as it's called, is one of the endangered animals also inhabits this sanctuary.

### Above mentioned feature represents which of the following National parks/Wildlife Sanctuary:

- (a) Simlipal National Park
- (b) Bhitarkanika National Park
- (c) Karlapat Wildlife Sanctuary
- (d) Debrigarh Wildlife Sanctuary

### Ans:(d)

### Explanation:

- Nestled between the Hirakud Dam and Reservoir makes for a picturesque setting, the sanctuary finds a special mention because of noted freedom fighter Veer SurendraSai. During his rebellion against the British Veer SurendraSaimade his base at 'Barapathara'' located within the sanctuary. The four-horned antelope or Chousingha as it's called is one of the endangered animals also inhabits this sanctuary.
- So, option (d) is correct.

### Q 85. Consider the following statements with reference to the "classes of soil":

- 1. Zonal soils are those that are well developed and reflect the influence of climate as the major soil forming factor.
- 2. Intrazonal soils are those that are immature or poorly developed.
- 3. Azonal soils are Semi- developed soils formed where some local factor is dominant.

### How many of the above statements is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

### Ans:(a) Explanation:

- Statement 1 is correct: Zonal soils are those soils formed along broad zones of the earth. They are very much in conformity with climate and natural vegetation such as Podzol, Chernozem and Laterite soils. They are mature soils i.e. have fully developed soil profiles with distinct horizons (A, B & C). They are very much in equilibrium with environmental conditions.
- Statement 2 is incorrect: Intrazonal soils are developed within the zonal soils. Because of certain local factors the type of soil is different from zonal soils eg. Alkali soils, peat soils i.e. Hydromorphic soils.
- Statement 3 is incorrect: AZONAL SOILS: Those soils which fail to develop mature soil profiles. These soils develop over flood plains, aeolian deserts, loessic areas, alluvial soils, etc. They are immature soils due to lack of time in their soil forming process.

### Q 86. Which of the following are the impacts of global warming?

- 1. Widespread vanishing of animal populations
- 2. Spread of disease

- 3. Bleaching of Coral Reefs
- 4. Loss of Plankton

### Select the correct answer using the code given below:

- (a) Only 1, 2 and 3
- (b) Only 2, 3 and 4
- (c) Only 1, 2 and 3
- (d) 1, 2, 3 and 4

### Ans:(d) Explanation:

- The average temperature of the earth's atmosphere is gradually increasing. This is called global warming. Global warming has become a major concern for governments worldwide. The following are the effects of global warming:
- Rise in Sea level
- Changes in rainfall patterns.
- Increased likelihood of extreme events such as heat waves, flooding, hurricanes, etc.
- Melting of glaciers.
- Widespread vanishing of animal populations due to habitat loss.
- Spread of disease (like malaria, etc).
- Bleaching of Coral Reefs.
- Loss of Plankton due to warming of seas.
- So, option (d) is correct.

### Q 87. All of the energy from the Sun that reaches the Earth arrives as solar radiation. Solar radiation includes:

- 1. Visible light
- 2. Ultraviolet light
- 3. Infrared
- 4. Radio wave
- 5. X-rays
- 6. Gamma rays

Select the correct answer using the code given below:

- (a) Only 1, 2 and 3
- (b) Only 1, 3, 4 and 5
- (c) Only 1, 2 and 5
- (d) 1, 2, 3, 4, 5 and 6

### Ans:(d)

### Explanation:

- All of the energy from the Sun that reaches the Earth arrives as solar radiation, part of a large collection of energy called the electromagnetic radiation spectrum. Solar radiation includes visible light, ultraviolet light, infrared, radio waves, X-rays, and gamma rays.
- So, option (d) is correct.

### Q 88. Consider the following statements regarding ocean acidification:

- 1. It is caused by the absorption of excess carbon dioxide (CO2) from the atmosphere by the oceans, leading to an increase in seawater pH.
- 2. Increased Ocean acidification slows the formation of calcium carbonate shells and skeletons by marine organisms.
- 3. It primarily affects coastal regions and shallow waters, while deep ocean waters remain unaffected by changes in pH levels.

### How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

### Ans: (a) Explanation:

- Statement 1 is incorrect: Ocean acidification is caused by the absorption of excess carbon dioxide (CO<sub>2</sub>) from the atmosphere by the oceans. When CO2 dissolves in seawater, it forms carbonic acid, which leads to a decrease in seawater pH, making it more acidic.
- Statement 2 is correct: The primary consequence of ocean acidification is the decrease in pH levels of seawater and increase in solubility of calcium carbonate shells and skeletons. Ocean acidification affects various marine organisms, including corals, shellfish, and plankton, by disrupting/slowing their ability to build and maintain calcium carbonate structures.
- Statement 3 is incorrect: Ocean acidification affects all parts of the ocean, including coastal regions, shallow waters, and deep ocean waters. While coastal areas may experience more pronounced changes in pH due to proximity to land-based sources of pollution and nutrient runoff, deep ocean waters are not immune to the effects of ocean acidification. The entire oceanic ecosystem is interconnected, and changes in pH levels can have widespread impacts.

### Q 89. Consider the following statements regarding chlorofluorocarbons (CFCs):

- 1. CFCs molecules are made up of chlorine, fluorine and carbon.
- 2. CFCs are highly inflammable, corrosive and toxic chemicals.
- 3. CFCs can be eliminated from the atmosphere by the usual scavenging processes like photodissociation, rain-out and oxidation.

### How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

### Ans: (a) Explanation:

- Statement 1 is correct: Chlorofluorocarbons (CFCs) are a group of compounds composed of carbon, fluorine, and chlorine.
- Statement 2 is incorrect: CFCs are a family of inert, low toxic, non-flammable, non-corrosive and easily produced liquefied chemicals that have principally been used in refrigeration, air conditioning, packaging, and insulation or as solvents and aerosol propellants (medical and other devices).
- Statement 3 is incorrect: CFCs cannot be eliminated from the atmosphere by the usual scavenging processes like photodissociation, rain-out and oxidation.

### Q 90. Arrange the following gases in increasing order regarding their relative contribution to total global warming:

- 1. Methane
- 2. Chlorofluorocarbons
- 3. Carbon dioxide
- 4. Nitrous oxide

### Select the correct answer using the code given below.

- (a) 4, 1, 2, 3
- (b) 4, 2, 3, 1
- (c) 2, 4, 1, 3

Ans:(d) Explanatio

- Explanation:
  - The increasing order of the gases in terms of their relative contribution to total global warming is Nitrous oxide < Chlorofluorocarbons < Methane < Carbon dioxide.
  - So, option (d) is correct.

### Q 91. Consider the following statements regarding carbon sinks:

- 1. A carbon sink is any area that absorbs carbon dioxide.
- 2. Forests, oceans, and soil are examples of natural carbon sinks.
- 3. Carbon is stored in the oceans through direct injection or fertilization.
- 4. Deforestation and land-use changes can transform carbon sinks into carbon sources.

### How many of the statements given above is/are correct?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

### Ans: (d) Explanation:

- Statement 1 is correct: A carbon sink is any natural or artificial area that absorbs more carbon dioxide (CO<sub>2</sub>) from the atmosphere than it releases. Carbon sinks play a crucial role in mitigating climate change by removing CO<sub>2</sub> from the atmosphere and storing it for extended periods, thereby reducing the greenhouse effect and global warming.
- Statement 2 is correct: While forests, oceans, and soil are examples of natural carbon sinks, each absorbing CO<sub>2</sub> through various processes, the statement implies that they are the only natural carbon sinks.
- Statement 3 is correct: Ocean carbon sequestration (OCS) is a method to distribute CO<sub>2</sub> more evenly throughout ocean depth and minimize surface ocean impacts. There are two major methods of OCS direct injection and ocean fertilization.
- Statement 4 is correct: Deforestation, land-use changes, and other human activities can transform carbon sinks into carbon sources. When forests are cleared or degraded, and natural ecosystems are converted to agricultural or urban areas, the stored carbon is released back into the atmosphere as CO<sub>2</sub>, contributing to increased greenhouse gas emissions and exacerbating climate change.

### Q 92. "Blue dot network" sometimes mentions in news. Which of the following is true about the initiative?

- (a) Sustainable development of the fisheries sector.
- (b) Initiative to extract polymetallic nodules.
- (c) To protect endangered marine species of Indo-pacific region.
- (d) To promote quality infrastructure investment that is aligned with Paris agreement.

### Ans: (d)

Explanation:

- Blue Dot Network participants from the public, private and civil society sectors believe in building and financing quality infrastructure projects.
- The Blue Dot Network aims to promote quality infrastructure investment that is open and inclusive, transparent, economically viable, Paris Agreement aligned, financially, environmentally and socially sustainable, and compliant with international standards, laws and regulations.

- To accomplish this, the Blue Dot Network will certify infrastructure projects against robust criteria and standards.
- So, option (d) is correct.

### Q 93. As a party to the United Nations Framework Convention on Climate Change (UNFCCC) and its Paris Agreement, recently India updated its Intended Nationally Determined Contribution (NDC). In this regard, consider the following statements:

- 1. To reduce emissions intensity of its GDP has been enhanced to 45 percent by 2030 from 2005 level.
- 2. To create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2050.
- 3. To achieve about 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030.

### Which of the above are part of India's NDC?

- (a) Only 1 and 2
- (b) Only 2 and 3
- (c) Only 1 and 3
- (d) 1, 2 and 3

#### Ans: (c) Explanation

- Explanation:
  - As a party to the United Nations Framework Convention on Climate Change (UNFCCC) and its Paris Agreement, India submitted its first Nationally Determined Contribution (NDC) in the year 2015, In August 2022, India updated its NDC which are as follow:
  - Statement 1 is correct: To reduce Emissions Intensity of its GDP by 45 percent by 2030, from 2005 level.
  - Statement 2 is incorrect: To create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030.
  - Statement 3 is correct: To achieve about 50 percent cumulative electric power installed capacity from non-fossil fuelbased energy resources by 2030, with the help of transfer of technology and low-cost international finance including from Green Climate Fund (GCF).
  - So, option (c) is correct.

### Q 94. Consider the following:

- 1. Volcanic eruptions
- 2. Combustion of fossil fuels
- 3. Surface of ocean
- 4. Decomposition process

### How many of the above is/ are source of Sulfur into the atmosphere?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) All four

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Ans: (d) Explanation:

- Sulfur enters the atmosphere from natural sources as hydrogen sulfide (H2S) from active volcanoes and the decay of organic matter in anaerobic environments (swamps, tidal flats), sulfur dioxide (SO2) from active volcanoes, and particles of sulfate salts (e.g. ammonium sulfate) from sea spray.
- Sulfur dioxide in the atmosphere comes from human activity, such as burning coal, oil, and gas to make electricity and heat. When coal and oil burn, the sulfur in them combines with oxygen in the air to make sulfur oxides.

- The sulfur cycle of marine sediments is primarily driven by the dissimilatory sulfate reduction (DSR) to sulfide by anaerobic microorganisms.
- So, option (d) is correct.

### Q 95. Consider the following statements with respect to Boreal Forest:

- 1. Such forest is found in cold regions with low rainfall.
- 2. There is a presence of evergreen plant species.
- 3. Soils are acidic and mineral deficient.

### How many of the above statements is/ are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

### Ans: (c) Explanation:

- Statement 1 is correct. The geographic location of the boreal forest is defined by its climate with cool summers and very long (7–9 months) cold winters, with a high proportion of the annual precipitation falling as snow.
- Statement 2 is correct. Boreal forests are the northernmost forests on the planet, dominated by species of spruce, fir, larch, pine, birch, and aspen, with large tracts of intact primary forest, as well as industrial forests, frequently logged for timber and pulp for paper and packaging products.
- Statement 3 is correct. Soils in the boreal forest are typically podzols, gray soils that are thin, acidic, and poor in nutrients.
- Q 96. The 2023-24 Union Budget proposed a Green Credit program to be notified under the Environment (Protection) Act 1986. Which ministry is responsible for its implementation?
  - (a) Ministry of New and Renewable Energy
  - (b) Ministry of Power
  - (c) Ministry of Environment, Forest and Climate change
  - (d) Ministry of Road Transport and Highways

### Ans: (c) Explanation:

- The 2023-24 Union Budget proposed a green credit program to be notified under the Environment (Protection) Act 1986. Recently, the Ministry of Environment, Forest and Climate Change further notified the green credit rules (Rules) in October 2023.
- So, option (c) is correct.

### Q 97. Consider the following statements with respect to Green Deposits guidelines issued by Reserve Bank of India:

- 1. It will be denominated in Indian Rupee only.
- 2. It is not mandatory for Regulated entity to raise green deposits.
- 3. Nuclear power generation, Direct waste incineration are some of the projects which can be financed using Green Deposits.

### How many of the above statements is/ are correct?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Ans: (b) Explanation:

- Green deposits are not very different from the regular deposits that banks accept from their customers. The only major difference is that banks promise to earmark the money that they receive as green deposits towards environment-friendly projects. For example, a bank may promise that green deposits will be used towards financing renewable energy projects that fight climate change.
- Statement 1 is correct: The current framework permits green deposits to be denominated in Indian Rupees only.
- Statement 2 is correct: It is not mandatory but in case REs intend to raise green deposits from their customers they should follow the framework prescribed therein.
- Statement 3 is incorrect: The RBI has come up with a list of sectors that can be classified as sustainable and thus eligible to receive green deposits. These include renewable energy, waste management, clean transportation, energy efficiency, and afforestation. Banks will be barred from investing green deposits in business projects involving fossil fuels, nuclear power, tobacco, Direct waste incineration etc.

### Q 98. Consider the following:

Assertion (A): Succession would occur faster in area existing in middle of the large continent. Reason(R): All seeds of plants belonging to different seres would reach much faster, establish and ultimately result in climax community.

### Which of the following is correct in respect of above statements?

- (a) Both A and R are true and R is the correct explanation of A
- (b) Both A and R are true and R is not the correct explanation of A
- (c) A is true but R is false
- (d) A is false but R is true

### Ans: (a) Explanation:

- The succession would be faster in the area that lies in the middle of the large continent. This is due to the fact that all pollen grains or seeds of plants from diverse seeds would arrive faster, settle, and finally result in a climax community.
- Hence, R is the correct explanation of A.

### Q 99. Consider the following statements:

- 1. Forest Rights Act, 2006 ensure habitat right for Particularly Vulnerable Tribal group.
- 2. All the Particularly Vulnerable Tribal groups have received habitat rights.

### Which of the above statements is/ are correct?

- (a) Only 1
- (b) Only 2
- (c) Both 1 and 2
- (d) Neither 1 nor 2

Ans: (a) Explanation:

- Statement 1 is correct. Habitat rights are given to PVTGs under section 3(1) (e) [rights including community tenures of habitat and habitation for primitive tribal groups and pre-agricultural communities] of The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 also known as the Forest Rights Act.
- **Statement 2 is incorrect.** Out of 75 PVTG in India, only three have habitat rights- the Bharia PVTG in Madhya Pradesh was the first, followed by the Kamar tribe and now the Baiga tribe in Chhattisgarh.

### Q 100. Consider the following pairs:

Tiger Reserve	State	
Kamlang Tiger reserve	Assam	
Amangarh Tiger reserve	Rajasthan	
Anamalai Tiger reserve	Kerala	

### How many of the above pairs is/ are correctly matched?

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Ans: (d) Explanation:

- Pair 1 is incorrectly matched: The Kamlang Wildlife Sanctuary, established in 1989, is the 50th Tiger reserve in India. The Sanctuary is rich with floral and faunal diversity. It is situated in the Lohit District of the northeastern Indian state of Arunachal Pradesh. The park is named after the Kamlang River which flows through it.
- Pair 2 is incorrectly matched: Amangarh Tiger Reserve is a Tiger Reserve under Project Tiger in India. It is in Amangarh in Bijnor district in the state of Uttar Pradesh. It has an area of 95 km<sup>2</sup> and is one among the four Tiger Reserves in Uttar Pradesh, the other three being Dudhwa Tiger Reserve, Pilibhit Tiger Reserve and Ranipur Tiger Reserve.
- Pair 3 is incorrectly matched: Anaimalai Tiger Reserve, earlier known as Indira Gandhi Wildlife Sanctuary and National Park and as Anaimalai Wildlife Sanctuary, is a protected area in the Anaimalai Hills of Pollachi and Valparai taluks of Coimbatore District and Udumalaipettai taluk in Tiruppur District, Tamil Nadu, India.