

# RAPID REVISION SERIES

# Static Quiz

**Full Compilation**

**ENVIRONMENT and S&T**

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**Q.1) With reference to ecology, what is Gaia Hypothesis?**

- a) It states that in most species, variability in reproductive success is greater in males than in females.
- b) It states that growth is dictated not by total resources available, but by the scarcest resources.
- c) It states that the Earth functions as an interactive system in which living organism have an influence on their physical characteristics and vice versa.
- d) It states that multiple species representing a variety of taxonomic groups can share similar, if not identical, roles in ecosystem functionality.

**Q.1) Solution (c)**

The Gaia Hypothesis is an ecological hypothesis proposing that the biosphere and the physical components of the Earth (atmosphere, cryosphere, hydrosphere and lithosphere) are closely integrated to form a complex interacting system that maintains the climatic and biogeochemical conditions on Earth in a preferred homeostasis. It was proposed by James Lovelock as the earth feedback hypothesis.

It was named after the Greek supreme goddess of Earth.

The hypothesis is frequently described as viewing the Earth as a single organism.

**Q.2) Consider the following statements:**

- 1. The level of biological magnification is different at different trophic levels of the ecosystem.
- 2. Commensalism is a negative interaction in food web which is beneficial to one species and harmful to other species involved.

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

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

**Q.2) Solution (a)**

Biological magnification is defined as the phenomena of accumulation or increase in the concentration of some toxic substances at each trophic level. The levels of biomagnification will be different at different trophic levels. For example in a pond of water, DDT was sprayed and the producers were found to have 0.04 ppm concentration of DDT. Since many types of planktons are eaten by some fishes and clams, their body accumulates 0.23 ppm of DDT. A sea gull that feeds on clams accumulates more DDT as one sea gull eats many clams. A hawk, the top carnivore, has the highest concentration of DDT.

Commensalism is a positive interaction in food web where One species (the commensal) benefits, while the other species (the host) is neither harmed nor inhibited. Example of commensalism is the relationship between trees and epiphytic plants.

**Q.3) The relationship between coral and zooxanthellae shows what type of interaction:**

- a) Neutralism
- b) Parasitism
- c) Competition
- d) Mutualism

**Q.3) Solution (d)**

Mutualism is an interaction which is favourable to both the species. Like Sea anemone gets attached to the shell of hermit crabs for the benefit of transport and obtaining new food while the anemone provides camouflage and protection utilizing its stinging cells to the hermit crab.

Some mutualisms are so intimate that the interacting species can no longer live without each other as they depend totally on each other to survive. Such close associations are called symbiosis (symbiosis is intense mutualism – like- coral and zooxanthellae).

**Q.4) With reference to ecosystem, consider the following statements regarding “dieback”?**

1. It refers to progressive dying usually backwards from tip of any portion of the plant.
2. This is an adaptive mechanism of plants.

**Choose the correct answer from the codes given below:**

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

**Q.4) Solution (c)**

Dieback refers to the progressive dying usually backwards from the tip of any portion of the plant. This is one of the adaptive mechanisms to avoid adverse conditions like drought. In this mechanism, the root remains alive for years together, but the shoots die. E.g. sal, red sanders, silk cotton tree etc.

**Q.5) Consider the following species:**

1. Hummingbirds
2. Tiger Sharks
3. Bees
4. Sea otters

**Which of the above are keystone species?**

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

**Q.5) Solution (d)**

*Keystone species are those that have an extremely high impact on a particular ecosystem relative to its population. The removal of keystone species from a habitat results in a dramatic change in the habitat. It affects other species to the extent that they might even get extinct. These species affect the structure and function of an ecosystem and the plants and animal species residing in that ecosystem.*

**Examples of Keystone Species:**

- **Hummingbirds:** Hummingbirds are responsible for pollination. New plant species take over at places with a low number of hummingbirds
- **Tiger Sharks:** Tiger sharks keep a check on the population of turtles and dugongs which would destroy the sea grass. The fish lay eggs on the sea grass and their destruction would reduce the number of fish.
- **Bees:** Bees pollinate plants and help in their reproduction process. The plants provide shelter to these insects which are then eaten by birds.
- **Sea Otters:** Sea otters are responsible to keep a check on the population of sea urchins and thereby prevent the destruction of kelp forests caused by the sea urchins.

**Q.6) A satellite is said to be in sun-synchronous orbit when:**

1. The orbit lies in the plane of the Earth's equator.
2. They travel from west to east.
3. The satellite always visits the same spot at the same local time

**Select the correct answer using the codes given below:**

- a) 1 only
- b) 2 and 3 only
- c) 3 only
- d) 1, 2 and 3

**Q.6) Solution (c)**

Satellites in polar orbits usually travel past Earth from north to south rather than from west to east, passing roughly over Earth's poles. Polar orbits are a type of low Earth orbit.

Sun-synchronous orbit (SSO) is a particular kind of polar orbit. Satellites in SSO, travelling over the Polar Regions, are synchronous with the Sun. This means they are synchronised to always be in the same 'fixed' position relative to the Sun. This means that the satellite always visits the same spot at the same local time – for example, passing the city of Paris every day at noon exactly.

This means that the satellite will always observe a point on the Earth as if constantly at the same time of the day, which serves a number of applications; for example, it means that scientists and those who use the satellite images can compare how somewhere changes over time. Therefore, scientists use image series like these to investigate how weather patterns emerge, to help predict weather or storms; when monitoring emergencies like forest fires or flooding; or to accumulate data on long-term problems like deforestation or rising sea levels.

Often, satellites in SSO are synchronised so that they are in constant dawn or dusk – this is because by constantly riding a sunset or sunrise, they will never have the Sun at an angle where the Earth shadows them. A satellite in a Sun-synchronous orbit would usually be at an altitude of 600 to 800 km. At 800 km, it will be travelling at a speed of approximately 7.5 km per second.

**Q.7) Which of the following pair is/are correctly matched?**

(Mission)

(Purpose)

- |                 |   |
|-----------------|---|
| 1. New Horizons | To search fundamentals of life within the Milky Way |
| 2. OSIRIS-REX   | Asteroid study and sample- return mission           |
| 3. SPHEREx      | To study Pluto and Kuiper belt objects              |

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 only
- c) 2 and 3 only
- d) 1 and 3 only

**Q.7) Solution (b)**

The objective of New Horizon mission is to help us understand worlds at the edge of our solar system by making the first reconnaissance of the dwarf planet Pluto and by venturing deeper into the distant, mysterious Kuiper Belt – a relic of solar system formation.

The objective of OSIRIS-REX (Origins, Spectral Interpretation, Resource Identification, Security, Regolith Explorer) is to collect and bring samples of Asteroid Bennu back to Earth by 2023.

The objective of SPHEREx (Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer) is to survey the sky in the near-infrared light to study the birth of the universe, gather data on more than 300 million galaxies as well as more than 100 million stars in the Milky Way galaxy.

**Q.8) Consider the following statements regarding the Artemis program:**

1. It is a joint mission of NASA and JAXA.
2. It is a manned mission.
3. The objective is to measure what happens when Sun's radiation hits the Moon where there is no magnetic field to protect it.

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

- a) 1 only
- b) 2 and 3 only
- c) 3 only
- d) 1, 2 and 3

**Q.8) Solution (b)**

ARTEMIS stands for "Acceleration, Reconnection, Turbulence and Electrodynamics of the Moon's Interaction with the Sun. It is a programme of NASA.

Through Artemis, NASA wants to send the first woman and the next man to the moon by the year 2024. The mission is named after the Greek mythological goddess of the Moon and twin sister to Apollo, namesake of the program that sent 12 American astronauts to the Moon between 1969 and 1972.

The objective of the mission is to measure what happens when Sun's radiation hits the Moon, where there is no magnetic field to protect it.

**Q.9) Consider the following statements regarding future space exploration missions:**

- | (Mission) | (Purpose)                                      |
|-----------|--|
| 1. NISAR  | to track subtle changes in the Earth's surface |

2. SHUKRAYAAN to study dynamics of Planet Venus
3. LUPEX to explore South Pole region of Mars

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1 and 3 only

**Q.9) Solution (a)**

NASA-ISRO SAR (NISAR) is planned to be launched in the year 2022. The mission will measure Earth's changing ecosystems, dynamic surfaces, and ice masses providing information about biomass, natural hazards, sea level rise, and groundwater, and will support a host of other applications. NISAR will observe Earth's land and ice-covered surfaces globally with 12-day regularity on ascending and descending passes, sampling Earth on average every 6 days for a baseline 3-year mission.

ISRO plans to launch SHUKRAYAAN orbiter in the year 2024. The Shukrayaan orbiter will be the first mission to Venus by ISRO and will study atmospheric chemistry, compositional variations and dynamics of the planet for four years.

ISRO and JAXA are collaborating on Lunar Polar Exploration (LUPEX) mission that is likely to be launched some time in 2024. The mission aims at an in-situ observation of areas where water is believed to exist, and obtain ground data on the quantity of water, besides understanding the distribution, conditions, form and other parameters of lunar water resources in the polar region. The mission is also meant to obtain data on the quantity and forms of the water resources present on the Moon.

**Q.10) Consider the following statements:**

1. A day lasts longer than a year on Venus.
2. Venus and Neptune are two planets in the solar system that rotate from east to west.

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

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

**Q.10) Solution (a)**

Recently, Scientists have obtained new data about Venus by bouncing radio waves off Venus. The researchers transmitted radio waves toward Venus 21 times from 2006 to 2020 from NASA's Goldstone Antenna in the Mojave Desert of California and studied the radio echo, which provided information on certain planetary traits. The study also measured the tilt of the Venusian axis and the size of the planet's core, allowing for a deeper understanding of an enigmatic world sometimes called Earth's 'evil twin'.

The study found that a single Venusian rotation takes 243.0226 Earth days. That means a day lasts longer than a year on Venus, which makes a complete orbit around the sun in 225 Earth days.

The new data showed that the Venusian planetary core has a diameter of about 4,360 miles (7,000 km), comparable to Earth's core. Previous Venus core estimates had been based on computer modelling rather than observational data.

Venus spins from east to west, in the opposite direction from all other planets in our solar system but Uranus. In another quirk, its day-night cycle - the time between sunrises as opposed to the length of a single axial spin - takes 117 Earth days because Venus rotates in the direction opposite of its orbital path around the sun.

Venus is one of just two planets that rotate from east to west. Only Venus and Uranus have this "backwards" rotation.

**Q.11) Which of the following add Sulphur to the atmosphere?**

1. Volcanic eruptions
2. Gases released by decomposition
3. Excretion of urea by animals

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 1 and 2 only
- c) 2 and 3 only
- d) 1, 2 and 3

**Q.11) Solution (b)**

Sulphur enters the atmosphere from several sources like volcanic eruptions, combustion of fossil fuels (coal, diesel etc.) from the surface of the ocean and gases released by decomposition.

Animal waste like urea, uric acid and death of vegetation add nitrogen in the form of nitrates directly into the soil.



**Q.12) Consider the following statements:**

1. Oxygen from the atmosphere is used for combustion and respiration.
2. Formation of oxides of nitrogen adds oxygen to the atmosphere.

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

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

**Q.12) Solution (a)**

Oxygen is a very abundant element on our Earth. It is found in the elemental form in the atmosphere to the extent of 21%. It also occurs extensively in the combined form in the Earth's crust as well as also in the air in the form of carbon dioxide.

Oxygen from the atmosphere is used up in three processes, namely combustion, respiration and in the formation of oxides of nitrogen. Oxygen is returned to the atmosphere in only one major process, that is, photosynthesis. And this forms the broad outline of the oxygen-cycle in nature.

**Q.13) Consider the following statements:**

1. The main storage of phosphorous is in the earth's crust.
2. Unlike carbon there is no respiratory release of phosphorus into atmosphere.
3. Phosphorous is the main cause of eutrophication.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.13) Solution (d)**

Phosphorus plays a central role in aquatic ecosystems and water quality.

Unlike carbon and nitrogen, which come primarily from the atmosphere, phosphorus occurs in large amounts as a mineral in phosphate rocks and enters the cycle from erosion and mining activities.

This is the nutrient considered to be the main cause of excessive growth of rooted and free-floating microscopic plants (phytoplankton) in lakes (leads to eutrophication).

The main storage for phosphorus is in the earth's crust. On land, phosphorus is usually found in the form of phosphates. By the process of weathering and erosion, phosphates enter rivers, streams and finally oceans. In the ocean, phosphorus accumulates on continental shelves in the form of insoluble deposits.

Difference between carbon and phosphorous cycle is:

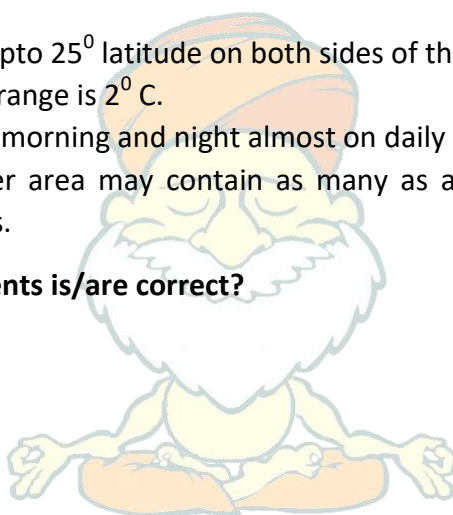
- There is no respiratory release of phosphorus into atmosphere like carbon.
- Atmospheric inputs of phosphorus through rainfall are much smaller than carbon inputs.
- Gaseous exchanges of phosphorus between organism and environment are negligible.

**Q.14) Which of the following are the characteristic features of the Evergreen Rainforest Biome?**

1. This biome extends upto  $25^{\circ}$  latitude on both sides of the equator.
2. Annual temperature range is  $2^{\circ}$  C.
3. Rainfall occurs in the morning and night almost on daily basis.
4. One square kilometer area may contain as many as about thousands of different types of plant species.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 2 and 4 only
- d) 3 and 4 only



**Q.14) Solution (c)**

The Evergreen Rainforest Biome:

- This biome extends upto  $10^{\circ}$  latitude on both sides of the equator. It covers the area of Amazon low land of South America, Congo basin of equatorial Africa and South Eastern Asian Islands extending from Sumatra to New Guinea
- This area experiences high temperature throughout the year with range as little as  $2^{\circ}$  C. However, the daily range of temperature is much higher than the annual range of temperature.
- This area gets heavy rainfall ranging between 150cm-250cm. It is distributed throughout the year. Rainfall occurs in the afternoon almost on daily basis.
- The combination of heat and moisture make this biome as perfect environment for a great variety of plants and animal species. The variety of plant species can be understood from the fact that one square kilometer may contain as many as about thousands of different types of plant species.

thousand of different types of plant species. Most of the trees have buttressed trunks, shallow roots and large dark evergreen leaves.

**Q.15) Consider the following statements regarding Temperate Grassland:**

1. They lie at the margin of the continents in the northern hemisphere and in the interior of the continent in the southern hemisphere.
2. These grasslands are known as Pampas in the Murray – Darling basin.
3. Grasslands in the southern hemisphere are located in the rain shadow areas of the high coastal mountains.
4. These grasslands are known as the granaries of the world.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 2 and 4 only
- d) 3 and 4 only

**Q.15) Solution (d)**

Temperate Grassland Biome:

- Temperate grasslands are located in two typical locations i.e. interior of the continent in the northern hemisphere and margin of the continents in the southern hemisphere.
- The temperate grasslands of the northern hemisphere are characterized by continental climate wherein extremes of summer and winter temperatures are well marked. Though grasslands in the southern hemisphere are located along the coast, these are located in the rain shadow areas of the high coastal mountains. These locations account for scanty rainfall in all these regions.
- These grasslands are found in all the continents under different names. In the northern hemisphere, the grasslands are far more extensive. In Eurasia, they are called the steppes and stretch east wards from the shores of the Black sea to the plains of Manchuria in china. In North America, the grasslands are quite extensive and they are called prairies. They lie between the foot hills of the Rockies and the Great Lakes. In the southern hemisphere, these grasslands are less extensive. These are known as Pampas in Argentina and Uruguay. In South Africa, these grasslands are sandwiched between Darkensberg Mountains and the Kalahari Desert and are called veldt. In Australia, these grasslands are known as Downs and are found in the Murray – Darling basins of South Australia.
- Majority of the grasslands have been converted into agricultural lands which have now become famous 'granaries of the world'.

**Q.16) With reference to terrestrial ecosystems, what are podzols?**

- a) Nutrient deficient soils of the equatorial rainforest
- b) Nutrient rich soils of tropical savannas
- c) Nutrient rich soils of topocal montane forest
- d) Nutrient deficient soils of boreal forest

**Q.16) Solution (d)**

Podzols are the typical soils of a coniferous or boreal biome.

The top layer of the soil is very thin and is overlain over sandy or loamy subsurface which has no organic matter (lost due to leaching of nutrients to the bottom layers).

The soils are characterized by low levels of moisture (excessively drained) and nutrients and are loamy or sandy. Others have shallow rooting zones and poor drainage due to subsoil cementation.

A low pH further compounds issue. The low pH (acidic) is due to excessive leaching of alkaline matter which if present would neutralise the organic acids of the accumulating litter.

Hence, most Podzols are poor soils for agriculture. They are mostly used for grazing.

**Q.17) Consider the following:**

1. Dry and warm summer
2. Prevalence of many local winds
3. Orchard farming and Viticulture is widely practised

**The above features are distinct characteristics of which of the following Biomes?**

- a) Savanna Biome
- b) Temperate Grassland Biome
- c) Mediterranean Biome
- d) Boreal Forest Biome

**Q.17) Solution (c)**

The Mediterranean climate is characterized by very distinctive climatic features with dry, warm summers and wet, cold winters and local winds.

During the summer months, the sun is overhead the Tropic of Cancer and Tropic of Capricorn. The belt of the influence of the Westerlies is shifted polewards, and the rain-bearing tradewinds are likely to be off-shore. Hence the regions are practically rainless in summers and hence remain dry.

The Mediterranean climatic region in Europe experiences many local winds due to the topography of the region with the Alps in the North, the Sahara desert in the South, the continental interiors in the East and the open Atlantic in the west. These create great differences in temperature, pressure, and precipitation. The two most important local winds are: Sirocco and Mistral.

The region is important for fruit cultivation, cereal growing, wine-making and agricultural industries as well as engineering and mining. The region is a net exporter of citrus fruits and the net importer of dairy products. These regions are known as the world's orchard lands.

Viticulture is speciality and tradition of Mediterranean region. The long, sunny summer allows the grapes to ripen. Regions bordering the Mediterranean Sea account for three-quarters of the world's production of wine.

**Q.18) What is P-81, sometimes seen in news?**

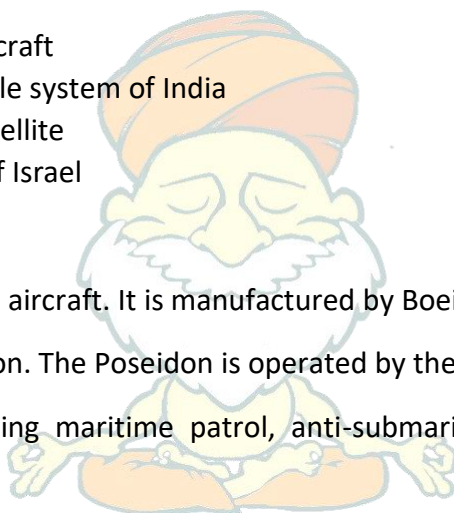
- a) Long range patrol aircraft
- b) Indigenous anti-missile system of India
- c) A communication Satellite
- d) Air defence system of Israel

**Q.18) Solution (a)**

P-81: It is a long range patrol aircraft. It is manufactured by Boeing for Indian Navy.

It is a variant of P-8A Poseidon. The Poseidon is operated by the US Navy.

P-81 is capable of conducting maritime patrol, anti-submarine warfare, reconnaissance missions and surveillance.



**Q.19) Consider the following:**

1. Nuclear Suppliers Group
2. Missile Technology Control Regime
3. Wassenaar Arrangement
4. Australia Group

**India is a member of which of the above Multilateral Export Control Regimes?**

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

**Q.19) Solution (b)**

MECR are voluntary and non-binding agreements created by the major supplier countries that have agreed to co-operate in their effort to prevent and regulate the transfer of certain military and dual use technology. It aims at preventing the proliferation of Weapons of Mass Destruction (WMD).

- They are independent of the United Nations.
- Their regulations apply only to members and it is not obligatory for a country to join.
- India is now a member of three of the four MECRs, except the nuclear supplier Group.

There are currently four such regimes under MECR:

- The Nuclear Suppliers Group (NSG), for the control of nuclear related technology.
- The Australia Group (AG) for control of chemical and biological technology that could be weaponized
- The Missile Technology Control Regime (MTCR) for the control of rockets and other aerial vehicles capable of delivering weapons of mass destruction.
- The Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies

**Q.20) Consider the following statements regarding Air Independent Propulsion System, sometimes seen in news:**

1. This technology will allow submarines to stay longer hours in water.
2. It decreases the noise level made by submarines while travelling.
3. It is a fuel cell based Air propulsion System.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.20) Solution (d)**

The Air Independent Propulsion Technology is developed by Naval Materials Research Laboratory (NMRL) of DRDO.

Key features are:

- The Air Propulsion System allows the submarines to stay for longer hours in water. The submarines need to come to the surface of the water to charge its batteries. This is reduced by Air Propulsion System.

- It decreases the noise levels made by the submarines while travelling. This makes it hard to detect the submarines.
- It is a fuel-cell based Air Propulsion System.
- It uses a Phosphoric Acid Fuel Cell.

The system was developed under Atma Nirbhar Bharat Campaign. Currently, this technology is available only in France, US, UK, China and Russia.

**Q.21) Consider the following statements regarding Coral reefs:**

1. The most favourable temperature for the growth of the coral reefs is between  $32^{\circ}$ - $38^{\circ}\text{C}$ .
2. Corals can survive only under saline conditions with an average salinity of 40%-45%.
3. The ideal depths for coral growth are 45 m to 55 m below sea surface.

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

- a) 1 only
- b) 2 and 3 only
- c) 3 only
- d) 1, 2 and 3

**Q.21) Solution (c)**

Ideal Conditions for Coral Growth are:

- Stable climatic conditions: Corals are highly susceptible to quick changes. They grow in regions where climate is significantly stable for a long period of time.
- Perpetually warm waters: Corals thrive in tropical waters [ $30^{\circ}\text{N}$  and  $30^{\circ}\text{S}$  latitudes, the temperature of water is around  $20^{\circ}\text{C}$ ] where diurnal and annual temperature ranges are very narrow.
- Shallow water: Coral require fairly good amount of sunlight to survive. The ideal depths for coral growth are 45 m to 55 m below sea surface, where there is abundant sunlight available.
- Clear salt water: Clear salt water is suitable for coral growth, while both fresh water and highly saline water are harmful.
- Abundant Plankton: Adequate supply of oxygen and microscopic marine food, called plankton [phytoplankton], is essential for growth. As the plankton is more abundant on the seaward side, corals grow rapidly on the seaward side.
- Little or no pollution: Corals are highly fragile and are vulnerable to climate change and pollution and even a minute increase in marine pollution can be catastrophic.



**Q.22) What kind of corals are found in Andaman and Nicobar Islands?**

1. Fringing
2. Atoll
3. Barrier

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.22) Solution (b)**

Important offshore island groups of India with extensive reef growth include the Andaman and Nicobar Islands in the Bay of Bengal and the Lakshadweep group of Islands in the Arabian Sea. The Andaman and Nicobar islands have fringing reefs (reefs that grow close to the shore and extend out into the sea like a submerged platform) and a 320 km long barrier reef on the west coast. The Lakshadweep Islands are made up of atolls (a roughly circular ring of reefs surrounding a lagoon).

**Q.23) Consider the following statements regarding mangrove ecosystem:**

1. They represent the example of ecotone.
2. They occur mainly between latitudes  $25^{\circ}$ - $35^{\circ}$  North and South of the equator.
3. They exhibit viviparity mode of reproduction.

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

- a) 1 and 2 only
- b) 1 and 3 only
- c) 2 and 3 only
- d) 1, 2 and 3

**Q.23) Solution (b)**

Mangroves represent a characteristic littoral (near the seashore) forest ecosystem.

These are mostly evergreen forests that grow in sheltered low lying coasts, estuaries, mudflats, tidal creeks backwaters (coastal waters held back on land), marshes and lagoons of tropical and subtropical regions.

Since mangroves are located between the land and sea, they represent the best example of ecotone.



Mangroves are shrubs or small trees that grow in coastal saline or brackish water. Mangroves are salt tolerant trees, also called halophytes, and are adapted harsh coastal conditions.

Mangroves occur worldwide in the tropics and subtropics, mainly between latitudes 25° N and 25° S. They require high solar radiation to filter saline water through their roots. This explains why mangroves are confined to only tropical and sub-tropical coastal waters.

Mangroves exhibit Viviparity mode of reproduction. i.e. seeds germinate in the tree itself (before falling to the ground). This is an adaptive mechanism to overcome the problem of germination in saline water.

**Q.24) Consider the following statements:**

1. Kelp forests are ecosystems with a high density of large brown algae seaweeds found mainly in tropical oceans.
2. They occur in the areas of significant upwelling.
3. Sea Urchins possess a great threat to the survival of Kelp forests.

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

- a) 1 and 2 only
- b) 1 and 3 only
- c) 2 and 3 only
- d) 1, 2 and 3

**Q.24) Solution (c)**

Kelp Forests are underwater ecosystems formed in shallow water by the dense growth of several different species known as kelps.

Kelps are actually extremely large brown algae, although they look like plants.

They are underwater forests that thrive well in cold, nutrient rich waters. Kelp forests have been observed throughout the Arctic and the Canadian Arctic alone represents 10 percent of the world's coastlines.

Kelp attaches to the seafloor and eventually grows to the water's surface and relies on sunlight to generate food and energy.

The productive kelp forests tend to be associated with areas of significant oceanographic upwelling.

They are known for their high growth rate. Some varieties grow as fast as half a metre a day, ultimately reaching 30 to 80 metres.

Sea urchins can destroy entire kelp forests by moving in herds whereas Sea otters play a key role in stabilizing Sea urchin populations so that kelp forests may thrive.

**Q.25) Commercial cultivation of seaweed has gained prominence due to its various advantages. In this reference, what is/are the ecological importance of seaweed cultivation?**

1. Bioindicator
2. Iron Sequestration
3. Climate Change mitigation
4. Nitrogen fixation in soil

**Choose the correct answer from the codes given below:**

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

**Q.25) Solution (d)**

They are the primitive, marine non-flowering marine algae without root, stem and leaves, play a major role in marine ecosystems.

the seaweeds derive nutrition through photosynthesis of sunlight and nutrients present in seawater. They release oxygen through every part of their bodies.

Importance of seaweeds:

They also act as a bio-indicator. When waste from agriculture, industries, aquaculture and households are let into the ocean, it causes nutrient imbalance leading to algal blooming, the sign of marine chemical damage.

These aquatic organisms heavily rely on iron for photosynthesis. When quantity of this mineral exceeds healthy levels and becomes dangerous to marine life, seaweeds trap it and prevent damage. Similarly, most heavy metals found in marine ecosystems are trapped and removed by seaweeds.

Seaweed has a significant role in mitigating climate change. By afforesting 9 per cent of the ocean with seaweed, it is possible to sequester 53 billion tons of carbon dioxide annually. Hence, there is a proposal termed as 'ocean afforestation' for farming seaweed to remove carbon.

There are many species of blue-green algae capable of fixing atmospheric nitrogen in the soil and are used as biofertilizers. Common examples are Anabaena and Nostic. Anabaena,

in association with water fern Azolla contributes nitrogen and also enriches soils with organic matter.

**Q.26) Consider the following statements regarding schemes being implemented by the Department of Biotechnology, Government of India:**

1. LOTUS HR Project aims to strengthen the development of vaccines for the diseases of epidemic potential in India.
2. Ind-CEPI Mission aims to develop universal water management and risk assessment.
3. UMMID initiative aims to tackle inherited genetic diseases of newborn babies

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

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 1, 2 and 3

**Q.26) Solution (c)**

Local Treatment of Urban Sewage streams for Healthy Reuse (LOTUS-HR) program aims to demonstrate a novel holistic (waste) water management approach that will produce clean water which can be reused for various purposes. The LOTUS-HR project is jointly supported by Department of Biotechnology, Ministry of Science and Technology, Government of India and Netherlands Organization for Scientific Research /STW, Government of Netherlands.

Ind-CEPI (Coalition for Epidemic Preparedness Innovations) Mission aims to strengthen the development of vaccines for the diseases of epidemic potential in India as well as build coordinated preparedness in the Indian public health system and vaccine industry to address existing and emergent infectious threats in India.

UMMID (Unique Methods of Management and Treatment of Inherited Disorders) initiative aims to tackle inherited genetic diseases of newborn babies. The programme is implemented through government hospitals to regularise the use of cutting edge scientific technology and molecular medicine to achieve Universal Health Coverage for all. The initiative is designed on the concept of 'Prevention is better than Cure'.

**Q.27) Recently the researchers discovered a mechanism where two proteins oppositely regulate the BBX11 gene to maintain optimum ranges of BBX11. BBX11 gene plays a vital role in:**

- a) Pest resistance of plant
- b) Greening of plant
- c) Salt tolerance of plant

d) Nitrogen fixation by plants

**Q.27) Solution (b)**

Recently, the Indian Institute of Science Education and Research (IISER) has recognized the BBX11 gene that facilitates the greening of crops.

BBX11 plays a vital role in regulation of the amount of protochlorophyllide synthesized by the plant.

- Protochlorophyllide is an intermediate in the synthesis of chlorophyll.
- If it is less, plants are unable to efficiently green in order to harvest sunlight and if the amount of protochlorophyllide is more, then photobleaching occurs.
- Photobleaching is loss of colour by a pigment.
- The quantity of protochlorophyllide synthesised needs to be proportional to the variety of enzymes available to transform them to chlorophyll.
- It is very important to regulate the amount of protochlorophyllide synthesized by the plant.
- Chlorophyll is the green pigment in plants, algae, and cyanobacteria that absorbs sunlight and uses its energy to synthesise carbohydrates from Carbon-di-Oxide (CO<sub>2</sub>) and water.

This discovery has many implications within the agriculture sector in tropical nations like India and can assist present results in optimising plant progress in frequently changing weather conditions.

**Q.28) Consider the following statements:**

1. Genetic Engineering Appraisal Committee under the Department of Biotechnology is the apex body that allows for commercial release of GM crops.
2. Use of the unapproved genetically modified variant can attract a jail term of 5 years under the Biological Diversity Act 2002.
3. FSSAI regulates genetically modified organisms levels in imported consumables.

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

- a) 1 only
- b) 3 only
- c) 2 and 3 only
- d) 1, 2 and 3

**Q.28) Solution (b)**

In India, the Genetic Engineering Appraisal Committee (GEAC) is the apex body that allows for commercial release of GM crops.

The Genetic Engineering Appraisal Committee (GEAC) is a statutory body constituted under the 'Rules for the Manufacture, Use /Import /Export and Storage of Hazardous Microorganisms/Genetically Engineering Organisms or Cells, 1989' notified under the Environment (Protection) Act, 1986. It functions under the Ministry of Environment, Forests & Climate Change.

Use of the unapproved GM variant can attract a jail term of 5 years and fine of Rs. 1 lakh under the Environment Protection Act, 1986.

The task of regulating GMO levels in imported consumables was initially with Genetic Engineering Appraisal Committee (GEAC) under the Union environment ministry. Its role in this was diluted with the enactment of the Food Safety and Standards Act, 2006 and FSSAI was asked to take over approvals of imported goods.

**Q.29) Consider the following statements regarding Nano Urea Liquid, seen recently in news:**

1. It is developed by FSSAI
2. It will improve Nitrogen Use Efficiency of plants.
3. It will protect plants from lodging effect.

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 2 and 3 only
- c) 3 only
- d) 1, 2 and 3

**Q.29) Solution (d)**

Indian Farmers Fertiliser Cooperative Limited (IFFCO) introduced the world's first Nano Urea Liquid for farmers across the world.

It is a nutrient (liquid) to provide nitrogen to plants as an alternative to the conventional urea.

It is developed to replace conventional urea and it can curtail the requirement of the same by at least 50%. Conventional urea is effective 30-40% in delivering nitrogen to plants, while the effectiveness of the Nano Urea Liquid is over 80%.

It has been found effective and efficient for plant nutrition which increases the production with improved nutritional quality.

It will boost a balanced nutrition program by reducing the excess use of Urea application in the soil and will make the crops stronger, healthier and protect them from lodging effect.

Lodging is the bending over of the stems near ground level of grain crops, which makes them very difficult to harvest, and can dramatically reduce yield.

**Q.30) Consider the following statements regarding Xenobots, seen recently in news:**

1. They are made from human stem cells.
2. They can be used to scrape plaque from arteries.
3. They can be used for gathering microplastic in the oceans.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.30) Solution (b)**

Xenobots are developed from stem cells of frogs.

Xenobots, named after the African clawed frog are synthetic organisms that are automatically designed by computers to perform some desired function and built by combining together different biological tissues.

They could be made from a human patient's own cells, which would bypass the immune response challenges of other kinds of micro-robotic delivery systems.

Such xenobots could potentially be used to scrape plaque from arteries and with additional cell types and bioengineering, locate and treat disease.

They can also be used for searching out nasty compounds or radioactive contamination and gathering microplastic in the oceans.

**Q.31) What is/are the importance/importances of the Global Environment Facility?**

1. It prioritizes integrated projects and programs that address more than one global environmental problem at a time.
2. Through its Small Grants Programme it finances community led initiatives to address global environmental issues.

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

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

**Q.31) Solution (c)**

The Global Environment Facility (GEF) was established on the eve of the 1992 Rio Earth Summit to help tackle our planet's most pressing environmental problems. The GEF unites 184 countries in partnership with international institutions, civil society organizations (CSOs), and the private sector to address global environmental issues while supporting national sustainable development initiatives.

The objectives of Global Environment Facility are:

- Strategically focusing its investments to catalyze transformational change in key systems that are driving major environmental loss, in particular energy, cities and food;
- Prioritizing integrated projects and programs that address more than one global environmental problem at a time, building on the GEF's unique position and mandate to act on a wide range of global environmental issues; and
- Implementing new strategies and policies to enhance results, including stronger engagement with the private sector, indigenous peoples, and civil society, and an increased focus on gender equality.

The GEF runs a Small Grants Programme that provides financial and technical support to projects which embody a community-based approach. The GEF sees community based projects as the cornerstone for addressing local and global environmental and sustainable development challenges.

**Q.32) Consider the following statements regarding Sea Cucumbers, sometimes seen in news:**

- a) They are endemic to the seas of tropical region.
- b) They are given protection under Schedule 1 of the Wildlife (Protection) Act, 1972.
- c) Dr KK Mohammed Koya Conservation Reserve in Lakshadweep is the world's first sea cucumber conservation area.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.32) Solution (b)**

They are marine animals with a leathery skin and an elongated body containing a single, branched gonad. Sea cucumbers are found on the sea floor worldwide.



Sea cucumbers live chiefly among corals but are also found among rocks and in muddy and sandy flats. They are distributed from the shore to the great depths of oceans.

In India, the sea cucumber is protected under the Schedule I of the Wildlife Protection Act, 1972, according to which the sea cucumbers cannot be transported for commercial use. In 2002, the Environmental ministry of India banned the commercial harvesting of sea cucumbers.

The Dr KK Mohammed Koya Conservation Reserve is the first sea cucumber conservation area in the world. It is located in the Cheriyapani Reef in the Union Territory of Lakshadweep. It was formed in 2020. It covers an area of 239 km<sup>2</sup>.

**Q.33) Consider the following statements regarding Montreux Record:**

1. It is a register of wetland sites on the list of Ramsar wetlands of international importance which are in urgent need of conservation.
2. Chilika Lake is listed in the Montreux record due to the problem of siltation.

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

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

**Q.33) Solution (a)**

The Montreux Record is a register of wetland sites on the List of Ramsar wetlands of international importance where changes in ecological character have occurred, are occurring, or are likely to occur as a result of technological developments, pollution or other human interference.

It is a voluntary mechanism to highlight specific wetlands of international importance that are facing immediate challenges. It is maintained as part of the List of Ramsar wetlands of international importance. At present, 48 sites are listed in Montreux Record.

At present 2 Indian sites are listed under it:

- Keoladeo National Park
- Loktak Lake

In 1993 Chilka lake was also listed in Montreux record due to problem of Siltation, But later in 2002, it was removed from the list as problem tackled by govt actions.

**Q.34) Which of the following pairs is/are correctly matched?**



(Protected Area)	(River flowing inside)
1. Dehing Patkai National Park	Kali
2. Anshi National Park	Pambar
3. Bhitarkanika National Park	Dharma

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 1, 2 and 3

**Q.34) Solution (c)**

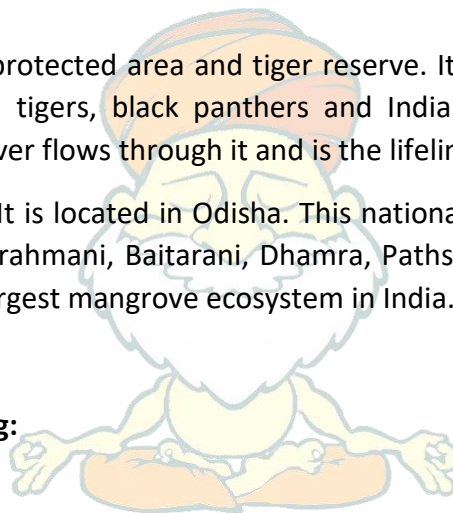
**Dehing Patkai National Park:** It is located in the Dibrugarh and Tinsukia districts of Assam. It is located in the Dehing patkai landscape which is a lowland rainforest. River Dehing flows through it.

**Anshi National Park:** It is a protected area and tiger reserve. It is located in Karnataka. The park is a habitat of Bengal tigers, black panthers and Indian elephants, amongst other distinctive fauna. The Kali River flows through it and is the lifeline of the ecosystem.

**Bhitarkanika National Park:** It is located in Odisha. This national park and wildlife sanctuary is inundated by the rivers Brahmani, Baitarani, Dhamra, Pathsala. It hosts many mangrove species, and is the second largest mangrove ecosystem in India.

**Q.35) Consider the following:**

- 1. Asiatic Lion
- 2. Asiatic Cheetah
- 3. Asiatic Elephant



**Which of the above species of animals is/are endemic to India?**

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 1, 2 and 3

**Q.35) Solution (a)**

Asiatic Lion can be found only in and around Gir National Park of Gujarat. These are listed as endangered species. The Asiatic lion is one of five species of cats native to India, along with the Bengal tiger, Indian leopard, snow leopard and clouded leopard.

The Asiatic cheetah is a Critically Endangered cheetah subspecies surviving today only in Iran. In 1952 the Asiatic Cheetah was officially declared extinct from India.

The Asian elephant, also known as the Asiatic elephant, is the only living species of the genus *Elephas* and is distributed throughout the Indian subcontinent and Southeast Asia, from India in the west, Nepal in the north, Sumatra in the south, and to Borneo in the east. It is listed as Endangered on the IUCN Red List of threatened species. It is also listed in Schedule I of the Wildlife (Protection) Act, 1972.

**Q.36) Which of the following pairs is/are correctly matched?**

(Protected Area)	(Protected Species)
1. Gahirmatha Sanctuary	Wild Ass
2. Chambal Sanctuary	Gharial
3. Vikaramshila Sanctuary	Dolphins

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.36) Solution (b)**

Gahirmatha Sanctuary is a marine wildlife sanctuary located in Odisha. It extends from Dhamra River mouth in the north to Brahmani river mouth in the south. It is very famous for its nesting beach for olive ridley sea turtles. It is the one of world's most important nesting beach for turtles.

National Chambal Sanctuary, also called the National Chambal Gharial Wildlife Sanctuary, is a tri-state protected area for the protection of the Critically Endangered gharial, the red-crowned roof turtle and the Endangered Ganges river dolphin. It is located on the Chambal River near the tripoint of Rajasthan, Madhya Pradesh and Uttar Pradesh.

Vikramshila Sanctuary is the protected area for the endangered Gangetic dolphins. It is located in Bihar. The Gangetic Dolphin has been declared as the national aquatic animal of India.

**Q.37) Consider the following statements regarding Forest (Conservation) Act, 1980:**

- 1. It prohibits the felling of forests for any non forestry use without prior clearance by the State Governments.
- 2. Lands specifically notified as forests are protected under this act.

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

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

**Q.37) Solution (d)**

The Forest Conservation Act, 1980 (FCA) is the principal legislation that regulates deforestation in the country. It prohibits the felling of forests for any “non-forestry” use without prior clearance by the central government.

The clearance process includes seeking consent from local forest rights-holders and from wildlife authorities. The Centre is empowered to reject such requests or allow it with legally binding conditions.

In a landmark decision in 1996, the Supreme Court had expanded the coverage of FCA to all areas that satisfied the dictionary definition of a forest; earlier, only lands specifically notified as forests were protected by the enforcement of the FCA.

The FCA is a brief legislation with only five sections. Section 1 defines the extent of coverage of the law, Section 2 restrictions of activities in forest areas, and the rest deals with the creation of advisory committees, powers of rule-making and penalties.

**Q.38) With reference to Multilateral Export Control Regime (MECR), consider the following statements:**

1. It is a cooperative agreement among countries which are the members of International Atomic Energy Agency.
2. Australia Group is a MECR which helps member nations to identify those exports which need to be controlled so as not to contribute to the spread of chemical and biological weapons.

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

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

**Q.38) Solution (b)**

A multilateral export control regime is an informal group of like-minded supplier countries that seek to contribute to the non-proliferation of weapons of mass destruction, delivery

systems, and advanced conventional weapons through national implementation of guidelines and control lists for exports.

There are currently four such regimes:

1. The Wassenaar Arrangement (WA) on Export Controls for Conventional Arms and Dual-Use Goods and Technologies
2. The Nuclear Suppliers Group (NSG), for the control of nuclear and nuclear-related technology
3. The Australia Group (AG) for the control of chemical and biological technology that could be weaponized
4. The Missile Technology Control Regime (MTCR) for the control of rockets and other aerial vehicles capable of delivering weapons of mass destruction.

The Australia Group is a multilateral export control regime (MECR) and an informal group of countries established in 1985 to help member countries to identify those exports which need to be controlled so as not to contribute to the spread of chemical and biological weapons.

India is a member of three of four MECRs, except the Nuclear Supplier Group (NSG).

**Q.39) Consider the following statements regarding International Thermonuclear Experimental Reactor:**

1. It aims to build an experimental machine to produce a large scale and carbon free source of energy.
2. It is based on the principle of nuclear fission.
3. India is a member of this experiment.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.39) Solution (c)**

The International Thermonuclear Experimental Reactor (ITER) is an international nuclear fusion research and engineering megaproject aimed at replicating the fusion processes of the Sun to create energy on earth.

The purpose of ITER is to demonstrate the scientific and technological feasibility of fusion energy for future electricity generation.

ITERs goals are:

- To produce 10 times as much output energy as input for short time periods.
- To demonstrate and test technologies that would be needed to operate a fusion power plant including cryogenics, heating, control, and diagnostics systems, including remote maintenance
- To achieve and learn from a burning plasma; to test tritium breeding
- To demonstrate the safety of a fusion plant.

Currently there are seven signatories to the ITER Agreement: the European Union (through the legally distinct organization Euratom), China, India, Japan, Russia, South Korea, and the United States.

ITER-India is a special project run by India's Institute for Plasma Research. ITER-India's research facility is based in Ahmedabad in the Gujarat state. India's deliverables to the ITER project include the cryostat, in-vessel shielding, cooling and cooling water systems.

**Q.40) Consider the following:**

1. Program of Action for Cancer Therapy
2. Human Health Program
3. International Project on Innovative Nuclear Reactors and Fuel Cycles

**Which of the above is/are the programmes of International Atomic Energy Agency?**

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 1, 2 and 3

**Q.40) Solution (d)**



The International Atomic Energy Agency (IAEA) offers its Member States a broad range of services. This includes a technical cooperation programme for some 125 countries to assist them in the peaceful use of nuclear technology; a research project support programme; and an array of review missions for countries with a nuclear power programme.

Some of its programmes are:

**Programme of Action for Cancer Therapy (PACT):** It is a programme created by the International Atomic Energy Agency (IAEA) in 2004 to build upon the Agency's experience in radiation medicine and technology, and enable developing countries to introduce, expand or improve their cancer care capacity and services in a sustainable manner by integrating radiotherapy into a comprehensive cancer control programme that maximizes its therapeutic effectiveness and impact.

**Human Health Programme:** The IAEA has established the Human Health Programme to support Member States in using nuclear techniques to prevent, diagnose and treat Non

communicable disease. The Human Health Programme provides a holistic approach to the prevention, diagnosis and treatment of non-communicable diseases, covering four main support areas: nutrition; diagnosis and follow-up; radiation oncology and radiotherapy; and quality assurance.

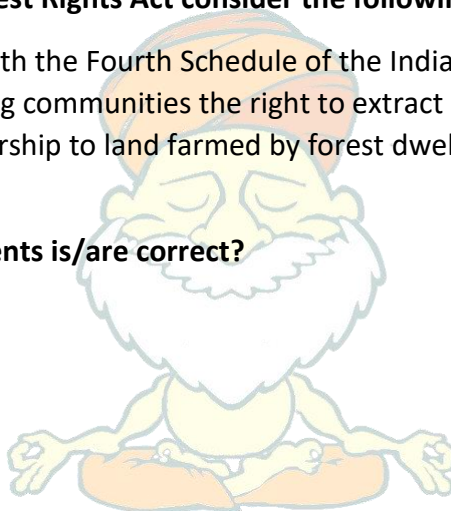
International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO): It is a membership-based project that supports its members on their long-term planning and collaboration on innovations in reactors, fuel cycles and institutional approaches that will promote the sustainable development of nuclear energy. INPRO was established in 2000 to help ensure that nuclear energy remains available to contribute to meeting global energy needs until the end of the 21st century. It provides a forum for experts and policy makers from industrialized and developing countries to discuss and cooperate on such issues as the sustainable planning, development and deployment of nuclear energy.

**Q.41) With reference to Forest Rights Act consider the following statements:**

1. It is in consonance with the Fourth Schedule of the Indian Constitution.
2. It gives forest dwelling communities the right to extract minor forest produce.
3. It gives right to ownership to land farmed by forest dwellers subject to a maximum of 4 hectares.

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

- a) 1 only
- b) 2 and 3 only
- c) 3 only
- d) 1, 2 and 3



**Q.41) Solution (b)**

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, was passed on 18 December 2006.

The law concerns the rights of forest-dwelling communities to land and other resources, denied to them over decades as a result of the continuance of colonial forest laws in India.

It expands the mandate of the Fifth and the Sixth Schedules of the Constitution that protect the claims of indigenous communities over tracts of land or forests they inhabit.

The act recognize and vest the forest rights and occupation in Forest land in forest Dwelling Scheduled Tribes (FDST) and Other Traditional Forest Dwellers (OTFD) who have been residing in such forests for generations. These are:

- Title rights - i.e. ownership - to land that is being farmed by tribals or forest dwellers as on 13 December 2005, subject to a maximum of 4 hectares; ownership is only for

land that is actually being cultivated by the concerned family as on that date, meaning that no new lands are granted.

- Use rights - to minor forest produce (also including ownership), to grazing areas, to pastoralist routes, etc.
- Relief and development rights - to rehabilitation in case of illegal eviction or forced displacement and to basic amenities, subject to restrictions for forest protection.
- Forest management rights - to protect forests and wildlife.

**Q.42) Consider the following:**

1. Man and Biosphere Programme
2. International Geoscience and Geoparks Programme
3. Climate and Clean Air Coalition
4. International Hydrological Programme

**Which of the above is/are the initiatives of United Nations Educational, Scientific and Cultural Organization (UNESCO)?**

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

**Q.42) Solution (c)**

UNESCO is the United Nations Educational, Scientific and Cultural Organization. It seeks to build peace through international cooperation in Education, the Sciences and Culture. UNESCO's programmes contribute to the achievement of the Sustainable Development Goals defined in Agenda 2030, adopted by the UN General Assembly in 2015.

Initiatives of UNESCO are:

1. Man and Biosphere Programme: The MAB programme is an intergovernmental scientific programme that aims to establish a scientific basis for enhancing the relationship between people and their environments. It combines the natural and social sciences with a view to improving human livelihoods and safeguarding natural and managed ecosystems, thus promoting innovative approaches to economic development that are socially and culturally appropriate and environmentally sustainable.

India has 18 Biosphere reserves out of which 11 have been recognized internationally under Man and Biosphere (MAB) program.

2. International Geoscience and Geoparks Programme: The International Geoscience and Geoparks Programme (IGGP) consists of two pillars:



- International Geoscience Programme (IGCP), since 1972, has harnessed the intellectual capacity of a worldwide network of geoscientists to lay the foundation for our planet's future, focusing on responsible and environmental resource extraction, natural hazard resiliency and preparedness, and adaptability in the era of a changing climate.
- UNESCO Global Geoparks (UGGp) are laboratories for sustainable development which promote the recognition and management of Earth heritage, and the sustainability of local communities. As of July 2020, there are 161 UNESCO Global Geoparks within 44 Member States, covering a total area of 325,179 km<sup>2</sup>.

3. International Hydrological Programme: The Intergovernmental Hydrological Programme (IHP) is the only intergovernmental programme of the United Nations system devoted to water research and management, and related education and capacity development.

Climate and Clean Air Coalition: It is an initiative of United Nations Environment Programme (UNEP). It is the only global effort that unites governments, civil society and private sector, committed to improving air quality and protecting the climate in next few decades by reducing short-lived climate pollutants across sectors.

The Coalition's initial focus is on methane, black carbon, and HFCs. At the same time, partners recognize that action on short-lived climate pollutants must complement and supplement, not replace, global action to reduce carbon dioxide, in particular efforts under the UNFCCC.

**Q.43) Which of the following pairs are correctly matched?**

(Conventions/protocols)

(Related to)

- |                      |   |
|----------------------|---|
| 1. Bonn Convention   | Conservation of Migratory Species of Wild Animals |
| 2. Vienna Convention | Hazardous Wastes and their Disposal               |
| 3. Basel Convention  | Protection of Ozone Layer                         |
| 4. Kigali Agreement  | Amendment to the Montreal Protocol                |

**Choose the correct answer from the codes given below:**

- 1 and 2 only
- 2 and 3 only
- 3 and 4 only
- 1 and 4 only

**Q.43) Solution (d)**

Bonn convention, also known as the Convention on the Conservation of Migratory Species of Wild Animals is an international agreement that aims to conserve migratory species throughout their ranges. It is the only global, and United Nations-based, intergovernmental



organization established exclusively for the conservation and management of terrestrial, aquatic and avian migratory species.

The Vienna Convention for the Protection of the Ozone Layer is a multilateral environmental agreement signed in 1985 that provided frameworks for international reductions in the production of chlorofluorocarbons due to their contribution to the destruction of the ozone layer, resulting in an increased threat of skin cancer.

Basel Convention, is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs).

The Kigali Agreement is an amendment to the Montreal Protocol which seeks to gradually reduce the consumption and production of hydrofluorocarbons (HFCs). It is a legally binding agreement designed to create rights and obligations in international law.

**Q.44) United Nations Framework for Climate Change Convention divided the countries in to Annex I, Annex II and Non-Annex I countries. In this context consider the following statements:**

1. Annex I countries are developed countries that are committed to reduce their emission levels of greenhouse gasses to targets that are mainly set below their 1990 levels.
2. Annex II countries are developing countries that not required reducing emission levels unless developed countries supply enough funding and technology.
3. India is Annex II party to UNFCCC.

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

- a) 1 only
- b) 2 and 3 only
- c) 3 only
- d) 1 and 2 only

**Q.44) Solution (a)**

Parties to UNFCCC are classified as:

- Annex I countries: industrialized countries and economies in transition- Annex I countries which have ratified the Protocol have committed to reduce their emission levels of greenhouse gasses to targets that are mainly set below their 1990 levels. There are 43 Annex I countries and the European Union is also a member.
- Annex II countries: developed countries which pay for costs of developing countries- Annex II countries are a sub-group of the Annex I countries. They comprise the OECD members, excluding those that were economies in transition in 1992.

- Non Annex I countries: Developing countries- Developing countries are not required to reduce emission levels unless developed countries supply enough funding and technology.

India is Non Annex party to UNFCCC.

**Q.45) Schedule VI of Wildlife (Protection) Act, 1972 contains:**

- a) List of animal species that need rigorous protection and contains the harshest penalties for violation of the law
- b) List of plants species that are forbidden from cultivation
- c) List of plant species that can be cultivated but cannot be traded outside India
- d) List of animals species which can be hunted

**Q.45) Solution (b)**

The Wild Life (Protection) Act, 1972 is an Act of the Parliament of India enacted for protection of plants and animal species.

This Act provides for the protection of the country's wild animals, birds, and plant species, in order to ensure environmental and ecological security. Among other things, the Act lays down restrictions on hunting many animal species.

It has six schedules which give varying degrees of protection:

Schedule I: Under this schedule species need rigorous protection and therefore, the harshest penalties for violation of the law are for species under this Schedule.

Schedule II: Animals under this list are accorded high protection. They cannot be hunted except under threat to human life.

Species listed in Schedule III and Schedule IV are also protected, but the penalties are much lower. Animals under Schedule V, e.g. common crows, fruit bats, rats and mice, are legally considered vermin and may be hunted freely.

The specified endemic plants in Schedule VI are prohibited from cultivation and planting. These species are:

- Beddome's cycad (*Cycas beddomei*)
- Blue Vanda (*Vanda soerulec*)
- Kuth (*Saussurea lappa*)
- Ladies slipper orchids (*Paphiopedilum* spp.)
- Pitcher plant (*Nepenthes khasiana*)
- Red Vanda (*Ranantthera inschootiana*)

**Q.46) With reference to Sundarbans, consider the following statements:**

1. It is the only mangrove forest in the world inhabited by tigers.
2. It is categorised as endangered as per IUCN Red List of Ecosystems.
3. Species of fish Masked Finfoot and Buffy fish owl are endemic to Sundarbans.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.46) Solution (a)**

Sundarbans is a mangrove area in the delta formed by the confluence of the Ganges, Brahmaputra and Meghna Rivers in the Bay of Bengal.

Four protected areas in the Sundarbans are enlisted as UNESCO World Heritage Sites, viz. Sundarbans National Park, Sundarbans West, Sundarbans South and Sundarbans East Wildlife Sanctuaries.

The Sundarbans mangrove ecosystem in India are evaluated as endangered as per IUCN's Red List of Ecosystems framework.

Recently, it was reported by Zoological Survey of India that out of total 1300 species of birds in India 428 species of birds are from Sundarbans. It means that one in every three birds in the country is found in Sundarbans.

Out of 428 birds listed, some, like the Masked Finfoot and Buffy fish owl, are recorded only from the Sunderbans. The area is home to nine out of 12 species of kingfishers found in the country as well rare species such as the Goliath heron and Spoon-billed Sandpiper.

**Q.47) With reference to "Intended Nationally Determined Contributions", consider the following statements:**

1. They are outcome of the Earth Summit 2012.
2. Under this India committed to achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030.

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

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

**Q.47) Solution (b)**

Countries across the globe committed to create a new international climate agreement by the conclusion of the U.N. Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP21) in Paris in December 2015. In preparation, countries have agreed to publicly outline what post-2020 climate actions they intend to take under a new international agreement, known as their Intended Nationally Determined Contributions (INDCs).

India has submitted its Intended Nationally Determined Contribution (INDC) to the United Nations Framework Convention on Climate Change.

Salient features of India's INDC are:

- To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation.
- To adopt a climate-friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development.
- To reduce the emissions intensity of its GDP by 33 to 35 per cent by 2030 from 2005 level.
- To achieve about 40 per cent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030, with the help of transfer of technology and low cost international finance, including from Green Climate Fund.
- To create an additional carbon sink of 2.5 to 3 billion tonnes of CO<sub>2</sub> equivalent through additional forest and tree cover by 2030.
- To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management.
- To mobilize domestic and new and additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.
- To build capacities, create domestic framework and international architecture for quick diffusion of cutting edge climate technology in India and for joint collaborative R&D for such future technologies.

**Q.48) With reference to New and Emerging Strategic Technologies (NEST), consider the following statements:**

1. It is a division set up under the Ministry of Science and Technology.
2. It acts as a nodal point to exchange views with foreign governments regarding emerging technologies as Artificial Intelligence and Internet of things.

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

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

**Q.48) Solution (b)**

New and Emerging Strategic Technologies –NEST is created under the Ministry of External Affairs.

The NEST acts as a nodal point to exchange views with foreign governments on new and emerging strategic technologies.

The division helps in collaboration with foreign partners in the field of 5G and artificial intelligence.

It help assess foreign policy and international legal implications of new and emerging technologies and technology-based resources, and recommend appropriate foreign policy choice.

The division holds responsibility for matters that involves negotiations with multilateral fora like the United Nations, G20. This will help to safeguard India's interests as such forums govern the rules of access to such technologies.

**Q.49) With reference to bioremediation, consider the following statements regarding biosparging:**

1. It is an ex-situ remediation technology.
2. It is a technique where soil is periodically turned in order to enhance aeration.

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

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

**Q.49) Solution (d)**

Bioremediation is the use of microorganisms to degrade the environmental contaminants into less toxic forms.

Biosparging is an in-situ remediation technology that uses indigenous microorganisms to biodegrade organic constituents in the saturated contaminated zones.

Biosparging is the process of groundwater remediation as oxygen, and possible nutrients, is injected. When oxygen is injected, indigenous bacteria are stimulated to increase rate of

degradation. Biosparging focuses on saturated contaminated zones, specifically related to ground water remediation.

**Q.50) Which of the following species are included in Species Recovery Programme under Integrated Development of Wildlife Habitats?**

1. Dugongs
2. Red Panda
3. Asiatic Elephant
4. Caracal

**Choose the correct answer from the codes given below:**

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

**Q.50) Solution (c)**

The Species Recovery programme is one of the components of Integrated Development of Wildlife Habitats' (IDWH).

Started in 2008-09, IDWH is meant for providing support to protected areas, protection of wildlife outside protected areas and recovery programmes for saving critically endangered species and habitats.

So far, the recovery programme for critically endangered species in India includes 22 wildlife species.

The species are: These are the Snow Leopard, Bustard (including Floricans), Dolphin, Hangul, Nilgiri Tahr, Marine Turtles, Dugongs, Caracal, Edible Nest Swiftlet, Asian Wild Buffalo, Nicobar Megapode, Manipur Brow-antlered Deer, Vultures, Malabar Civet, Indian Rhinoceros, Asiatic Lion, Swamp Deer, Jerdon's Courser, the Northern River Terrapin, Clouded Leopard, Arabian Sea Humpback Whale and Red Panda.

**Q.51) Consider the following statements regarding BirdLife International:**

1. It is an accredited organization of United Nations Environment Programme.
2. It is the official IUCN's Red List authority for birds.
3. Bombay Natural History Society is the Partner of BirdLife International in India.

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only

- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.51) Solution (d)**

BirdLife International:

BirdLife International is a global partnership of non-governmental organizations that strives to conserve birds and their habitats.

It is an accredited organization of the United Nations Environment Programme.

BirdLife International's priorities include preventing extinction of bird species, identifying and safeguarding important sites for birds, maintaining and restoring key bird habitats, and empowering conservationists worldwide.

BirdLife International has identified 13,000 Important Bird and Biodiversity Areas and is the official International Union for Conservation of Nature's Red List authority for birds.

BirdLife International has established that 1,375 bird species (13% of the total) are threatened with extinction (critically endangered, endangered or vulnerable).

Bombay Natural History Society:

It is one of the largest non-governmental organisations in India engaged in conservation and biodiversity research.

It is the partner of BirdLife International in India. It has been designated as a 'Scientific and Industrial Research Organisation' by the Department of Science and Technology.

Many prominent naturalists, including the ornithologists Sálim Ali and S. Dillon Ripley, have been associated with it.

The Asian waterbird census is an annual exercise undertaken in India by Bombay Natural History Society in association with Wetlands International, in which enthusiastic birdwatchers count the birds by observing them near their respective breeding grounds. The exercise is a part of 'International waterbird census', an international exercise. It also aims to create awareness regarding bird species as well as health of the wetlands, which are facing severe threat amidst anthropogenic disturbance. It is conducted in the month of January every year.

**Q.52) With reference to Key Biodiversity Areas, consider the following statements:**

1. These are sites contributing significantly to the global persistence of biodiversity.
2. Areas designated as KBA in India are protected under Wildlife (Protection) Act, 1972.
3. KBAs are an important tool towards the achievement of Aichi Biodiversity Targets.



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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.52) Solution (c)**

Key Biodiversity Areas (KBAs) are nationally identified sites that contribute significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems.

The identification of KBAs is an important approach to address biodiversity conservation at the site scale i.e. at the level of individual protected areas.

In 2016, the International Union for the Conservation of Nature (IUCN) published a Global Standard for the Identification of Key Biodiversity Areas 1, providing criteria under which an area can be quantitatively assessed for inclusion as a Key Biodiversity Area, with the thresholds being applicable and comparable across taxonomic groups.

KBA identification should build off the existing network of KBAs, which includes:

- Important Bird and Biodiversity Areas (IBAs)
- Important Plant Areas (IPAs)
- Important Sites for Freshwater Biodiversity
- Alliance for Zero Extinction (AZE) sites

KBAs can be used to support the strategic expansion of protected area networks by governments and civil society working towards achievement of the Aichi Biodiversity Targets (in particular Targets 11 and 12) as established by the Convention on Biological Diversity.

IUCN identifies 531 KBA sites in India but these have no legal basis.

**Q.53) Sometimes the term Living Fossil is seen in news. In this reference consider the following statements:**

1. Living Fossils are the species which is on the verge of extinctions and only less than 50 individual of that species are left.
2. Horseshoe crab and ginkgo trees are examples of living fossils.
3. There are no living fossils found in India.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) None of the above



**Q.53) Solution (b)**

The term "living fossil" is meant to describe an organism that has remained relatively unchanged over millions of years, or one that has no, or very few, close surviving relatives.

It was originally used by Charles Darwin to describe ancient species, like the ginkgo tree or horseshoe crab that appeared little changed over millions of years.

Coelacanth, Horseshoe crab and ginkgo trees are examples of living fossils.

Ginkgo Tree: Known for its three-inch wide, fan-shaped leaves that turn golden yellow in autumn, the ginkgo tree can be found also. It is found in Kashmir, Gilgat, IRAN, Afghanistan and North America and is one of the oldest species of trees in existence today.

Coelacanth: It is found in the Western Indian Ocean.

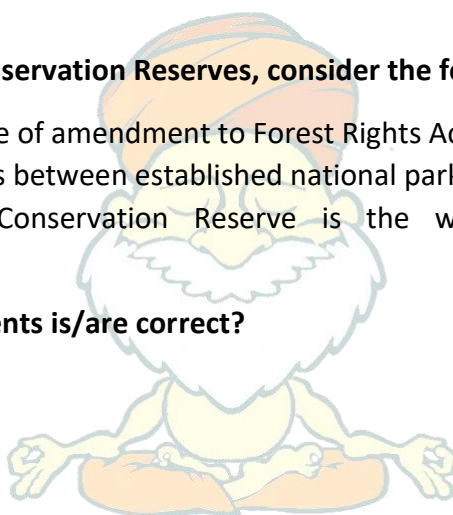
Horseshoe crab: Odisha is the largest habitat for Horseshoe crabs.

**Q.54) With reference to Conservation Reserves, consider the following statements:**

1. They are the outcome of amendment to Forest Rights Act, 2006.
2. It acts as buffer zones between established national parks, wildlife sanctuaries.
3. Mohammed Koya Conservation Reserve is the world's first sea cucumber conservation area.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 2 and 3 only



**Q.54) Solution (d)**

Conservation Reserves:

Conservation reserves and community reserves are terms denoting protected areas of the country which typically act as buffer zones to or connectors and migration corridors between established national parks, wildlife sanctuaries and reserved and protected forests.

Such areas are designated as conservation areas if they are uninhabited and completely owned by the Government of India but used for subsistence by communities, and community areas if part of the lands are privately owned.

These protected area categories were first introduced in the Wildlife (Protection) Amendment Act of 2002 – the amendment to the Wildlife Protection Act of 1972.

These categories were added because of reduced protection in and around existing or proposed protected areas due to private ownership of land, and land use.

Tiruvidaimarudur Conservation Reserve, declared on February 14, 2005, is the First Conservation Reserve to be established in the country.

The Dr KK Mohammed Koya Sea Cucumber Conservation Reserve is the first sea cucumber conservation area in the world. It is located in the Cheriyanani Reef in the Indian Union Territory of Lakshadweep. It was formed in 2020. It covers an area of 239 km<sup>2</sup>.

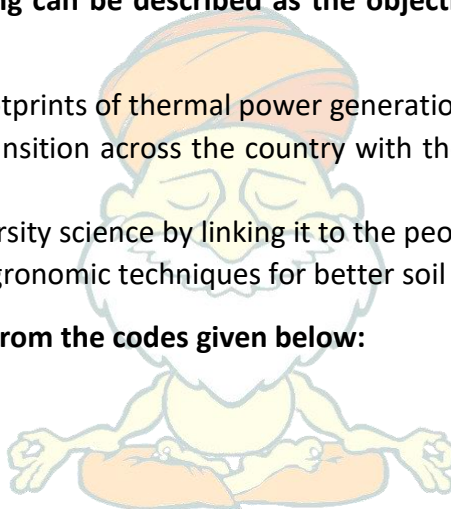
In India, the sea cucumber is protected under the Schedule I of the Wildlife Protection Act, 1972, according to which the sea cucumbers cannot be transported for commercial use. In 2002, the Environmental ministry of India banned the commercial harvesting of sea cucumbers.

**Q.55) Which of the following can be described as the objectives of 'National Mission on use of Biomass'?**

1. To reduce carbon footprints of thermal power generation.
2. To help in energy transition across the country with the aim of establishing cleaner energy sources.
3. To transform biodiversity science by linking it to the peoples' economic prosperity.
4. To promote better agronomic techniques for better soil conservation.

**Choose the correct answer from the codes given below:**

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



**Q.55) Solution (a)**

The Ministry of Power decided to set up 'National Mission on use of Biomass' in coal based power plants.

This initiative is taken to address the issue of air pollution due to farm stubble burning and to reduce carbon footprints of thermal power generation.

The objectives of the mission will be:

- To increase the level of co-firing from present 5% to higher levels to have a larger share of carbon neutral power generation from the thermal power plants.
- To take up R&D activity in boiler design to handle the higher amount of silica, alkalis in the biomass pellets.

- To facilitate overcoming the constraints in supply chain of bio mass pellets and agro-residue and its transport upto to the power plants.
- To consider regulatory issues in biomass co-firing.

The duration of proposed National Mission would be a minimum 5 years.

The National Mission on biomass will also contribute in the National Clean Air Programme (NCAP).

**Q.56) Consider the following statements:**

1. Wildlife Sanctuaries provide protection to the entire ecosystem, that is, flora, fauna, landscape.
2. National Parks are reserved exclusively for wildlife uses especially those in danger of extinction and the rare ones.
3. National parks are given a greater degree of protection than Wildlife Sanctuaries.

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

- a) 1 only
- b) 2 and 3 only
- c) 3 only
- d) 1, 2 and 3

**Q.56) Solution (c)**

The Wildlife (Protection) Act, 1972 provides for the establishment of Protected Areas in India. There are different categories of protected areas which are managed with different objectives for the larger motive of conservation.

**National Parks**

National parks provide protection to the entire ecosystem, that is, flora, fauna, landscape, etc. of that region. The national parks not only conserve wildlife but also provide a diversion of environmental and landscape heritage in a manner that does not harm it, in order to provide enjoyment to future generations.

National parks are given a greater degree of protection, with human activity greatly restricted.

Only certain areas can be visited and only activities permitted by the chief wildlife warden of the state are allowed in the park.

**Wildlife Sanctuaries**

Wildlife Sanctuary, as the name implies, is the place that is reserved exclusively for wildlife use, which includes animals, reptiles, insects, birds, etc. wild animals, especially those in

danger of extinction and the rare ones, so that they can live in peace for a lifetime and keep their population viable. Restrictions are less and open to visitations by the general public.

Wildlife is the main natural heritage, worldwide. Continuous industrialisation and deforestation have posed a threat of extinction to wildlife.

Wildlife sanctuaries refer to an area that provides protection and living conditions favorable to wild animals. India has 553 wildlife sanctuaries.

**Q.57) With reference to BharatNet Project, consider the following statements:**

1. The objective of this project is to provide high speed broadband connectivity to all the Statutory Towns of India.
2. Dark fibres of public sector undertakings are being utilised in this project.
3. It is entirely funded by the Universal Service Obligation Fund.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.57) Solution (b)**

BharatNet is a flagship mission implemented by Bharat Broadband Network Ltd. (BBNL).

Objective: to connect all of India's households, specifically rural households through demand, affordable high-speed internet connectivity to fulfill the objectives of the Digital India programme in partnership with the states and the private sector.

It intends to cover all 2.5 lakh Gram Panchayats for the provision of E-governance, E-healthcare, E-Commerce, E-Education, and Public Interest Access services.

Dark fibre is the extra optical fibre laid by companies in order to avoid cost repetition when more bandwidth is needed. This unused infrastructure of Bharat Broadband Network Limited (BBNL) is used by the companies under BharatNet project to expand their presence in rural India and offer 4G as well as other long-term evolution (LTE) mobile telephony services.

The entire project is being funded by the Universal Service Obligation Fund (USOF), which was set up for improving telecom services in rural and remote areas of the country.

**Q.58) Consider the following statements:**

1. C-DAC is the nodal agency to deal with cyber security threats in India.

2. CERT-IN is the premier agency undertaking building of multiple generations of Supercomputer.

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

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

**Q.58) Solution (d)**

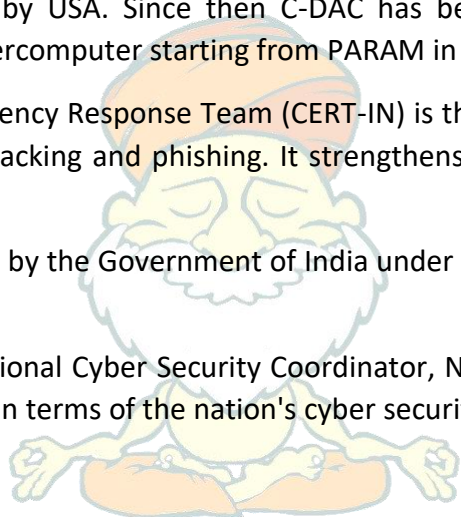
Centre for Development of Advanced Computing (C-DAC) is the premier R&D organization of the Ministry of Electronics and Information Technology (MeitY) for carrying out R&D in IT, Electronics and associated areas.

The setting up of C-DAC in 1988 itself was to built Supercomputers in context of denial of import of Supercomputers by USA. Since then C-DAC has been undertaking building of multiple generations of Supercomputer starting from PARAM in 1988.

The Indian Computer Emergency Response Team (CERT-IN) is the nodal agency to deal with cyber security threats like hacking and phishing. It strengthens security-related defence of the Indian Internet domain.

CERT-IN was formed in 2004 by the Government of India under Information Technology Act, 2000.

It liaisons with Office of National Cyber Security Coordinator, National Security Council and National Information Board in terms of the nation's cyber security and threats.



**Q.59) With reference to Cyber Security terms, what is “Black Hat”?**

- a) Hackers that break into the network to steal information that will be used to harm the owner or the users without consent.
- b) An audio or video clip that has been edited and manipulated to seem real or believable.
- c) A hacking attack that tricks victims into clicking on an unintended link or button, usually disguised as a harmless element.
- d) Malware that allows cybercriminals to remotely control your computer.

**Q.59) Solution (a)**

When speaking in cyber security terms, the differences in hacker “hats” refers to the intention of the hacker. For example:

Black hat: Hackers that break into the network to steal information that will be used to harm the owner or the users without consent. It's entirely illegal.

White hat: Breaches the network to gain sensitive information with the owner's consent – making it completely legal. This method is usually employed to test infrastructure vulnerabilities.

Deepfake: An audio or video clip that has been edited and manipulated to seem real or believable.

Clickjacking: A hacking attack that tricks victims into clicking on an unintended link or button, usually disguised as a harmless element.

Rootkit: Malware that allows cybercriminals to remotely control your computer.

**Q.60) With reference to Information Technology initiatives taken in India, GARUDA is:**

- a) Fastest Supercomputer of India
- b) India's Grid Computing initiative
- c) App to create a secure cyber space by detecting botnet infections
- d) None of the above

**Q.60) Solution (b)**

GARUDA (Global Access to Resource Using Distributed Architecture) is India's Grid Computing initiative connecting 17 cities across the country.

The Department of Information Technology (DIT), Government of India has funded the Centre for Development of Advanced Computing (C-DAC) to deploy the nationwide computational grid GARUDA.

GARUDA will assist to accelerate India's drive to turn its substantial research investment into tangible economic benefits.

**Q.61) Which of the following statements is/are correct regarding National Green Tribunal (NGT)?**

1. The Chairperson of the NGT is a retired Judge of the Supreme Court.
2. The NGT deals with civil cases under Wildlife (Protection) Act, 1972.
3. An order of Tribunal is executable as a decree of a civil court.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.61) Solution (c)**

The NGT was established on October 18, 2010 under the National Green Tribunal Act 2010.

The objective of NGT is to provide a specialized forum for effective and speedy disposal of cases pertaining to environment protection, conservation of forests and for seeking compensation for damages caused to people or property due to violation of environmental laws or conditions specified while granting permissions.

An order/decision/award of Tribunal is executable as a decree of a civil court.

The Chairperson of the NGT is a retired Judge of the Supreme Court, Head Quartered in Delhi. Other Judicial members are retired Judges of High Courts.

The NGT has the power to hear all civil cases relating to environmental issues and questions that are linked to the implementation of laws listed in Schedule I of the NGT Act. These include the following:

- The Water (Prevention and Control of Pollution) Act, 1974;
- The Water (Prevention and Control of Pollution) Cess Act, 1977;
- The Forest (Conservation) Act, 1980;
- The Air (Prevention and Control of Pollution) Act, 1981;
- The Environment (Protection) Act, 1986;
- The Public Liability Insurance Act, 1991;
- The Biological Diversity Act, 2002.

This means that any violations pertaining only to these laws, or any order / decision taken by the Government under these laws can be challenged before the NGT.

Importantly, the NGT has not been vested with powers to hear any matter relating to the Wildlife (Protection) Act, 1972, Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and various laws enacted by States relating to forests, tree preservation etc.

**Q.62) Which of the following statements is/are correct regarding Central Pollution Control Board?**

1. It was established under the Environment (Protection) Act, 1986.
2. It is headed by the Prime Minister.
3. It runs nationwide program of ambient air quality monitoring known as System of Air Quality and Weather Forecasting And Research (SAFAR).

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 2 and 3 only



- c) 3 only
- d) None of the above

**Q.62) Solution (d)**

The Central Pollution Control Board (CPCB) of India is a statutory organisation under the Ministry of Environment, Forest and Climate Change (MoEFCC).

It was established in 1974 under the Water (Prevention and Control of pollution) Act, 1974.

The CPCB is also entrusted with the powers and functions under the Air (Prevention and Control of Pollution) Act, 1981.

It serves as a field formation and also provides technical services to the Ministry of Environment and Forests under the provisions of the Environment (Protection) Act, 1986.

It is the apex organisation in country in the field of pollution control, as a technical wing of MoEFCC. The board is led by its Chairperson appointed by the Appointments Committee of the Cabinet of the Government of India.

CPCB runs nationwide programs of ambient air quality monitoring known as National Air Quality Monitoring Programme (NAMP). The network consists of 621 operating stations covering 262 cities/towns in 29 states and 5 Union Territories of the country.

The System of Air Quality and Weather Forecasting And Research (SAFAR) is a national initiative introduced by the Ministry of Earth Sciences (MoES) to measure the air quality of a metropolitan city, by measuring the overall pollution level and the location-specific air quality of the city.

The system is indigenously developed by the Indian Institute of Tropical Meteorology (IITM), Pune and is operationalized by the India Meteorological Department (IMD).

**Q.63) Which of the following pollutants are monitored under National Air Quality Monitoring Programme (NAMP)?**

1. Sulphur Dioxide
2. Ground level Ozone
3. Oxides of Nitrogen
4. Methane
5. Particulate Matters

**Choose the correct answer from the codes given below:**

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

**Q.63) Solution (a)**

The apex regulatory agency on pollution issues in India, the Central Pollution Control Board (CPCB) coordinates the air quality monitoring regime through its nation-wide programme known as the National Air Quality Monitoring Programme (NAMP).

Under NAMP, using a network that consists of 342 pollution monitoring stations, the CPCB regularly monitors four air pollutants viz.,

- Sulphur Dioxide (SO<sub>2</sub>),
- Oxides of Nitrogen as NO<sub>2</sub>,
- Suspended Particulate Matter (SPM) and
- Respirable Suspended Particulate Matter or Particulate Matter of less than 10 $\mu$  size (commonly called PM<sub>10</sub> or RSPM).

The monitoring of meteorological parameters such as wind speed and wind direction, relative humidity (RH) and temperature are integrated with the monitoring of air quality.

The monitoring of air pollutants is carried out for 24 hours (4-hourly sampling for gaseous pollutants and 8-hourly sampling for particulate matter) with a frequency of twice a week, to have one hundred and four (104) observations in a year.

State pollution control boards and the National Environmental Engineering Research Institute (NEERI), Nagpur carry out the monitoring, and the Union Ministry of Environment, Forest and Climate Change oversees the operation under the NCAP.

**Q.64) Import of which of the following items is/are banned under Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016?**

1. Waste edible fats
2. Solid Plastic Waste
3. Second-hand critical care medical equipment

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 1 and 2 only
- c) 2 and 3 only
- d) 1, 2 and 3

**Q.64) Solution (b)**

Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016 make state governments responsible for environmentally sound management of hazardous and other wastes and mandate them to set up industrial space or sheds for recycling, pre-processing and other utilization of hazardous or other waste.

The rules also mandates state pollution control boards to prepare an annual inventory of the waste generated, recycled, recovered, utilised including co-processed, waste re-exported and waste disposed.

Under the rules following items have been prohibited for import:

- Waste edible fats and oil of animals, or vegetable origin;
- Household waste;
- Tyres for direct re-use purpose;
- Solid Plastic wastes including Pet bottles;
- Waste electrical and electronic assemblies scrap;
- Other chemical wastes especially in solvent form.

Earlier Critical Care Medical equipments were banned for import under the rules but due to shortage of ventilators during covid pandemic the government has allowed import of second-hand or used ventilators.

**Q.65) Consider the following statements regarding Global Green Growth Institute (GGGI):**

1. It provides technical support, research and stakeholder engagement for green growth plans with special focus on developing countries.
2. India is a member state of GGGI.
3. GGGI is a knowledge partner of SATAT initiative of the Ministry of Petroleum and Natural Gas.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.65) Solution (c)**

The Global Green Growth Institute (GGGI) is a treaty-based inter-governmental international development organization headquartered in Seoul, South Korea.

The organization aims to promote green growth, a growth paradigm that is characterized by a balance of economic growth and environmental sustainability.

GGGI provides technical support, research and stakeholder engagement for green growth plans, especially in developing countries, aiming to replace the more typical paradigm based on industrial development.

India is a partner state of this organization. India has submitted a Letter of Intent to become a Member.

The Global Green Growth Institute (GGGI) signed a Memorandum of Understanding (MoU) with the Ministry of Petroleum and Natural Gas (MoPNG), Government of India as a knowledge partner under the Sustainable Alternative Towards Affordable Transportation (SATAT) scheme for the development of Compressed Biogas (CBG), also known as Biological Compressed Natural Gas (BioCNG).

Under this partnership, GGGI and MoPNG will promote circular economy through Waste-to-Energy and identify rapidly growing markets to utilize CBG / BioCNG as a clean and green fuel.

**Q.66) Which of the following statements is/are correct regarding Bio-carbon Fund initiative?**

1. It is an initiative of United Nations Environment programme.
2. It seeks to promote reduced greenhouse gas emissions from the land sector.
3. Currently it supports programmes in Mexico, India and Indonesia.

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1, 2 and 3

**Q.66) Solution (b)**

The BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL) is a multilateral fund, supported by donor governments and managed by the World Bank.

It promotes reducing greenhouse gas emissions from the land sector, including efforts to reduce deforestation and forest degradation in developing countries (REDD+), sustainable agriculture, as well as smarter land-use planning, policies and practices.

The ISFL currently supports programs in Colombia, Ethiopia, Indonesia, Mexico, and Zambia.

These large-scale programs are pioneering work that enables countries and the private sector to adopt changes in the way farmers work on the ground, as well as informing policies made at the international level.

**Q.67) Which of the following statements is/are correct regarding TRAFFIC, the Wildlife Trade Monitoring Network?**

1. It is an international non-governmental organization.

2. It is joint programme of WWF and IUCN.
3. It aims to ensure that trade in wild plants and animals is not a threat to the conservation of nature.

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.67) Solution (d)**

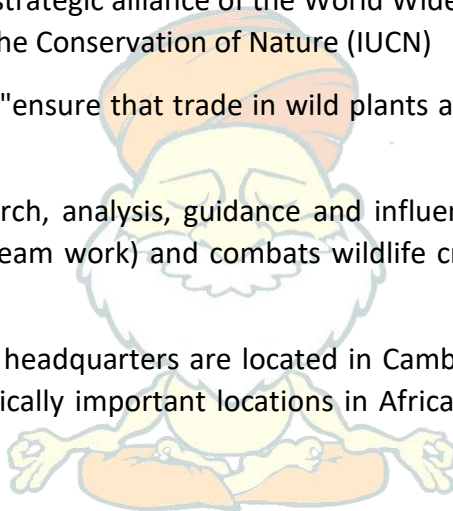
TRAFFIC, the Wildlife Trade Monitoring Network, is the leading non-governmental organisation working globally on the trade of wild animals and plants in the context of both biodiversity and sustainable development.

It was founded in 1976 as a strategic alliance of the World Wide Fund for Nature (WWF) and the International Union for the Conservation of Nature (IUCN)

The organisation's aim is to "ensure that trade in wild plants and animals is not a threat to the conservation of nature".

It states that through research, analysis, guidance and influence, it promotes sustainable wildlife trade (the green stream work) and combats wildlife crime and trafficking (the red stream work).

Founded in 1979, TRAFFIC's headquarters are located in Cambridge, United Kingdom, with offices located in 15 strategically important locations in Africa, Asia, the Americas, Europe and Oceania.



**Q.68) Which of the following statements is/are correct regarding Sendai Framework?**

1. It is a successor agreement to the Hyogo Framework for Action.
2. It aims to conserve terrestrial, marine and avian migratory species throughout their range.

**Choose the correct answer from the codes given below:**

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

**Q.68) Solution (a)**

The Sendai Framework for Disaster Risk Reduction (2015–2030) is an international document that was adopted by the United Nations member states at the World Conference on Disaster Risk Reduction held in Sendai, Japan.

It is the successor agreement to the Hyogo Framework for Action (2005–2015), which had been the most encompassing international accord to date on disaster risk reduction.

The Sendai Framework sets four specific priorities for action:

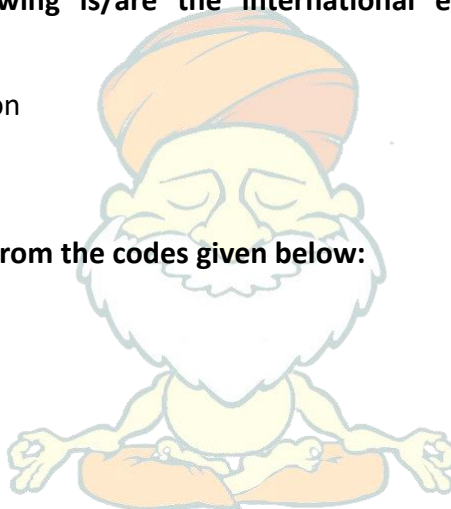
1. Understanding disaster risk
2. Strengthening disaster risk governance to manage disaster risk
3. Investing in disaster risk reduction for resilience
4. Enhancing disaster preparedness for effective response, and to "Building Back Better" in recovery, rehabilitation and reconstruction

**Q.69) Which of the following is/are the international efforts to combat chemical disasters?**

1. Rotterdam Convention
2. Basel Convention
3. Istanbul Convention

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only



**Q.69) Solution (b)**

The Rotterdam Convention is a multilateral treaty to promote shared responsibilities in relation to importation of hazardous chemicals. The convention promotes open exchange of information and calls on exporters of hazardous chemicals to use proper labeling, include directions on safe handling, and inform purchasers of any known restrictions or bans.

Basel Convention, is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs). The convention is also intended to minimize the rate and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes they generate.

Istanbul Convention is a human rights treaty of the Council of Europe against violence against women and domestic violence.

**Q.70) Consider the following statements regarding CITES:**

1. Appendix III of CITES contains species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.
2. Species may be added to or removed from Appendix III of CITES, only by the Conference of the Parties.

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

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

**Q.70) Solution (d)**

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement to which States and regional economic integration organizations adhere voluntarily.

CITES works by subjecting international trade in specimens of selected species to certain controls. All import, export, re-export and introduction from the sea of species covered by the Convention has to be authorized through a licensing system. Each Party to the Convention must designate one or more Management Authorities in charge of administering that licensing system and one or more Scientific Authorities to advise them on the effects of trade on the status of the species.

The species covered by CITES are listed in three Appendices, according to the degree of protection they need.

- Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances.
- Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.
- Appendix III contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade.

Species may be added to or removed from Appendix I and II, or moved between them, only by the Conference of the Parties. However, species may be added to or removed from Appendix III at any time and by any Party unilaterally.

**Q.71) Consider the following:**



1. Ozone
2. Acid Rain
3. PAN
4. nitrogen oxide
5. Particulate Matter

**Which of the above are secondary pollutants?**

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

**Q.71) Solution (a)**

Pollutants are classified according to the form in which they persist after release into the environment.

Primary air pollutants: Pollutants that are formed and emitted directly from particular sources. Examples are particulate matter, carbon monoxide, nitrogen oxide, and sulphur oxide.

Secondary Pollutants: These are formed by interaction among the primary pollutants. For example:

- Peroxyacetyl Nitrate (PAN) is formed by the interaction of nitrogen oxides and hydrocarbons.
- Ozone is formed when hydrocarbons (HC) and nitrogen oxides (NO<sub>x</sub>) combine in the presence of sunlight
- Acid rain is formed when sulphur dioxide or nitrogen oxides react with water.

**Q.72) Consider the following statements regarding Acid Rain:**

1. Its pH more than 7.
2. Acid rain is caused by emissions of ozone and carbon dioxide.
3. It can be in the form of rain, fog, mist or snow.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1, 2 and 3

**Q.72) Solution (c)**

Acid rain, also called acid precipitation or acid deposition, precipitation possessing a pH of about 5.2 or below primarily produced from the emission of sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>; the combination of NO and NO<sub>2</sub>) from human activities, mostly the combustion of fossil fuels.

Acid rain is a popular expression for the more scientific term acid deposition, which refers to the many ways in which acidity can move from the atmosphere to Earth's surface.

Acid deposition includes acidic rain as well as other forms of acidic wet deposition—such as snow, sleet, hail, and fog (or cloud water).

Acid deposition also includes the dry deposition of acidic particles and gases, which can affect landscapes during dry periods. Thus, acid deposition is capable of affecting landscapes and the living things that reside within them even when precipitation is not occurring.

Effects of Acid Rain:

- The regional effects of acid deposition were first noted in parts of western Europe and eastern North America in the late 1960s and early 1970s when changes in the chemistry of rivers and lakes, often in remote locations, were linked to declines in the health of aquatic organisms such as resident fish, crayfish, and clam populations.
- In the 1970s and '80s, forested areas in central Europe, southern Scandinavia, and eastern North America showed alarming signs of forest dieback and tree mortality.
- Acid deposition also affects human-made structures. The most notable effects occur on marble and limestone, which are common building materials found in many historic structures, monuments, and gravestones.

**Q.73) Consider the following statements regarding ocean acidification:**

1. It is the consequence of the absorption of large amounts of carbon dioxide by the oceans.
2. Increasing acidity in oceans accentuates coral bleaching.
3. It reduces the formation of clouds.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.73) Solution (d)**

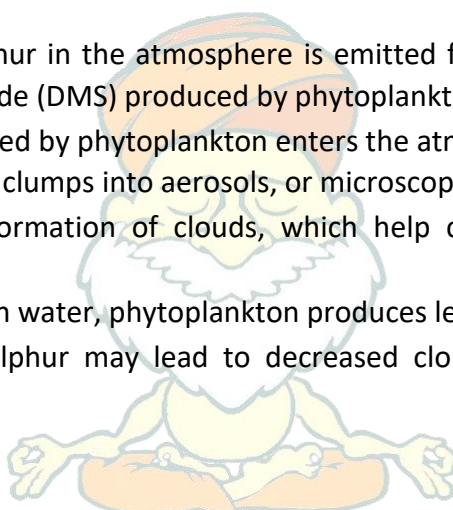
Ocean acidification is the ongoing decrease in the pH value of the Earth's oceans, caused by the uptake of carbon dioxide (CO<sub>2</sub>) from the atmosphere. The main cause of ocean acidification is the burning of fossil fuels.

Effect of ocean acidification on marine life

- Ocean acidification reduces the amount of carbonate, a key building block in seawater. This makes it more difficult for marine organisms, such as coral and some plankton, to form their shells and skeletons, and existing shells may begin to dissolve.
- The impacts of ocean acidification are not uniform across all species. Some algae and seagrass may benefit from higher CO<sub>2</sub> concentrations in the ocean, as they may increase their photosynthetic and growth rates. However, a more acidic environment will harm other marine species such as molluscs, corals and some varieties of plankton.
- Increasing acidity is thought to have a range of potentially harmful consequences for marine organisms such as depressing metabolic rates and immune responses in some organisms and causing coral bleaching.

Effect of ocean acidification on cloud formation:

- The majority of sulphur in the atmosphere is emitted from the ocean, often in the form of dimethylsulfide (DMS) produced by phytoplankton.
- Some of DMS produced by phytoplankton enters the atmosphere and reacts to make sulphuric acid, which clumps into aerosols, or microscopic airborne particles.
- Aerosols seed the formation of clouds, which help cool the Earth by reflecting sunlight.
- But, in acidified ocean water, phytoplankton produces less DMS.
- This reduction of sulphur may lead to decreased cloud formation, raising global temperatures.



**Q.74) With reference to difference between phytoremediation and bioremediation, consider the following statements:**

1. Phytoremediation is the use of living organisms to degrade and detoxify environmental contaminants whereas the bioremediation is the use of plants removal of contaminants.
2. Bioremediation is more ecologically-friendly while phytoremediation is cost friendly.
3. Phytoremediation can be either in situ or ex situ while bioremediation is mainly an in-situ process.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1 and 3 only

**Q.74) Solution (b)**

Bioremediation and phytoremediation are two types of mechanisms used in the removal of contaminants from the ecosystems. Both involve in the degradation, transform, detoxify or immobilization of the pollutants.

Difference between Bioremediation and Phytoremediation:

- Bioremediation refers to the use of either naturally occurring or deliberately introduced microorganisms to consume and break down environmental pollutants, in order to clean a polluted site while phytoremediation refers to a process of decontaminating soil or water by using plants and trees to absorb or break down pollutants.
- Bioremediation is the method of removing contaminants from ecosystems while phytoremediation is a type of bioremediation.
- Bioremediation mainly uses microbes while phytoremediation depends on plants.
- Bioremediation can be either in situ or ex situ while phytoremediation is mainly an in-situ process.
- Bioremediation is more ecologically-friendly while phytoremediation is cost friendly.

**Q.75) Consider the following statements:**

1. Phytoextraction is the process in which toxic and non-biodegradable contaminants are extracted from the environment by growing green plants.
2. Rhizofiltration is the removal of toxic compounds in the contaminated environment, by the filtration process of the roots of the plants.
3. Phytoextraction is used for treatment in aquatic environments, while rhizofiltration deals with soil remediation.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.75) Solution (a)**

Phytoextraction:

- Phytoextraction (or phytoaccumulation or phytosequestration) exploits the ability of plants or algae to remove contaminants from soil or water into harvestable plant biomass.
- The roots take up substances from the soil or water and concentrate it above ground in the plant biomass.

- Phytoextraction can also be performed by plants (e.g. Populus and Salix) that take up lower levels of pollutants, but due to their high growth rate and biomass production, may remove a considerable amount of contaminants from the soil.

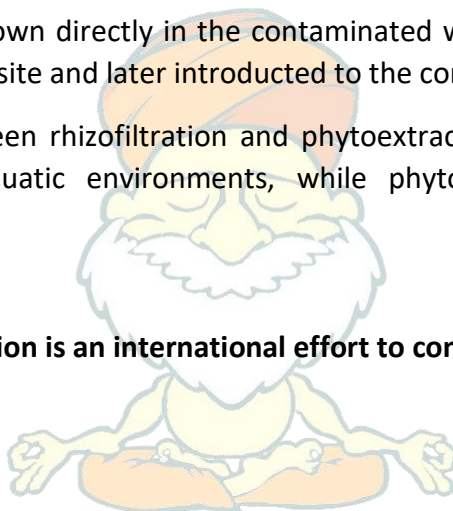
Rhizofiltration:

- It is a form of phytoremediation that involves filtering contaminated groundwater, surface water and wastewater through a mass of roots to remove toxic substances or excess nutrients.
- The contaminated water is either collected from a waste site and brought to the plants, or the plants are planted in the contaminated area, where the roots then take up the water and the contaminants dissolved in it.
- Many plant species naturally uptake heavy metals and excess nutrients for a variety of reasons: sequestration, drought resistance, disposal by leaf abscission, interference with other plants, and defense against pathogens and herbivores.
- Rhizofiltration is a contamination treatment method that may be conducted in situ, with plants being grown directly in the contaminated water body or ex situ, where plants are grown off-site and later introduced to the contaminated water body.

The major difference between rhizofiltration and phytoextraction is that rhizofiltration is used for treatment in aquatic environments, while phytoextraction deals with soil remediation.

**Q.76) The MARPOL convention is an international effort to combat:**

- a) Mercury pollution
- b) Noise pollution
- c) Light pollution
- d) Marine pollution



**Q.76) Solution (d)**

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes.

It was developed by the International Maritime Organization with an objective to minimize pollution of the oceans and seas, including dumping, oil and air pollution.

The original MARPOL was signed on 17 February 1973, but did not come into force at the signing date. The current convention is a combination of 1973 Convention and the 1978 Protocol, which entered into force on 2 October 1983. As of January 2018, 156 states are parties to the convention.

All ships flagged under countries that are signatories to MARPOL are subject to its requirements, regardless of where they sail and member nations are responsible for vessels registered on their national ship registry.

**Q.77) Which of the following are the initiatives aimed towards elimination of Malaria?**

1. MERA India
2. E-2020
3. YEP

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only

**Q.77) Solution (b)**

Malaria Elimination Research Alliance (MERA) India:

- The purpose of MERA India is to identify, articulate, prioritise and respond to the research needs of the country in a coordinated and combinatorial way to eliminate malaria from India by 2030.
- It is a conglomeration of National and International partners like World Health Organization (WHO), National Vector Borne Diseases Control Program (NVBDCP), and medicines for Malaria Venture (MMV), medical colleges and several Multi-National Companies (MNCs) working towards malaria control and elimination.
- MERA-India fosters multicentric studies in thematic areas to provide a platform for pan-India data.
- The National Vector Borne Diseases Control Program (NVBDCP) developed a comprehensive framework to achieve "Malaria free India by 2030".

E-2020:

- According to a WHO analysis published in 2016, 21 countries have the potential to eliminate malaria by 2020. They were selected based on an analysis that looked at the likelihood of elimination across 3 key criteria: trends in malaria case incidence between 2000 and 2014; declared malaria objectives of affected countries; and informed opinions of WHO experts in the field.
- Together, these 21 malaria-eliminating countries are part of a concerted effort known as the E-2020 initiative, supported by WHO and other partners, to eliminate malaria in an ambitious but technically feasible time frame.

- In a recently published report “Zeroing in on malaria elimination”, which is the final report of the E-2020 initiative, WHO highlighted that 8 E-2020 member countries reported zero indigenous cases of malaria in 2020, a remarkable achievement in view of the ongoing global COVID-19 pandemic. Maintaining zero cases is a testament to their commitment to protect hard-won gains and keep the disease at bay.
- Building on the successes of the E-2020, WHO has identified a new group of 25 countries that have the potential to stamp out malaria within a 5-year timeline.
- The E-2025 countries will receive technical and on-the-ground support by WHO and its partners. In return, they are expected to audit their elimination programmes annually, participate in elimination forums, conduct surveillance assessments, and share malaria case data periodically.

Yaws Eradication Programme (YEP):

The objectives of the programme were to achieve:

- Cessation of transmission of yaws in the country (defined as nil reporting of new yaws cases) and
- Eradication of yaws defined as absence of new cases for a continuous period of three years, supported by absence of evidence of transmission through sero-survey among under-five children (i.e. no sero reactivity to RPR/VDRL in <5 yr children).

The programme strategy adopted to achieve these objectives:

- Creating yaws consciousness and awareness in health professionals and community members,
- Trained manpower development,
- Detection and treatment of cases and contacts,
- Monitoring and evaluation, and
- IEC activities harnessing multi-sectoral approach.

The disease has been eliminated from India in 2006 as no new yaws case has been reported after 2003 in the country.

**Q.78) With reference to the effects of radioactive radiation on living beings, consider the following statements:**

1. Gamma radiation cannot penetrate the skin but if their source is inside the body, they can cause damage to bones or lungs.
2. X-rays can penetrate the skin but cannot pass through the tissues.

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



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

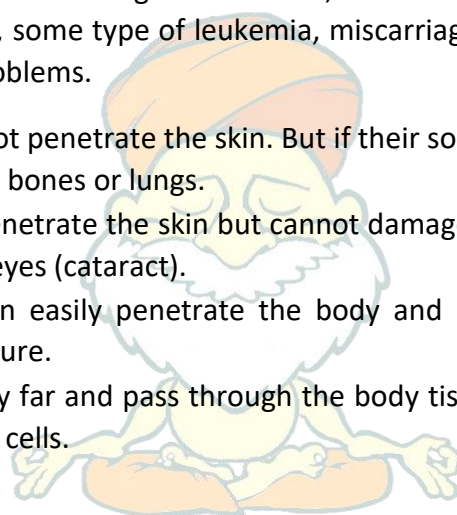
**Q.78) Solution (d)**

Exposure to any type of ionizing radiation (alpha and beta particles, gamma-rays and X-rays) can prove harmful and even lethal. The two types of effects are:

- genetic
- non-genetic or body damage

In genetic damage, genes and chromosomes get altered. Its effect may become visible as deformations in the offsprings (children or grandchildren). Alterations or breaks in the genetic material, that is DNA (deoxyribonucleic acid)- the molecule containing genetic information, is called mutation. In nongenetic effects, the harm is visible immediately in the form of birth defects, burns, some type of leukemia, miscarriages, tumors, cancer of one or more organs and fertility problems.

- Alpha-particles cannot penetrate the skin. But if their sources is inside the body, they can cause damage to bones or lungs.
- Beta-particles can penetrate the skin but cannot damage the tissues. They can cause damage to skin and eyes (cataract).
- Gamma-radiation can easily penetrate the body and pass through it. They cause damage to cell structure.
- X-rays can travel very far and pass through the body tissues except bones. They can cause damage to the cells.



**Q.79) Consider the following statements regarding Climate Breakthroughs Summit:**

1. It is a collaboration between the World Economic Forum, Mission Possible Partnership, the United Nations Climate Champions, and the United Kingdom.
2. One of its key campaigns is 'Race to Zero' campaign that mobilises support to move towards zero-carbon recovery for a sustainable future.

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

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

**Q.79) Solution (c)**

The Climate Breakthroughs Summit is a collaboration between the World Economic Forum, Mission Possible Partnership, the United Nations Climate Champions, and the United Kingdom.

It aims to demonstrate the need for systemic change to accelerate the global transition to a zero-carbon economy.

One of its key campaigns is 'Race to Zero' campaign that mobilises support of 708 cities, 24 regions, 2,360 businesses, 163 investors, and 624 higher education institutions to move towards zero-carbon recovery for a sustainable future.

Maersk, the world's largest container shipping line and vessel operator, joined Race to Zero with the commitment to halving the emission by 2030.

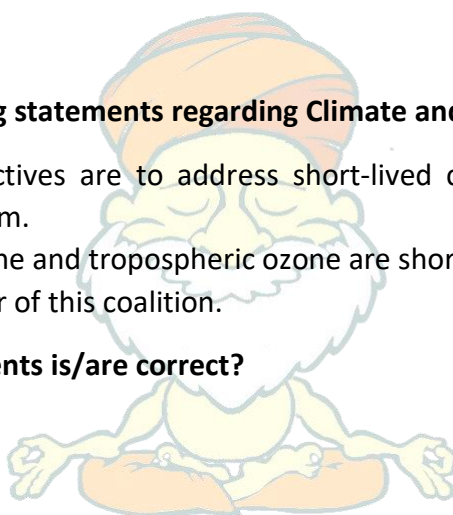
As many as 40 health care institutions worldwide have committed to halving emissions by 2030 and reaching net zero by 2050. These 40 institutions represent more than 3,000 health care facilities in 18 countries.

**Q.80) Consider the following statements regarding Climate and Clean Air Coalition (CCAC):**

1. The Coalition's objectives are to address short-lived climate pollutants by raising awareness about them.
2. Black Carbon, methane and tropospheric ozone are short-lived climate pollutant.
3. India is not a member of this coalition.

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

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only



**Q.80) Solution (b)**

The Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC) was launched by the United Nations Environment Programme (UNEP) and six countries — Bangladesh, Canada, Ghana, Mexico, Sweden, and the United States.

The Coalition's objectives are to address short-lived climate pollutants by:

- Raising awareness of short-lived climate pollutant impacts and mitigation strategies;
- Enhancing and developing new national and regional actions, including by identifying and overcoming barriers, enhancing capacity, and mobilizing support;
- Promoting best practices and showcasing successful efforts; and
- Improving scientific understanding of short-lived climate pollutant impacts and mitigation strategies.

Short-lived climate pollutants (SLCPs) are agents that have relatively short lifetime in the atmosphere – a few days to a few decades – and a warming influence on climate. The main short-lived climate pollutants are black carbon, methane and tropospheric ozone, which are the most important contributors to the human enhancement of the global greenhouse effect after CO<sub>2</sub>.

India formally joined the Climate & Clean Air Coalition (CCAC) in 2019. It furthers India's commitment to combat air pollution with a solutions-oriented approach.

**Q.81) Consider the following statements regarding Carbon Sequestration:**

1. It is the long-term removal or capture of carbon dioxide from the atmosphere.
2. Iron fertilization is a sequestration process to remove carbon from terrestrial areas.
3. A bamboo forest sequesters carbon at a much faster rate than a mature forest.

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

- a) 1 and 2 only
- b) 1 and 3 only
- c) 2 and 3 only
- d) 1, 2 and 3

**Q.81) Solution (b)**

Carbon sequestration is the long-term removal, capture, or sequestration of carbon dioxide from the atmosphere to slow or reverse atmospheric CO<sub>2</sub> pollution and to mitigate or reverse climate change.

Carbon dioxide (CO<sub>2</sub>) is naturally captured from the atmosphere through biological, chemical, and physical processes. These changes can be accelerated through changes in land use and agricultural practices, such as converting crop and livestock grazing land into land for non-crop fast growing plants.

Artificial processes have been devised to produce similar effects including large-scale, artificial capture and sequestration of industrially produced CO<sub>2</sub> using subsurface saline aquifers, reservoirs, ocean water, aging oil fields, or other carbon sinks, bio-energy with carbon capture and storage, biochar, ocean fertilization, enhanced weathering, and direct air capture when combined with storage.

Ocean iron fertilization is an example of a geo-engineering technique used to sequester CO<sub>2</sub> in oceans. Iron fertilization attempts to encourage phytoplankton growth, which removes carbon from the atmosphere for at least a period of time. Natural iron fertilisation events (e.g., deposition of iron-rich dust into ocean waters) can enhance carbon sequestration. Sperm whales act as agents of iron fertilisation when they transport iron from the deep ocean to the surface during prey consumption and defecation.

Although a bamboo forest stores less total carbon than a mature forest of trees, a bamboo plantation sequesters carbon at a much faster rate than a mature forest or a tree plantation. Therefore the farming of bamboo timber may have significant carbon sequestration potential.

**Q.82) Which of the following rating system for green buildings in India are developed by the Bureau of Energy Efficiency (BEE)?**

1. India Green Building Council
2. GRIHA Rating
3. Energy Saving Building Code
4. ECO-NIWAS

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 and 3 only
- c) 3 and 4 only
- d) 1 and 4 only

**Q.82) Solution (c)**

Rating system for green buildings in India:

- The Indian Green Building Council (IGBC) was formed by the Confederation of Indian Industry (CII). IGBC is India's premier body for green building certification and related services.
- GRIHA: Green Rating for Integrated Habitat Assessment (GRIHA) is a rating system evolved by The Energy and Resources Institute (TERI).
- The Energy Conservation Building Code (ECBC) was launched in May 2007 by the Bureau of Energy Efficiency (BEE), Ministry of Power. Its main objective is to establish minimum requirements for energy efficient design and construction of buildings.
- ECO-NIWAS Portal (Energy Conservation-New Indian Way for Affordable & Sustainable homes) was launched by the government to increase awareness about sustainable building and energy efficient homes in the country. It is developed by BEE.

**Q.83) Consider the following statements:**

1. Carbon Offsetting refers to the total emission of Greenhouse emissions over a period of time by any individual, group or organization.

2. Carbon Offsets are measured in tonnes of carbon dioxide-equivalent.

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

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

**Q.83) Solution (b)**

A carbon offset is a reduction in emissions of carbon dioxide or other greenhouse gases made in order to compensate for emissions made elsewhere.

Offsets are measured in tonnes of carbon dioxide-equivalent. One tonne of carbon offset represents the reduction of one tonne of carbon dioxide or its equivalent in other greenhouse gases.

Carbon offsets represent multiple categories of greenhouse gases, including[16] carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulfur hexafluoride (SF<sub>6</sub>).

Emission reduction projects reduce the amount of greenhouse gases in the atmosphere in one of three ways:

- By capturing and destroying a greenhouse gas that would otherwise be emitted into the atmosphere. An example of this is a methane gas capture project at a landfill.
- By producing energy using a clean, renewable resource that eliminates the need to produce that same energy from fossil fuels, the burning of which releases greenhouse gas into the atmosphere. An example of this is wind power.
- By capturing and storing (or “sequestering”) greenhouse gases to prevent their release into the atmosphere. An example of this is a project that promotes the healthy growth and maintenance of forests.

**Q.84) Consider the following statements regarding REDD+:**

1. It is a mechanism developed by Parties to the United Nations Framework Convention on Climate Change (UNFCCC).
2. It creates a financial value for the carbon stored in forests by offering incentives for developing countries to reduce emissions from forested lands.
3. It is legally binding on United Nations member countries.

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

- a) 1 and 2 only
- b) 2 and 3 only

- c) 1 and 3 only
- d) 1, 2 and 3

**Q.84) Solution (a)**

Reducing emissions from deforestation and forest degradation (REDD+):

- REDD+ is a voluntary climate change mitigation approach that has been developed by Parties to the United Nations Framework Convention on Climate Change (UNFCCC).
- It creates a financial value for the carbon stored in forests by offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development.
- Developing countries would receive results-based payments for results-based actions.
- REDD+ goes beyond simply deforestation and forest degradation and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.

**Q.85) Consider the following statements regarding Intergovernmental Panel on Climate Change (IPCC):**

1. It is an international non profit organization.
2. It has observer status in United Nations.
3. IPCC assessments provide a scientific basis for governments at all levels to develop climate-related policies.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 2 and 3 only

**Q.85) Solution (c)**

The Intergovernmental Panel on Climate Change (IPCC) is an intergovernmental body of the United Nations.

It was set up in 1988 by the World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP).

It is dedicated to providing the world with objective, scientific information relevant to understanding the scientific basis of the risk of human-induced climate change, its natural, political, and economic impacts and risks, and possible response options.

IPCC assessments provide a scientific basis for governments at all levels to develop climate-related policies, and they underlie negotiations at the UN Climate Conference – the United Nations Framework Convention on Climate Change (UNFCCC).

IPCC reports cover the scientific, technical and socioeconomic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation.

**Q.86) Which of the following statement is correct regarding 'Barbados Program of Action'?**

- a) It a multi-stakeholder partnership that brings together all actors working to prevent marine litter and plastic pollution.
- b) It is a policy document which addresses the economic, environmental, and social developmental vulnerabilities faced by Small Island Developing States.
- c) It is an international effort working towards conservation of rainforest ecosystem.
- d) It is a programme which focuses on consolidating assessments and impact studies of marine ecosystems in West Asia.

**Q.86) Solution (b)**

The United Nations Programme of Action on the Sustainable Development of Small Island Developing States, popularly referred to as the Barbados Program of Action (BPOA), is a policy document that both: comprehensively addresses the economic, environmental, and social developmental vulnerabilities facing islands; and outlines a strategy that seeks to mitigate those vulnerabilities.

The Barbados Programme of Action (BPoA) was established by the United Nations General Assembly in 1994 to reaffirm the principles and commitments to sustainable development with respect to SIDS.

The Conference adopted the Barbados Declaration, a statement of political will underpinning the commitments contained in the BPoA.

It remains the only internationally approved programme specific to Small Island Developing States (SIDS) which has been collectively and unanimously endorsed by SIDS.

**Q.87) Consider the following statements regarding climate forcing:**

1. Climate forcing is the difference between the rate of energy received by absorption of solar radiation and the rate of energy emitted by the top of the Earth's atmosphere.
2. Positive climate forcing cools the Earth while negative climate forcing warms it.



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

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

**Q.87) Solution (a)**

Climate forcing is the physical process of affecting the climate on the Earth through a number of forcing factors. These factors are specifically known as forcings because they drive the climate to change, and it is important to note that these forcings exist outside of the existing climate system.

Examples of some of the most important types of forcings include: variations in solar radiation levels, volcanic eruptions, changing albedo, and changing levels of greenhouse gases in the atmosphere.

Climate forcing is the difference between the rate of energy received by absorption of solar radiation and the rate of energy emitted by the top of the Earth's atmosphere, expressed in watts per square meter.

There are two main types of forcings that exist - positive forcing and negative forcing. Positive forcing warms the Earth, while negative forcing cools it.

Greenhouse gases are a major contribution to the forcing effect - most notably carbon dioxide, methane, and NO<sub>2</sub>.

**Q.88) Consider the following statements:**

1. Geoengineering is a deliberate, large-scale intervention carried out in the Earth's natural systems to reverse the impacts of climate change.
2. Solar geoengineering aims to reduce the albedo of the earth surface in order to mitigate the effect of global warming.
3. Cirrus cloud thinning is a method of geo engineering which aims to reduce the heat trapping capacity of these clouds.

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

- a) 1 and 2 only
- b) 1 and 3 only
- c) 2 and 3 only
- d) 1, 2 and 3

**Q.88) Solution (b)**

Geoengineering is a deliberate, large-scale intervention carried out in the Earth's natural systems to reverse the impacts of climate change. This involves techniques to physically manipulate the global climate to cool the planet.

The main categories of climate engineering are solar geoengineering and carbon dioxide removal.

Solar geoengineering would deflect sunlight away from the Earth, or by increasing the reflectivity (albedo) of the atmosphere or the Earth's surface. These methods are not a substitute for climate change mitigation because they would not reduce greenhouse gas concentrations in the atmosphere, and thus would not address ocean acidification caused by carbon dioxide.

Carbon dioxide removal refers to removing carbon dioxide gas from the atmosphere and sequestering it for long periods of time.

Solar geoengineering methods include:

- Stratospheric aerosol injection, in which small particles would be injected into the upper atmosphere;
- Marine cloud brightening, which would spray fine sea water to whiten clouds and thus increase cloud reflectivity; and
- Cirrus cloud thinning, which would reduce their heat trapping capacity, resulting in a cooling effect on Earth's climate. This could be a potential tool to reduce anthropogenic global warming.

**Q.89) Consider the following statements:**

1. Blue carbon refers to the carbon captured by plant, soil, mangroves and seagrass.
2. The International Blue Carbon Initiative is a coordinated, global program of IUCN which focuses on mitigating climate change.

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

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

**Q.89) Solution (b)**

Blue carbon is the carbon stored in coastal and marine ecosystems. The Blue Carbon Initiative currently focuses on carbon in coastal ecosystems - mangroves, tidal marshes and seagrasses. These ecosystems sequester and store large quantities of blue carbon in both the plants and the sediment below. For example, over 95% of the carbon in seagrass meadows is stored in the soils.

The International Blue Carbon Initiative: Conservation International (CI), International Union for Conservation of Nature (IUCN) and the Intergovernmental Oceanic Commission (IOC) of UNESCO has collaborated with governments and organisations across the world to develop mechanisms for ensuring coastal Blue Carbon ecosystems.

The Blue Carbon Initiative focuses on mangroves, salt marshes and seagrasses, which are found on every continent except Antarctica.

Coastal ecosystems accumulate large amounts of carbon, 5 times more than forests.

Green carbon is the carbon removed through the process of photosynthesis. Carbon removed from the atmosphere is stored in plants and soils.

**Q.90) Consider the following statements regarding LEAF Coalition:**

1. It is a collective of the governments of the USA, United Kingdom and Norway.
2. It is a public-private effort to protect Antarctic region.

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

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

**Q.90) Solution (a)**

The Lowering Emissions by Accelerating Forest finance (LEAF) a collective of the United States, United Kingdom and Norway governments.

It initiative is a step towards concretising the aims and objectives of the Reducing Emissions from Deforestation and Forest Degradation (REDD+) mechanism.

It intends to mobilize at least USD 1 billion in financing to countries committed to protecting their tropical forests.

Tropical forests around the world are under threat. The world lost more than 10 million hectares of primary tropical forest cover last year, an area roughly the size of Switzerland. Ending tropical and subtropical forest loss by 2030 is a crucial part of meeting global climate, biodiversity and sustainable development goals. Protecting tropical forests offers one of the biggest opportunities for climate action in the coming decade.

The LEAF Coalition can help reverse the trend by providing unprecedented financial support to tropical forest governments implementing forest protection, contributing to green and resilient growth through sustainable investments.

The LEAF Coalition empowers tropical and subtropical forest countries to move more rapidly towards ending deforestation, while supporting them in achieving their Nationally Determined Contributions (NDCs) under the Paris Agreement.

**Q.91) With reference to Leuser Ecosystem, consider the following statements:**

1. It is among the most ancient and life-rich ecosystems and a hot spot of biodiversity.
2. It is located in the equatorial regions of Africa.
3. It has been designated as a UNESCO World Heritage Site in Danger.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.91) Solution (c)**

Leuser Ecosystem:

- The Leuser Ecosystem is an area of forest located in the provinces of Aceh and North Sumatra on the island of Sumatra in Indonesia. The ecosystem stretches from the coast of the Indian Ocean to the Malacca Straits.
- Covering more than 2.6 million hectares it is one of the richest expanses of tropical rain forest in Southeast Asia and is the last place on earth where the Sumatran elephant, rhino, tiger and orangutan are found within one area.
- It has one of the world's richest yet least-known forest systems and its vegetation is an important source of Earth's oxygen.
- There are at least 130 species of mammals within the ecosystem which means that one in 32 of the world's mammals are found there, or one quarter of Indonesia's mammals.
- Primates residing within the ecosystem include the white-handed gibbon, the siamang, macaques, the loris and the lutung. Leuser is home to as many as seven species of cats including the clouded leopard, the Asian golden cat, and the spotted linsang.
- The sun bear is quite common within the boundaries of the ecosystem.
- The primary threat to this unique ecosystem is illegal palm oil expansion. As global demand for palm oil rises, oil palm growers seek to multiply the acreage of this valuable crop.
- Consequently, the Leuser Ecosystem has been designated a UNESCO World Heritage Site in Danger.

**Q.92) Which of the following statements is/are correct regarding Asian Wild Buffalo:**

1. It is currently endemic to India only.
2. It is commonly found in wet grasslands, swamps, flood plains and densely vegetated river valleys.
3. This species is included in the species recovery programme for critically endangered species in India.

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

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only

**Q.92) Solution (d)**

Asian Wild Buffalo also known as the wild water buffalo occurs in India, Nepal, Bhutan, Thailand, and Cambodia.

It is associated with wet grasslands, swamps, flood plains and densely vegetated river valleys.

In India, it is largely restricted to in and around Kaziranga, Manas and Dibru-Saikhowa National Parks, Laokhowa Wildlife Sanctuary and Bura Chapori Wildlife Sanctuary and in a few scattered pockets in Assam; and in and around D'Ering Memorial Wildlife Sanctuary in Arunachal Pradesh. A small population survives in Balphakram National Park in Meghalaya, and in Chhattisgarh in Indravati National Park and Udanti Wildlife Sanctuary.

The estimated population of the wild buffaloes in the Northeast is around 3,000-4,000, the largest in the country and accounting for 92% of the world population.

A population reduction by at least 50% over the last three generations seems likely given the severity of the threats, especially hybridization; this population trend is projected to continue into the future. The most important threats are:

- interbreeding with feral and domestic water buffaloes in and around protected areas;
- hunting, especially in Thailand, Cambodia, and Myanmar;
- habitat loss of floodplain areas due to conversion to agriculture and hydropower development;
- degradation of wetlands due to invasive species such as stem twiners and lianas;
- diseases and parasites transmitted by domestic livestock;
- interspecific competition for food and water between wild water buffaloes and livestock.

Conservation:

- It is listed under Schedule 1 of the Wild Life (Protection) Act, 1972.
- It is classified as endangered in the IUCN Red List of Threatened Species.
- It is included in CITES Appendix III, and is legally protected in Bhutan, India, Nepal, and Thailand
- It is included in the species recovery programme for critically endangered species in India.

**Q.93) Consider the following statements regarding Himalayan Trillium:**

1. It is found at the foothills of Himalayas.
2. The herb has been used in traditional medicines.
3. It is listed as critically endangered flora by IUCN.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1 and 3 only

**Q.93) Solution (b)**

Himalayan Trillium:

- It is a common herb of the Himalayas. It is often locally called as Nagchatri.
- It is found in temperate and sub-alpine zones of the Himalayas at an altitude from 2,400-4,000 meters above sea level.
- It is found in India, Afghanistan, Pakistan, China, Nepal, Bhutan.
- In India, it is found in four states only- Himachal Pradesh, Jammu and Kashmir, Sikkim, and Uttarakhand.
- The plant is a small herb and can be identified by its three leaves in one whorl at the summit of the stem and a solitary, purple flower in the centre. Leaves are broadly ovate, acute and conspicuously stalked.
- The herb has been used in traditional medicine to cure diseases like dysentery, wounds, skin boils, inflammation, sepsis, as well as menstrual and sexual disorders.
- Overexploitation and uprooting of this medicinal plant from natural habitat, to meet pharmaceutical industry demands has made the made a global threat to the population of nag chhatri with the small geographical niche.
- It is declared 'endangered' by the International Union for Conservation of Nature (IUCN).

**Q.94) With reference to India's Tiger census, consider the following statements:**

1. It is conducted every five years.
2. It is done using camera traps technology.
3. Last census recorded that India is home to 75% of the global tiger population.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.94) Solution (b)**

India's Tiger Census:

- National Tiger Conservation Authority (NTCA) in collaboration with the State Forest Departments, Conservation NGO's and coordinated by the Wildlife Institute of India (WII), conducts National assessment for the "Status of Tigers" ever four years since 2006.
- The fourth cycle of the assessment was undertaken in 2018 and 2019 using the best available science, technology and analytical tools.
- In this cycle, recording of primary field data digitally, through mobile phone application M-STripES (Monitoring system for tigers - intensive protection and ecological status), that uses GPS to geotag photo-evidences and survey information, made this exercise more accurate.
- Further, it involved the development of innovative technology like automated segregation of camera trap photographs to species using artificial intelligence and neural network models (software CaTRATCamera Trap data Repository and Analysis Tool).
- Program Extract Compare that fingerprints tigers from their stripe patterns was used to count the number of individual tigers.
- It counted 2976 tigers which is 75% of the global tiger population.
- Tigers were observed to be increasing at a rate of per annum in India when consistently 6% sampled areas were compared from 2006 to 2018.
- Feral dogs were detected in most tiger reserves. Dogs are a threat to both ungulates (which they hunt) and to carnivores, since they carry infectious diseases like rabies, parvovirus, and distemper.

**Q.95) What does the 'Pink Pages' of IUCN Red Data Book contains?**

- a) Extinct Species
- b) Species which are extinct in Wild



- c) Critically endangered species
- d) Species that were formerly endangered, but have now recovered

**Q.95) Solution (c)**

The International Union for Conservation of Nature (IUCN) Red list contains the catalog of taxa that are facing the risk of extinction. The Red data book is the record of the list of Animals and plants which are facing the risk of danger. It contains Red, Pink and Green pages.

The Red data book contains three coloured pages, Red, Pink and Green.

- Red is symbolic of the danger that some species of both plants and animals presently experience throughout the globe.
- The Pink pages in the Red data book include the critically endangered species.
- Green pages are used for those species that were formerly endangered, but have now recovered to a point where they are no longer threatened.

Critically endangered (CR) Species:

- There are the species which have extremely high risk of extinction in the wild.
- They suffer from reduction in population (greater than 90% over the last 10 years),
- Population size is reduced to less than 50 mature individuals),
- Quantitative analysis showing the probability of extinction in wild in at least 50% in their 10 years, and it is therefore considered to be facing an extremely high risk of extinction in the wild.

**Q.96) Which of the following statements is/are correct regarding Caracal?**

1. In India it is found in Western Ghats.
2. Asian populations of Caracal come under Appendix I of CITES.
3. It is included in the list of critically endangered species by IUCN.

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.96) Solution (b)**

Caracal:

- The caracal is a medium-sized wild cat native to Africa, the Middle East, Central Asia, and arid areas of Pakistan and north-western India.

- The wildcat has long legs, a short face, long canine teeth, and distinctive ears — long and pointy, with tufts of black hair at their tips. The iconic ears are what give the animal its name — caracal comes from the Turkish karakulak, meaning 'black ears'. In India, it is called siya gosh, a Persian name that translates as 'black Ear'. A Sanskrit fable exists about a small wild cat named deergha-karn or 'long-eared'.
- The earliest evidence of the caracal in the subcontinent comes from a fossil dating back to the civilisation of the Indus Valley c. 3000-2000 BC, according to a reference in 'Historical and current extent of occurrence of the Caracal in India'.
- The caracal has traditionally been valued for its litheness and extraordinary ability to catch birds in flight; it was a favourite coursing or hunting animal in medieval India.
- Firuz Shah Tughlaq (1351-88) had siyah-goshdar khana, stables that housed large numbers of coursing caracal. It finds mention in Abul Fazl's Akbarnama, as a hunting animal in the time of Akbar (1556-1605). Descriptions and illustrations of the caracal can be found in medieval texts such as the Anvar-i-Suhayli, Tutinama, Khamsa-e-Nizami, and Shahnameh.
- The caracal could be earlier found in arid and semi-arid scrub forest and ravines in Rajasthan, Delhi, Haryana, Punjab, Gujarat, Madhya Pradesh, Uttar Pradesh, Maharashtra, Andhra Pradesh, Telangana, Odisha, Jharkhand, and Chhattisgarh. Today, its presence is restricted to Rajasthan, Kutch, and parts of Madhya Pradesh.

**Conservation:**

- The National Board for Wildlife and Union Ministry of Environment, Forest and Climate Change recently included Caracal in the list of critically endangered species.
- African caracal populations are listed under CITES Appendix II, while Asian populations come under CITES Appendix I.
- It is listed as Least Concern in IUCN Red List.
- It is included in Schedule I of Wildlife Protection Act, 1972.

**Q.97) With reference to Management Effectiveness Evaluation (MEE) of Protected Areas, consider the following statements:**

1. Protected Areas in India cover about 5% of the total geographic area of the country.
2. Northern region of India is the best performer according to latest MEE framework survey.
3. The Turtle Wildlife Sanctuary is the worst performer according to latest MEE framework survey.

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

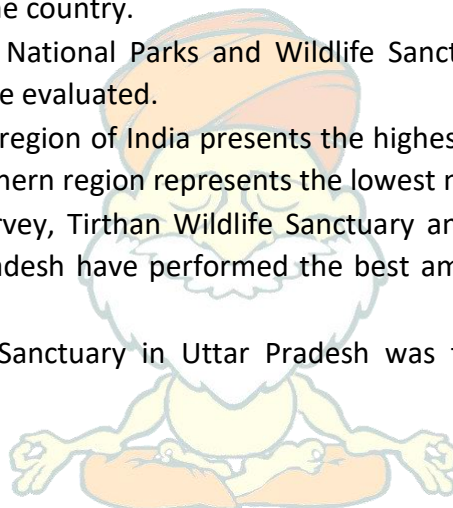
- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only

d) 1, 2 and 3

**Q.97) Solution (c)**

Management Effectiveness Evaluation (MEE) of Protected Areas:

- Ministry of Environment, Forest and Climate Change has released Management Effectiveness Evaluation (MEE) of 146 national parks and wildlife sanctuaries in the country.
- Management Effectiveness Evaluation of Protected Areas has emerged as a key tool that is increasingly being used by governments and international bodies to understand strengths and weaknesses of the protected area management systems.
- India has systematically designated its Protected Areas in four legal categories — National Parks, Wildlife Sanctuaries, Conservation Reserves and Community Reserves under the Wildlife (Protection) Act, 1972.
- India has a network of 903 Protected Areas covering about 5 per cent of its total geographic area of the country.
- For the survey, 146 National Parks and Wildlife Sanctuaries across 29 states and Union territories were evaluated.
- Region wise eastern region of India presents the highest overall mean MEE Score of 66.12% and the Northern region represents the lowest mean MEE Score of 56%.
- According to the survey, Tirthan Wildlife Sanctuary and Great Himalayan National Park in Himachal Pradesh have performed the best among the surveyed protected areas.
- The Turtle Wildlife Sanctuary in Uttar Pradesh was the worst performer in the survey.



**Q.98) Consider the following Tiger Reserves:**

1. Panna
2. Pench
3. Satpura

**Which of the above has been declared as Biosphere Reserve by UNESCO?**

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only

**Q.98) Solution (a)**

Panna Tiger Reserve:

- Panna Tiger Reserve (PTR) in Madhya Pradesh (MP) has been included in the global network of biosphere reserves by the United Nations Educational, Scientific and Cultural Organisation (UNESCO).
- It is the third Biosphere Reserve in Madhya Pradesh to be included in the list after Pachmarhi and Amarkantak.
- The UNESCO's recognition cited PTR as a critical tiger habitat.
- The area has undergone substantial ecosystem restoration in the buffer zone. With only three urban centres and over 300 villages, agriculture is the main source of income together with horticulture, forestry and cultural and eco-tourism.
- PTR was notified as a biosphere reserve by the Union Ministry of Environment, Forest and Climate Change (MoEFCC ) in 2011 and after nine years the UNESCO included it in the Man and Biosphere programme.

**Q.99) With reference to Greater One-Horned Rhino, consider the following statements:**

1. They inhabit the alluvial Terai-Duar savanna and grasslands and riverine forest
2. Kaziranga National Park has the highest population of Greater One-Horned Rhino.
3. Pobitora Wildlife Sanctuary has the highest population density of Greater One-Horned Rhino.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.99) Solution (d)**

Greater One-Horned Rhino:

They are also called Indian rhinoceros.

It is listed as Vulnerable on the IUCN Red List, as populations are fragmented and restricted to less than 20,000 km<sup>2</sup>.

They inhabit the alluvial Terai-Duar savanna and grasslands and riverine forest and Brahmaputra Basin.

As of 2018, the global population is estimated to comprise 3,588 individuals, including 2,939 individuals in India and 649 in Nepal.

Nearly 85% of the global Indian rhinoceros population is concentrated in Assam, where Kaziranga National Park contains 70% of rhino population.

Pobitora Wildlife Sanctuary in Assam has the highest density of Indian rhinos in the world with 84 individuals in an area of 38.80 km<sup>2</sup>.

Serious declines in quality of habitat have occurred in some areas, due to:

- severe invasion by alien plants into grasslands affecting some populations;
- demonstrated reductions in the extent of grasslands and wetland habitats due to woodland encroachment and silting up of beels (swampy wetlands);
- grazing by domestic livestock

**Q.100) Clouded leopard is mainly found in which of the following Countries?**

1. Mongolia
2. Uzbekistan
3. Thailand
4. Myanmar

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 and 3 only
- c) 3 and 4 only
- d) 1 and 4 only

**Q.100) Solution (c)**

The clouded leopard (*Neofelis nebulosa*) is a wild cat inhabiting dense forests from the foothills of the Himalayas through mainland Southeast Asia into South China.

It is listed as Vulnerable on the IUCN Red List.

The population is threatened by large-scale deforestation and commercial poaching for the wildlife trade. Its body parts are offered for decoration and clothing, though it is legally protected in most range countries.

The clouded leopard occurs from the Himalayan foothills in Nepal, Bhutan and India to Myanmar, southeastern Bangladesh, Thailand, Peninsular Malaysia, to south of the Yangtze River in China. It is regionally extinct in Singapore and Taiwan.

In India, it occurs in Sikkim, northern West Bengal, Meghalaya subtropical forests, Tripura, Mizoram, Manipur, Assam, Nagaland and Arunachal Pradesh.

It is different from Snow Leopard which inhabits alpine and subalpine zones at elevations from 3,000 to 4,500 m, ranging from eastern Afghanistan, the Himalayas and the Tibetan Plateau, to southern Siberia, Mongolia and western China.

In India it is found in Jammu and Kashmir, Ladakh, Uttarakhand, Himachal Pradesh, Sikkim and Arunachal Pradesh.

Both Cluded Leopard and Snow leopard are listed as Vulnerable in IUCN Red List and are included in the species recovery programme for critically endangered species in India.

**Q.101) Which of the following protected areas is/are listed in UNESCO's Man and Biosphere Programme?**

1. Gulf of Mannar
2. Simlipal
3. Kachchh

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 1 and 3 only

**Q.101) Solution (b)**

Man and the Biosphere Programme (MAB) is an intergovernmental scientific program, launched in 1971 by UNESCO.

It aims to establish a scientific basis for the improvement of relationships between people and their environments.

MAB combines the natural and social sciences, economics and education to improve human livelihoods and the equitable sharing of benefits, and to safeguard natural and managed ecosystems, thus promoting innovative approaches to economic development that are socially and culturally appropriate, and environmentally sustainable.

The MAB program provides a unique platform for cooperation on research and development, capacity-building and networking to share information, knowledge and experience on three interlinked issues:

- biodiversity loss
- climate change
- sustainable development

Following biosphere reserves of India have been recognized internationally under Man and Biosphere Reserve program:

- Nilgiri
- Gulf of Mannar
- Sunderban

- Nanda Devi
- Nokrek
- Pachmarhi
- Simlipal
- Achanakmar - Amarkantak
- Great Nicobar
- Agasthyamala
- Khangchendzonga
- Panna

**Q.102) With reference to Biosphere Reserve, consider the following statements:**

1. It aims to restore the traditional life of the tribals living in that vicinity.
2. Any human activity is strictly prohibited in the core and buffer zone of the biosphere reserve.
3. Sunderban is the largest biosphere reserve of India.

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

- a) 1 only
- b) 2 and 3 only
- c) 3 only
- d) 1, 2 and 3 only

**Q.102) Solution (a)**

Biosphere reserves are sites established by countries and recognized under UNESCO's Man and the Biosphere (MAB) Programme to promote sustainable development based on local community efforts and sound science.

The programme of Biosphere Reserve was initiated by UNESCO in 1971.

The purpose of the formation of the biosphere reserve is to conserve in situ all forms of life, along with its support system, in its totality, so that it could serve as a referral system for monitoring and evaluating changes in natural ecosystems.

Biosphere reserves promote solutions reconciling the conservation of biodiversity with its sustainable use.

Biosphere reserves have three unified zones:

- The core area: It involves an entirely secured and protected ecosystem that contributes to the preservation of landscapes, ecosystems, species and genetic variation.



- The buffer zone: It encompasses or adjoins the core areas. It is utilized for activities compatible with sound ecological practices that can fortify scientific research, monitoring, training, and education.
- The transition area: It is the part of the reserve where the greatest activity is permitted to promote economic and human development that is sustainable.

Kuchch in Gujarat is the largest biosphere reserve of India. It covers parts of four districts of Gujarat namely Kachchh, Rajkot, Surendranagar and Patan. The reserve is mainly composed of two major land units known as Great Rann of Kachchh (GRK) and Little Rann of Kachchh (LRK). The GRK and the LRK with an area of about 16780 and 5180 km<sup>2</sup>, respectively, constitute the entire Rann of Kachchh.

**Q.103) Consider the following statements:**

1. Restrictions on human interference are greater in Biosphere Reserve than in national parks.
2. Boundaries of Biosphere Reserves are not sacrosanct.

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

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

**Q.103) Solution (d)**

Difference between Biosphere Reserve and National Park:

- A biosphere reserve is ecosystem-oriented, i.e. supports all forms of life in the reserve system. The national park is habitat for particular wild animal species.
- Size of Biosphere reserve ranges up to 5670 sq km. In India, the most common average size of National park is 100 - 500 sq km (in about 40% of cases) and 500 - 1000 sq km (in about 15% of cases). The average size ranges from .04 to 3162 sq km.
- Both in the National park and Biosphere reserve boundaries are fixed by legislation.
- Except for the buffer zone, both national parks and biosphere reserves have no biotic interference.
- Tourism is not permissible in Biosphere reserve whereas Tourism is permissible in National parks.
- Biosphere reserve is scientifically managed and attention provided whereas in National park scientific management is lacking.

**Q.104) Which of the following is/are ex-situ methods of conservation of flora and fauna?**

1. Wildlife Sanctuary
2. Tissue culture propagation
3. Cryopreservation of gametes

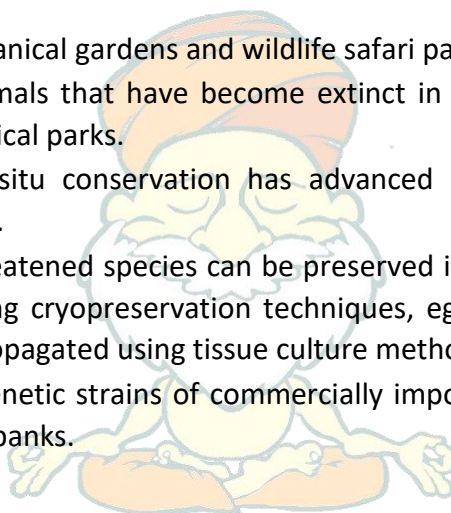
**Choose the correct answer from the codes given below:**

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

**Q.104) Solution (b)**

Ex situ Conservation of flora and fauna:

- In this approach, threatened animals and plants are taken out from their natural habitat and placed in special setting where they can be protected and given special care.
- Zoological parks, botanical gardens and wildlife safari parks serve this purpose.
- There are many animals that have become extinct in the wild but continue to be maintained in zoological parks.
- In recent years ex situ conservation has advanced beyond keeping threatened species in enclosures.
- Now gametes of threatened species can be preserved in viable and fertile condition for long periods using cryopreservation techniques, eggs can be fertilised in vitro, and plants can be propagated using tissue culture methods.
- Seeds of different genetic strains of commercially important plants can be kept for long periods in seed banks.



**Q.105) Which of the following species is/are endemic to Western Ghats?**

1. Red Panda
2. Nilgiri tahr
3. Lion-tailed macaque

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only

**Q.105) Solution (d)**

The Western Ghats include a diversity of ecosystems ranging from tropical wet evergreen forests to montane grasslands containing numerous medicinal plants and important genetic resources such as the wild relatives of grains, fruit and spices.

They also include the unique shola ecosystem which consists of montane grasslands interspersed with evergreen forest patches.

Though covering an area of 180,000km<sup>2</sup>, or just under 6 per cent of the land area of India, the Western Ghats contain more than 30 per cent of all plant, fish, herpeto-fauna, bird, and mammal species found in India.

Many species are endemic, such as the Nilgiri tahr (*Hemitragus hylocrius*), the lion-tailed macaque (*Macaca silenus*) and the Grey Horn Bill (*Ocyrces griseus*).

In fact, 50 per cent of India's amphibians and 67 per cent of fish species are endemic to this region.

30 per cent of the world's Asian elephant (*Elephas maximus*) population and 17 per cent of the world's existing tigers (*Panthera tigris*) are found in Western Ghats.

In India Red Panda is found in Sikkim, western Arunachal Pradesh, Darjeeling district of West Bengal and parts of Meghalaya. It is also the state animal of Sikkim.

**Q.106) Consider the following statements:**

1. For any area to be declared as biodiversity hotspot must have at least 1,500 vascular plants as endemics.
2. In India, Eastern Ghats and Western Ghats are biodiversity hotspots.

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

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

**Q.106) Solution (a)**

A biodiversity hotspot is a biogeographic region with significant levels of biodiversity that is threatened by human habitation.

To qualify as a biodiversity hotspot, a region must meet two strict criteria:

- It must have at least 1,500 vascular plants as endemics — which is to say, it must have a high percentage of plant life found nowhere else on the planet. A hotspot, in other words, is irreplaceable.

- It must have 30% or less of its original natural vegetation. In other words, it must be threatened.

Around the world, 36 areas qualify as hotspots. Their intact habitats represent just 2.5% of Earth's land surface, but they support more than half of the world's plant species as endemics — i.e., species found no place else — and nearly 43% of bird, mammal, reptile and amphibian species as endemics.

There are four biodiversity hotspots in India:

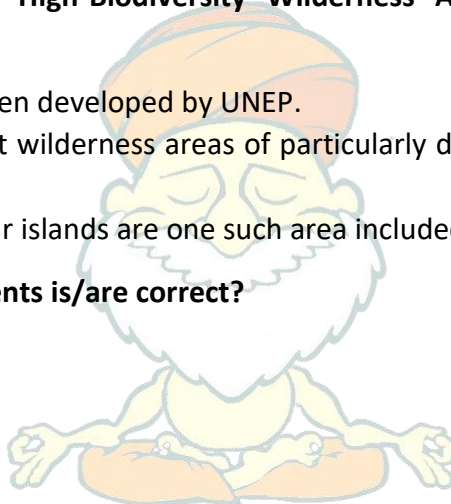
1. The Himalayas
2. Indo-Burma Region
3. The Western Ghats
4. Sundaland

**Q.107) With reference to High-Biodiversity Wilderness Area (HBWA), consider the following statements:**

1. This approach has been developed by UNEP.
2. It consists of five vast wilderness areas of particularly dense and important levels of biodiversity.
3. Andaman and Nicobar islands are one such area included in the list of HBWA.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1 and 3 only



**Q.107) Solution (b)**

The High Biodiversity Wilderness Areas (HBWA) approach has been developed by Conservation International (CI). HBWAs consist of 5 of the 24 major wilderness areas that hold globally significant levels of biodiversity.

The aim of this initiative is to identify regions in which at least 70 percent of their original vegetation has remained intact in order to ensure that this is safeguarded and these regions do not become biodiversity hotspots. Currently the areas listed as HBWAs are:

- Amazon Basin, Brazil
- Congo Basin, The Democratic Republic of Congo
- New Guinea, Indonesia and Papua New Guinea
- North American Deserts, Southwest United States and Mexico
- Miombo-Mopane Woodlands and Savannas, Zambia

**Q.108) Which of the following protected areas is/are constituted under the provisions of Wildlife (Protection) Act, 1972?**

1. Biosphere Reserves
2. Elephant Reserves
3. Community Reserves

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1 and 3 only

**Q.108) Solution (c)**

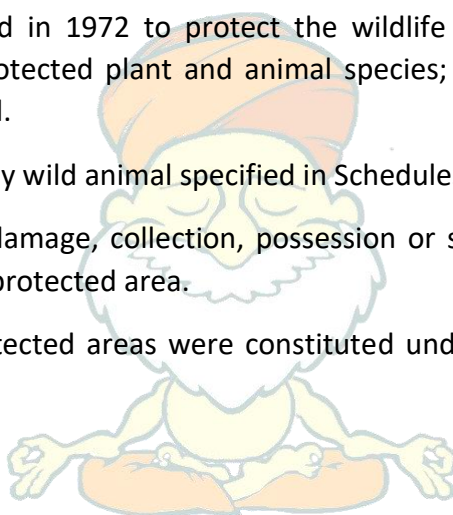
The Wildlife Act was passed in 1972 to protect the wildlife and their habitats. The Act established schedules of protected plant and animal species; hunting or harvesting these species was largely outlawed.

It prohibits the hunting of any wild animal specified in Schedules I, II, III and IV of the act.

It prohibits the uprooting, damage, collection, possession or selling of any specified plant from any forest land or any protected area.

Following categories of protected areas were constituted under the provisions of Wildlife Protection Act, 1972:

- National Parks
- Wildlife Sanctuaries
- Conservation Reserves
- Community Reserves



**Q.109) Consider the following statements:**

1. National parks in India are IUCN category II protected areas.
2. Wildlife sanctuaries of India are classified as IUCN Category IV protected areas.
3. Biosphere reserves in India are IUCN category V protected areas.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.109) Solution (d)**

IUCN protected area categories are categories used to classify protected areas in a system developed by the International Union for Conservation of Nature (IUCN).

The enlisting of such areas is part of a strategy being used toward the conservation of the world's natural environment and biodiversity.

The IUCN has developed the protected area management categories system to define, record and classify the wide variety of specific aims and concerns when categorising protected areas and their objectives.

**1. Category II – national park:**

- As per IUCN A national park (IUCN Category II) is similar to a wilderness area in its size and its main objective of protecting functioning ecosystems.
- However, national parks tend to be more lenient with human visitation and its supporting infrastructure.
- National parks are managed in a way that may contribute to local economies through promoting educational and recreational tourism on a scale that will not reduce the effectiveness of conservation efforts.
- National parks in India are IUCN category II protected areas.

**2. Category IV – habitat or species management area:**

- A habitat or species management area (IUCN Category IV) is similar to a natural monument or feature, but focuses on more specific areas of conservation (though size is not necessarily a distinguishing feature), like an identifiable species or habitat that requires continuous protection rather than that of a natural feature.
- These protected areas will be sufficiently controlled to ensure the maintenance, conservation, and restoration of particular species and habitats—possibly through traditional means—and public education of such areas is widely encouraged as part of the management objectives.
- Wildlife sanctuaries of India are classified as IUCN Category IV protected areas.

**3. Category V – protected landscape or seascape:**

- A protected landscape or protected seascape (IUCN Category V) covers an entire body of land or ocean with an explicit natural conservation plan, but usually also accommodates a range of for-profit activities.
- The main objective is to safeguard regions that have built up a distinct and valuable ecological, biological, cultural, or scenic character.
- In contrast with previous categories, Category V permits surrounding communities to interact more with the area, contributing to the area's sustainable management and engaging with its natural and cultural heritage.
- Biosphere Reserves in India are classified as IUCN Category V protected areas.

**Q.110) Which of the following countries are members of South Asia Wildlife Enforcement Network (SAWEN)?**

1. Afghanistan
2. India
3. Maldives
4. Myanmar

**Choose the correct answer from the codes given below:**

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

**Q.110) Solution (a)**

South Asia Wildlife Enforcement Network (SAWEN) is a regional inter-governmental wildlife law enforcement support body of South Asian countries namely - Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

It aims to strengthen, promote and co-ordinate regional co-operation for curbing illegal wildlife trade that threatens the wild flora and fauna of South Asia.

SAWEN was officially launched in January, 2011 in Paro Bhutan.

It promotes regional cooperation to combat wildlife crime in South Asia.

It focuses on policy harmonization; institutional capacity strengthening through knowledge and intelligence sharing; and collaboration with regional and international partners to enhance wildlife law enforcement in the member countries.

SAWEN operates its activities from the Secretariat based in Kathmandu, Nepal.

Objectives of SAWEN are:

- To take initiatives for bringing harmonization and standardization in laws and policies of member countries concerning conservation of wild fauna and flora;
- To document the trend of poaching and illegal wildlife trade, and related threats to the natural biodiversity within and across countries in the region;
- To strengthen institutional responses to combat wildlife crime by promoting partnership with relevant institutions for research and information sharing, training and capacity building, and technical support; and



- To encourage member countries to prepare and implement their National Action Plans to combat wildlife crime and to collaborate towards effective implementation of such plans.

**Q.111) Concerning Gharial, a species of crocodilian, consider the following statements:**

1. Gharial is a salt water species of Crocodile.
2. It is listed as critically endangered in the IUCN Red List.
3. National Chambal Sanctuary is dedicated to the conservation of Gharial.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.111) Solution (b)**

The gharial (*Gavialis gangeticus*), is a crocodilian in the family Gavialidae and among the longest of all living crocodilians.

It is found naturally in the fresh water habitat. Its primary habitat is Chambal River a tributary of Yamuna River. It is also found in Ghagra, Gandak, Ramganga and Son River.

The wild gharial population has declined drastically since the 1930s, and is limited to only 2% of its historical range today.

Conservation programmes initiated in India focused on reintroducing captive-bred gharials since the early 1980s.

Loss of habitat because of sand mining and conversion to agriculture, depletion of fish resources and detrimental fishing methods continue to threaten the population. It has been listed as critically endangered on the IUCN Red List.

National Chambal Sanctuary is a tri-state protected area in northern India for the protection of the Critically Endangered gharial. It is located on the Chambal River near the tri-point of Rajasthan, Madhya Pradesh and Uttar Pradesh.

**Q.112) Consider the following statements:**

1. Species diversity is essential for a healthy breeding of population of species.
2. Genetic diversity relates to the number of species in a defined area.
3. Areas rich in species diversity are called hotspots of diversity

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 3 only
- d) 1, 2 and 3

**Q.112) Solution (c)**

Biodiversity elates to the variability among living organisms on the earth, including the variability within and between the species and that within and between the ecosystems.

Biodiversity is our living wealth. It is a result of hundreds of millions of years of evolutionary history.

There are three levels of Biodiversity:

- Genetic diversity
- Species diversity
- Ecosystem diversity

**Genetic Diversity**

- Genes are the basic building blocks of various life forms.
- Genetic biodiversity refers to the variation of genes within species. Groups of individual organisms having certain similarities in their physical characteristics are called species.
- Human beings genetically belong to the homo sapiens group and also differ in their characteristics such as height, colour, physical appearance, etc., considerably.
- This is due to genetic diversity. This genetic diversity is essential for a healthy breeding of population of species.

**Species Diversity**

- This refers to the variety of species.
- It relates to the number of species in a defined area.
- The diversity of species can be measured through its richness, abundance and types.
- Some areas are richer in species than others. Areas rich in species diversity are called hotspots of diversity.

**Q.113) Which of the following is/are the ecological role of Biodiversity?**

1. Maintenance of water cycle
2. Climate regulation
3. Maintenance of homeostasis of ecosystem

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.113) Solution (d)**

Biodiversity has contributed in many ways to the development of human culture and, in turn, human communities have played a major role in shaping the diversity of nature at the genetic, species and ecological levels.

Ecological Role of Biodiversity:

- Species of many kinds perform some function or the other in an ecosystem. Nothing in an ecosystem evolves and sustains without any reason. That means, every organism, besides extracting its needs, also contributes something of useful to other organisms.
- Species capture and store energy, produce and decompose organic materials, help to cycle water and nutrients throughout the ecosystem, fix atmospheric gases and help regulate the climate.
- These functions are important for ecosystem function and human survival.
- The more diverse an ecosystem, better are the chances for the species to survive through adversities and attacks, and consequently, is more productive. Hence, the loss of species would decrease the ability of the system to maintain itself. Just like a species with a high genetic diversity, an ecosystem with high biodiversity may have a greater chance of adapting to environmental change. In other words, the more the variety of species in an ecosystem, the more stable the ecosystem is likely to be. Thus, homeostasis of ecosystem is maintained.

**Q.114) Concerning 'foundation species', consider the following statements:**

1. The foundation species are species that have a strong role in structuring a community.
2. A foundation species occupy bottom most trophic level in a food web.
3. Corals are examples of foundation species.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1 and 3 only

**Q.114) Solution (d)**

Foundation Species:

- The foundation species are species that have a strong role in structuring a community.
- A foundation species can occupy any trophic level in a food web (i.e., they can be primary producers, herbivores or predators).
- The term was coined by Paul K. Dayton in 1972 who applied it to certain members of marine invertebrate and algae communities.
- Foundation species play a major role in creating or maintaining a habitat that supports other species.
- Corals are one of the examples of foundation species. Corals produce reef structures in marine ecosystems that provide a huge range of species with habitats, protection against predation and breeding grounds. Without Corals, these type of marine ecosystems would not be sustainable.

**Q.115) In the context of biodiversity of an area, consider the following statements:**

1. Alpha diversity is a comparison of diversity between ecosystems, usually measured as the change in the amount of species between the ecosystems.
2. Gamma diversity is a measure of the overall diversity for the different ecosystems within a region.
3. Beta diversity refers to the diversity within a particular area or ecosystem and is usually expressed by species richness in that ecosystem.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1 and 3 only

**Q.115) Solution (b)**

Diversity of species (sometimes communities) in a landscape is generally observed in three different scales:

- 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.
- Beta diversity is a comparison of diversity between ecosystems, usually measured as the change in the amount of species between the ecosystems.
- Gamma diversity is a measure of the overall diversity for the different ecosystems within a region.

Example: Alpha, beta and gamma diversity across a mountain landscape:

If we consider mountain slope as a landscape, on the slope there will be many different patches of forests and grasslands.

Alpha diversity is the species diversity present within each forest or grassland patch of the slope. Beta diversity is represented by the species diversity between any two patches and their communities. Gamma diversity of the landscape is the species diversity along the entire range of the mountain slope.

**Q.116) Consider the following statements regarding Eco-Sensitive Zones in India:**

1. Eco-Sensitive Zones means the fragile area that exists within 10 kilometres of protected areas.
2. The Eco-Sensitive Zone around protected areas is declared by the respective state governments.

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

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

**Q.116) Solution (a)**

Eco-Sensitive Zone (ESZ) means the fragile area that exists within 10 kilometres of protected areas like National Parks and Wildlife Sanctuaries. The purpose of marking an Eco-Sensitive Zone is to create a kind of shock-absorber around the protected areas.

The Eco-Sensitive Zone around protected areas is declared by the Ministry of Environment Forests and Climate Change (MoEFCC), Government of India.

Commercial mining, stone quarrying, crushing units, setting up industries that cause pollution, establishment of hydro-electric projects, commercial use of firewood, solid waste disposal or wastewater disposal and many other activities are prohibited or banned around ESZ.

**Q.117) With reference to Biological Diversity Act, 2002, consider the following statements:**

1. The Act was enacted to meet the obligations under the Cartagena protocol on biosafety.
2. The act prohibits any person or organisation obtaining any biological resource occurring in India for its research or commercial utilisation without the prior approval from the National Biodiversity Authority.

3. The act stipulates all offences under it as cognizable and non-bailable.

**Which of the above statements are correct?**

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.117) Solution (b)**

The Biological Diversity Act, 2002 is enacted by the Parliament of India for the preservation of biological diversity in India, and provides mechanism for equitable sharing of benefits arising out of the use of traditional biological resources and knowledge.

The Act was enacted to meet the obligations under the Convention on Biological Diversity (CBD), because India is a party of the convention.

The Act prohibits the following activities without the prior approval from the National Biodiversity Authority:

- Any person or organisation (either based in India or not) obtaining any biological resource occurring in India for its research or commercial utilisation.
- The transfer of the results of any research relating to any biological resources occurring in, or obtained from, India.
- The claim of any intellectual property rights on any invention based on the research made on the biological resources obtained from India.

The National Biodiversity Authority (NBA) is a statutory autonomous body under the Ministry of Environment and Forests established in 2003 to implement the provisions under the Act.

Penalties: If a person, violates the regulatory provisions he/she will be "punishable with imprisonment for a term which may extend to five years, or with fine which may extend to ten lakh rupees and where the damage caused exceeds ten lakh rupees, fine may commensurate {be in proportion} with the damage caused, or with both. Any offence under this Act is non-bailable and is cognizable.

**Q.118) With reference to Biodiversity Heritage Sites, consider the following statements:**

1. These sites are notified by the State Governments in consultation with local bodies.
2. Environment Protection Act, 2002 provides for declaration of areas of biodiversity importance as Biodiversity Heritage Sites.

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

- a) 1 only

- b) 2 only
- c) Both 1 and 2
- d) Neither 1 nor 2

**Q.118) Solution (a)**

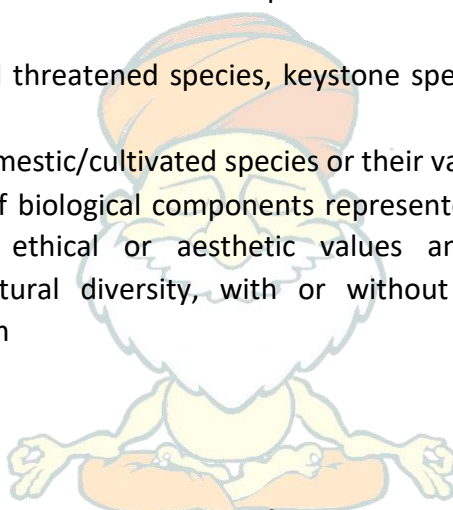
Biodiversity Heritage Sites are notified areas of biodiversity importance.

The Indian State Government can notify the Biodiversity Heritage Sites in consultation with local governing bodies under Section 37 of Biological Diversity Act of 2002.

These areas are considered unique and fragile ecosystems. They can be either terrestrial, coastal and inland waters or marine ecosystems.

Biodiversity Heritage Sites (BHS) are unique ecosystems having rich biodiversity comprising of any one or more of the following components:

- Richness of wild as well as domesticated species or intra-specific categories,
- High endemism,
- Presence of rare and threatened species, keystone species, species of evolutionary significance,
- Wild ancestors of domestic/cultivated species or their varieties,
- Past pre-eminence of biological components represented by fossil beds and having significant cultural, ethical or aesthetic values and are important for the maintenance of cultural diversity, with or without a long history of human association with them



**Q.119) Consider the following statements regarding International Union for the Protection of New Varieties of Plants (UPOV):**

1. It grants intellectual property right to breeders of new plant varieties.
2. Only the breeder of a new plant variety can obtain protection of that new plant variety.
3. India is a member of UPOV.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1 and 3 only

**Q.119) Solution (a)**



The International Union for the Protection of New Varieties of Plants (UPOV) is an intergovernmental organization based in Geneva, Switzerland. UPOV was established in 1961 by the International Convention for the Protection of New Varieties of Plants (the "UPOV Convention").

The mission of UPOV is to provide and promote an effective system of plant variety protection, with the aim of encouraging the development of new varieties of plants, for the benefit of society.

The UPOV Convention provides the basis for members to encourage plant breeding by granting breeders of new plant varieties an intellectual property right: the breeder's right.

Only the breeder of a new plant variety can protect that new plant variety. It is not permitted for someone other than the breeder to obtain protection of a variety.

There are no restrictions on who can be considered to be a breeder under the UPOV system: a breeder might be an individual, a farmer, a researcher, a public institute, a private company etc.

India is not a member of UPOV.

**Q.120) Consider the following statements:**

1. Species diversity increases as we move away from the equator towards the poles.
2. A forest in Equador has up to 10 times as many species of vascular plants as a forest of equal area in the Midwest of the USA.

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

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

**Q.120) Solution (b)**

Patterns of Biodiversity:

- The diversity of plants and animals is not uniform throughout the world but shows a rather uneven distribution. For many group of animals or plants, there are interesting patterns in diversity, the most well- known being the latitudinal gradient in diversity.
- In general, species diversity decreases as we move away from the equator towards the poles.
- With very few exceptions, tropics (latitudinal range of 23.5° N to 23.5° S) harbour more species than temperate or polar areas.

- Colombia located near the equator has nearly 1,400 species of birds while New York at 41° N has 105 species and Greenland at 71° N only 56 species.
- India, with much of its land area in the tropical latitudes, has more than 1,200 species of birds.
- A forest in a tropical region like Equador has up to 10 times as many species of vascular plants as a forest of equal area in a temperate region like the Midwest of the USA.
- The largely tropical Amazonian rain forest in South America has the greatest biodiversity on earth- it is home to more than 40,000 species of plants, 3,000 of fishes, 1,300 of birds, 427 of mammals, 427 of amphibians, 378 of reptiles and of more than 1,25,000 invertebrates.

Greater biodiversity in tropics is attributed to following factors:

- Speciation is generally a function of time, unlike temperate regions subjected to frequent glaciations in the past, tropical latitudes have remained relatively undisturbed for millions of years and thus, had a long evolutionary time for species diversification.
- Tropical environments, unlike temperate ones, are less seasonal, relatively more constant and predictable. Such constant environments promote niche specialisation and lead to a greater species diversity.
- There is more solar energy available in the tropics, which contributes to higher productivity; this in turn might contribute indirectly to greater diversity.

**Q.121) Consider the following statements:**

1. Nomadic herding is practised in the thickly forested areas of Amazon basin, tropical Africa and parts of south-east Asia.
2. Nomadic herding arises in response to climatic constraints and terrain.

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

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

**Q.121) Solution (b)**

Nomadic herding is an ecological or near ecological system of agri-culture. It is carried on mainly to produce food for the family and to fulfill the needs of clothing, shelter and recreation. It is the simplest form of pastoralism.

The nomadic herders are dependent on sheep, cattle, goats, camels, horses and reindeers for their livelihood. Herds composition varies from one region to another, but throughout the dry belt sheep and goats are the most common animals and cattle are the least common as they do not like hot and arid climates.

Nomadic herding is practised in the semi-arid and arid regions of Sahara, Central Asia and some parts of India, like Rajasthan and Jammu and Kashmir.

In this type of farming, herdsmen move from place to place with their animals for fodder and water, along defined routes.

This type of movement arises in response to climatic constraints and terrain. Sheep, camel, yak and goats are most commonly reared.

They provide milk, meat, wool, hides and other products to the herders and their families.

In the forested areas of Amazon basin, tropical Africa and parts of south-east Asia shifting cultivation is practiced.

**Q.122) With reference to different kind of sustainable agricultural practices, consider the following statements:**

1. In a mixed farming system generally, a leguminous crop is grown along with the main crop.
2. In polyvarietal cultivation several genetic varieties of the same crop are planted at the same time.

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

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

**Q.122) Solution (b)**

Mixed farming is a system of farming which involves the growing of crops as well as the raising of livestock.

For example, a mixed farm may grow cereal crops such as wheat or rye and also keep cattle, sheep, pigs or poultry. Often the dung from the cattle serves to fertilize the cereal crops.

It is different from mixed cropping which involves growing of crops as well as the raising of livestock.

In mixed cropping system of agriculture generally, a leguminous crop is grown along with the main crop. Legumes help to increase soil fertility by fixing atmospheric nitrogen.

Polyvarietal cultivation is a type of mixed cropping which involves planting of a plot of land with several varieties of the same crop. It increases the total productivity of a crop per unit area and acts as an insurance against failure of crops in abnormal year.

**Q.123) What are the factors that should be taken into account while planning crop rotation?**

1. Crops requiring more manure should be sown after one that requires less manure.
2. Non-Leguminous crop should be grown after leguminous crop.
3. Crops require less water should be grown after one that requires more water.

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1 and 3 only

**Q.123) Solution (c)**

Crop rotation:

- It is practice of growing different crops in regular succession in the same field.
- This practice controls insects and diseases, increases soil fertility and decreases soil erosion.
- Generally soil cannot sustain continuous cropping with high yielding single crop because certain nutrients required by the crop get exhausted totally while others remain unutilized leading to serious nutrients imbalance in soil and encouraging certain diseases and pests.
- Sowing a leguminous crops (eg. green gram) as a rotational crop is very useful because legumes enhance nitrogen level in the soil due to their ability to fix atmospheric nitrogen, reduces the need for chemical nitrogen fertilizer.
- Thereby cutting the cost and saving the soil from the harmful effects of using high yielding varieties alongwith the application of large amount of fertilizer, pesticides and water.
- It is possible to grow two or sometimes three different crops in succession on the same land within a year which is known as multiple cropping.
- This practice can go on for sometime but the land cannot maintain high yield in the long run.
- Crop rotation takes into account the following factors:
  - Leguminous crop should be grown after non-leguminous crop.
  - Crops require less water (irrigation) should be grown after one – that requires more water.

- Crops requiring less manure should be sown after one that requires more manure

**Q.124) Which of the following is/are the correct sequence of crop rotation?**

1. Green gram - Moong - Wheat
2. Ground nut - Wheat - Moong
3. Paddy - Wheat - Moong

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only

**Q.124) Solution (d)**

In the method of crop rotation crops grown in the field is changed each season or each year. farmers also change from crops to fallow. Example: Maize will be planted in the first year and beans in the second year. This Crop rotation system is a key principle of agriculture conservation as it improves the soil structure and fertility. It also helps to control weeds, pests, and diseases.

Important crop patterns of crop rotation are:

1. Green gram - Wheat - Moong
2. Ground nut - Wheat - Moong
3. Arhar - Sugarcane - Wheat - Moong
4. Paddy - Wheat - Moong

**Q.125) With reference to plant nutrients, consider the following statements:**

1. Nitrogen imparts dark green colour to plants.
2. Phosphorus is important in stimulating root growth of plant.
3. Potassium is important for water regulation and uptake.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.125) Solution (d)**

Nitrogen (N):

- Nitrogen is considered to be the most important nutrient, and plants absorb more nitrogen than any other element.
- Nitrogen is essential to in making sure plants are healthy as they develop and nutritious to eat after they're harvested. That's because nitrogen is essential in the formation of protein, and protein makes up much of the tissues of most living things.
- Nitrogen also imparts vigorous vegetative growth and dark green colour to plants.

Phosphorous (P):

- Phosphorus, is linked to a plant's ability to use and store energy, including the process of photosynthesis.
- It's also needed to help plants grow and develop normally. Phosphorus in commercial fertilizers comes from phosphate rock.
- It forms an integral part of nucleic acids, the carriers of genetic information, and is important in stimulating root growth.

Potassium (K):

- Potassium helps strengthen plants' abilities to resist disease and plays an important role in increasing crop yields and overall quality.
- Potassium also protects the plant when the weather is cold or dry, strengthening its root system and preventing wilt.
- Potassium is involved in processes which ensure carbon assimilation and the transportation throughout the plant for growth and the storage of sugars and proteins. The potassium ion is also important for water regulation and uptake.

**Q.126) With reference to the modern agricultural practices, consider the following statements:**

1. Hydroponics is growing plants in mist environment without the use of soil medium.
2. Aeroponics is growing plants using mineral nutrient solutions, in water, without soil.
3. Aquaponics is a polyculture system of growing crops and raising fish at the same time.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 3 only
- d) 1, 2 and 3

**Q.126) Solution (c)**

Hydroponics:

- Hydroponics is a type of horticulture which involves growing plants (usually crops) without soil, by using mineral nutrient solutions in an aqueous solvent.
- The nutrients used in hydroponic systems can come from many different sources, including fish excrement, duck manure, purchased chemical fertilizers, or artificial nutrient solutions.
- Plants commonly grown hydroponically include tomatoes, peppers, cucumbers, strawberries, lettuces and cannabis.

Aeroponics:

- Aeroponics is the process of growing plants in an air or mist environment without the use of soil or an aggregate medium.
- Unlike hydroponics, which uses a liquid nutrient solution as a growing medium and essential minerals to sustain plant growth, aeroponics is conducted without a growing medium.

Aquaponics:

- Aquaponics is a food production system that couples aquaculture (raising aquatic animals such as fish, crayfish, snails or prawns in tanks) with hydroponics (cultivating plants in water) whereby the nutrient rich aquaculture water is fed to hydroponic grown plant, involving nitrifying bacteria for converting ammonia into nitrates.

**Q.127) Which of the following commodity boards operate under the Ministry of Agriculture?**

1. Tobacco Board
2. Coconut Development Board
3. Spices Board

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1, 2 and 3

**Q.127) Solution (b)**

Coconut Development Board (CDB) is a statutory body established under the Ministry of Agriculture and Farmers Welfare, Government of India for the integrated development of



coconut cultivation and industry in the country with focus on productivity increase and product diversification.

Focus areas of coconut development board are:

- Increasing the production of quality planting material.
- Creating future production potential by bringing more area under coconut.
- Improving productivity of existing coconut holdings.
- Integrated management of major pests and diseases.
- Strengthening coconut industry by promoting product diversification and by-product utilization.

There are five statutory Commodity Boards under the Department of Commerce. These Boards are responsible for production, development and export of tea, coffee, rubber, spices and tobacco.

Tobacco Board:

- The Tobacco Board was constituted as a statutory body on 1st January, 1976 under Tobacco Board Act, 1975.
- The primary function of the Board is export promotion of all varieties of tobacco and its allied products, its functions extend to production, distribution (for domestic consumption and exports) and export promotion of Flue Cured Virginia (FCV) tobacco.

Spices Board:

- The Spices Board was constituted as a statutory body on 26th February, 1987 under Spices Board Act, 1986.
- It is responsible for the development of cardamom industry and export promotion of the 52 spices listed in the Schedule of the Spices Board Act, 1986.
- The primary functions of the Board include production development of small and large cardamom, development and promotion of export of spices.

**Q.128) Consider the following statements regarding National Agricultural Cooperative Marketing Federation of India Ltd:**

1. It is one of the largest procurement as well as marketing agencies for agricultural products in India.
2. It is registered under the Societies Registration Act, 1860.
3. Agricultural farmers are the main members of the general body of this organisation.

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

- a) 1 and 2 only

- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.128) Solution (c)**

National Agricultural Cooperative Marketing Federation of India Ltd (NAFED):

- It is an apex organization of marketing cooperatives for agricultural produce in India.
- It was founded on 2 October 1958 to promote the trade of agricultural produce and forest resources across the nation.
- It is registered under the Multi-State Co-operative Societies Act.
- NAFED is now one of the largest procurement as well as marketing agencies for agricultural products in India.
- Agricultural farmers are the members of the General Body of NAFED, who participate in the decision making process of NAFED.

Objectives of NAFED:

- To facilitate, coordinate and promote the marketing and trading activities of the cooperative institutions, partners and associates in agricultural, other commodities, articles and goods.
- To undertake purchase, sale and supply of agricultural, marketing and processing requisites, such as manure, seeds, fertilizer, agricultural implements and machinery.
- To act as warehouseman under the Warehousing Act and own and construct its own godowns and cold storages.
- To act as agent of any Government agency or cooperative institution, for the purchase, sale, storage and distribution of agricultural, horticultural, forest and animal husbandry produce, wool, agricultural requisites and other consumer goods.
- To act as insurance agent and to undertake all such work which is incidental to the same;
- To organize consultancy work in various fields for the benefit of the cooperative institutions in general and for its members in particular.
- To set up storage units for storing various commodities and goods, by itself or in collaboration with any other agency in India or abroad.
- To maintain transport units of its own or in collaboration with any other organization in India or abroad for movements of goods on land, sea, air and operate freight station, container depot and undertake other incidental activities.

**Q.129) Sprinkler system of irrigation is seen as an important method of sustainable agriculture. In this context what is/are the benefits of sprinkler system of irrigation?**

1. Uniform water application
2. Application of chemicals to plants through fertigation
3. Cost effective operation

**Choose the correct answer from the codes given below:**

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only

**Q.129) Solution (b)**

Sprinkler irrigation is a method of applying water in a manner similar to rain. It is suited for most row, field and tree crops. Water can be sprayed over or under the crop canopy.

Following are the advantages of sprinkler irrigation system:

Water requirement in sprinkler irrigation is much less as compared to any other conventional method of irrigation. This is because of irrigation of a smaller portion of land, decreased evaporation from the soil surface and reduction or elimination of run-offs.

It ensures uniform water application. Therefore, all plants in a field receive equal amount of water. Higher uniformity results in efficient irrigation, thereby, causing less wastage of water, power and fertilisers.

It requires less electricity as compared to other systems.

It can apply chemicals to plants through fertigation unit. 'Fertigation' is the application of fertilisers used for making soil amendments in order to improve plant growth.

One of the major advantages of sprinkler system is that it reduces labour costs. Labour requirement is reduced as it is an automated system and does not require labourers to irrigate an area.

Disadvantages of sprinkler irrigation method are:

- High operating cost.
- Water will drift when there is a lot of wind.
- A stable water supply is needed.
- Saline water may cause problem.
- Water must be free from sand, debris and large amount of salt

**Q.130) With reference to the traditional methods of irrigation in India, which of the following pairs is/are correctly matched?**

S. No.	Name of irrigation method	Region
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1.	Zing	Ladakh
2.	Ahar Pynes	Bihar
3.	Phad	Assam

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.130) Solution (a)**

**Zings:**

- Zings, found in Ladakh, are small tanks that collect melting glacier water.
- A network of guiding channels brings water from the glacier to the tank.
- A trickle in the morning, the melting waters of the glacier turn into a flowing stream by the afternoon.
- The water, collected by evening, is used in the fields on the following day.
- A water official called a Chirpun is responsible for the equitable distribution of water in this dry region that relies on melting glacial water to meet its farming needs.

**Ahar Pynes:**

- Ahar Pynes are traditional floodwater harvesting systems indigenous to South Bihar.
- Ahars are reservoirs with embankments on three sides that are built at the end of diversion channels like pynes.
- Pynes are artificial rivulets led off from rivers to collect water in the ahars for irrigation in the dry months.
- Paddy cultivation in this relatively low rainfall area depends mostly on ahar pynes.

**Phad:**

- Phad, a community-managed irrigation system, probably came into existence a few centuries ago.
- The system starts with a bhandhara (check dam) built across a river, from which kalvas (canals) branch out to carry water into the fields in the phad (agricultural block).
- Sandams (escapes outlets) ensure that the excess water is removed from the canals by charis (distributaries) and sarangs (field channels).
- The Phad system is operated on three rivers in the Tapi basin – Panjhra, Mosam and Aram – in the Dhule and Nasik districts of Maharashtra.

**Q.131) With reference to the LiDAR technology, consider the following statements:**

1. It uses radio waves to measure distances to a target.
2. This system is useful to generate precise, three-dimensional information about the shape of the Earth.
3. Airplanes and helicopters are the most commonly used platforms for acquiring LiDAR data.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.131) Solution (b)**

LiDAR stands for Light Detection and Ranging. It is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth.

These light pulses—combined with other data recorded by the airborne system — generate precise, three-dimensional information about the shape of the Earth and its surface characteristics.

A LiDAR instrument principally consists of a laser, a scanner, and a specialized GPS receiver.

Airplanes and helicopters are the most commonly used platforms for acquiring LiDAR data over broad areas.

Two types of LiDAR are topographic and bathymetric:

- Topographic LiDAR typically uses a near-infrared laser to map the land.
- Bathymetric LiDAR uses water-penetrating green light to also measure seafloor and riverbed elevations.

LiDAR systems allow scientists and mapping professionals to examine both natural and manmade environments with accuracy, precision, and flexibility.

**Q.132) With reference to Natural Capital Accounting and Valuation of the Ecosystem Services (NCAVES), consider the following statements:**

1. It is a joint initiative of United Nations and World Bank.
2. It aims to assist developing countries of the world to advance the knowledge agenda on environmental-economic accounting.
3. In India NCAVES is implemented by the Ministry of Statistics and Program Implementation.

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

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only

**Q.132) Solution (c)**

Natural Capital Accounting and Valuation of Ecosystem Services (NCAVES) is launched by the United Nations Statistics Division, the United Nations Environment Programme, the Secretariat of the Convention on Biological Diversity, and the European Union.

The project funded by the European Union through its Partnership Instrument (PI), aims to assist the five participating partner countries, namely Brazil, China, India, Mexico and South Africa, to advance the knowledge agenda on environmental-economic accounting, in particular ecosystem accounting.

The objective of this initiative is:

- Improving the measurement of ecosystems and their services (both in physical and monetary terms) at the (sub)national level
- Mainstreaming biodiversity and ecosystems at (sub)national level policy planning and implementation;
- Contribute to the development of internationally agreed methodology and its use in partner countries.

In India, the NCAVES project is being implemented by the Ministry of Statistics and Program Implementation (MoSPI) in close collaboration with the Ministry of Environment, Forest and Climate Change (MoEF&CC) and the National Remote Sensing Centre (NRSC).

Achievements of MoSPI under the project include:

- Publication of "EnviStats India", on an annual basis since 2018, which is a compilation of the Environment Accounts as per the UN-SEEA framework.
- Development of the India-EVL Tool which is essentially a look-up tool giving a snapshot of the values of various ecosystem services in the different States of the country.

**Q.133) With reference to Nucleic Acid vaccines, consider the following statements:**

1. It uses genetic material from a disease-causing virus to stimulate an immune response against it.
2. Only DNA can be used as a genetic material for manufacturing these diseases.
3. These can be produced more rapidly as they do not require a host for growth.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.133) Solution (c)**

Nucleic acid vaccines use genetic material from a disease-causing virus or bacterium (a pathogen) to stimulate an immune response against it.

Depending on the vaccine, the genetic material could be DNA or RNA; in both cases it provides the instructions for making a specific protein from the pathogen, which the immune system will recognise as foreign (an antigen).

Once inserted into host cells, this genetic material is read by the cell's own protein-making machinery and used to manufacture antigens, which then trigger an immune response.

This is a relatively new technology, so although DNA and RNA vaccines are being developed against various diseases, including HIV, Zika virus and COVID-19, so far none of them have yet been approved for human use.

Several DNA vaccines are licenced for animal use, including a horse vaccine against West Nile virus.

Advantages of Nucleic acid vaccines are:

- Safe and non-infectious as they are not made with pathogen particles or inactivated pathogen.
- Can generate a stronger type of immunity and are well tolerated as compared to traditional vaccines.
- Can be produced more rapidly as they do not require a host for growth, e.g., eggs or bacteria.

**Q.134) Consider the following statements regarding Ozone layer:**

1. Ozone depletions at South Pole are much smaller in size than the North Pole.
2. Ozone depletion is directly related to the formation of Polar vortex.
3. Vienna Protocol regulates production and consumption of ozone depleting substances.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only



d) 1 and 3 only

**Q.134) Solution (b)**

Ozone depletion, gradual thinning of Earth's ozone layer in the upper atmosphere caused by the release of chemical compounds containing gaseous chlorine or bromine from industry and other human activities.

The thinning is most pronounced in the Polar Regions, especially over Antarctica.

Ozone depletions at North Pole are much smaller in size, owing to warmer temperatures in North Pole than the South Pole.

Ozone depletion is a major environmental problem because it increases the amount of ultraviolet (UV) radiation that reaches Earth's surface, which increases the rate of skin cancer, eye cataracts, and genetic and immune system damage.

Ozone depletion is directly related to the formation of Polar vortex (in stratosphere). During winter, temperatures in the vortex usually drop below 195 K (-78°C), and polar stratospheric clouds (PSCs) form. PSCs provide surface for ozone depleting substances such as chlorine containing CFCs, HCFCs, bromine containing halons etc. to reach stratosphere. At the poles, ODSs attach to ice particles in PSCs. When the sun comes out again in the polar spring, the ice particles melt, releasing the ozone-depleting molecules from the ice particle surfaces. Once released, these ozone-destroying molecules harm and breaking apart the molecular bonds in UV radiation-absorbing ozone.

The Montreal Protocol, ratified in 1987, was the first of several comprehensive international agreements enacted to halt the production and use of ozone-depleting chemicals.

**Q.135) With reference to the Marine Heat Waves, consider the following statements:**

1. It is defined as a condition when seawater temperatures exceed a seasonally-varying threshold for at least 15 consecutive days.
2. Ocean currents are the most common drivers of marine heat waves.
3. Marine heat waves can lead to coral bleaching.

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

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only

**Q.135) Solution (d)**

A marine heat wave is defined as a condition when seawater temperatures exceed a seasonally-varying threshold (usually the 90th percentile) for at least 5 consecutive days.

Causes of marine heatwaves:

- Heatwaves can happen in summer and also in winter, where they are known as “winter warm-spells”. These winter events can have important impacts, such as in the southeast of Australia where the spiny sea urchin can only colonise further south when winter temperatures are above 12 °C. A winter warm spell there can help promote colonisation.
- Marine heatwaves can be caused by a whole range of factors, and not all factors are important for each event.
- The most common drivers of marine heatwaves include ocean currents which can build up areas of warm water and air-sea heat flux, or warming through the ocean surface from the atmosphere.
- Winds can enhance or suppress the warming in a marine heatwave, and climate modes like El Niño can change the likelihood of events occurring in certain regions.

Impacts of marine heatwaves:

- Biodiversity can be drastically affected by marine heatwaves. In 2016, marine heatwaves across northern Australia led to severe bleaching of the Great Barrier Reef.
- Marine heatwaves can change the habitat ranges of certain species, such as the spiny sea urchin off southeastern Australia which has been expanding southward into Tasmania at the expense of kelp forests which it feeds upon.

**Q.136) The Adaptation Gap Report 2020 is released by:**

- a) WB
- b) IPCC
- c) UNEP
- d) IUCN

**Q.136) Solution (c)**

The Adaptation Gap Report is released by United Nations Environment Programme (UNEP).

Since 2014, these reports have focused on exploring Finance, Technology and Knowledge gaps in climate change adaptation.

It complements the Emissions Gap Report series – exploring global progress on adaptation and options for enhancing the global adaptation efforts.

The 2020 edition looks at progress in planning for, financing and implementing adaptation – with a focus on nature-based solutions.

Key findings of the Adaptation Gap Report 2020:

- 72% of countries have adopted at least one national-level adaptation planning instrument.  
Most developing countries are preparing National Adaptation Plans, a key mechanism to strengthen the focus on adaptation.
- Around half of countries' planning documents address risks comprehensively, include relevant stakeholders and have dedicated planning processes in place.
- International public adaptation finance is slowly rising, but there is not enough data to identify trends in domestic public or private finance.
- Annual adaptation costs in developing countries alone are estimated at USD 70 billion currently. This figure is expected to reach USD 140-300 billion in 2030 and USD 280-500 billion in 2050
- Multilateral support for adaptation increased between 2013 and 2017. In contrast, bilateral adaptation support increased slowly over the same period.
- Since 2006, close to 400 adaptation projects financed by multilateral funds serving the Paris Agreement have been undertaken in developing countries, half of which started after 2015. The Green Climate Fund, Least-Developed Country Fund and Adaptation Fund have together reached more than 20 million direct and indirect beneficiaries and trained more than 500,000 people on climate resilience measures.

**Q.137) Consider the following statements regarding 'Additive Manufacturing':**

1. It refers to the construction of a three-dimensional object from a digital 3D model by adding materials layer by layer.
2. Atal Tinkering Labs have been set up by the Union Government to promote the ecosystem of Additive Manufacturing in India.
3. India's market share in the field of Additive Manufacturing is more than China.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.137) Solution (a)**

Additive manufacturing or 3D printing is defined as the technology that constructs a three-dimensional object from a digital 3D model or a Computer-aided design (CAD) model by adding material layer by layer.

The addition of material can happen in multiple ways, namely power deposition, resin curing, filament fusing. The deposition and solidification are controlled by computer to create a three-dimensional object. These objects can be of almost any shape or geometry.

The AM market globally focused on the sectors including automotive, consumer products, medical, business machines, aerospace, government/military, academic and others. Automotive or motor vehicles account for the largest share in this market due to its easy applications in the production of end-products (engines, spare parts, other interior, and exterior parts) as compared to other segments such as consumer products and business machines, which have limited usage in manufacturing of end-products.

USA's market share on AM is 36%, followed by EU as 26% and China 14% and India holding a meager 1.4% of the global market share.

Initiatives to promote 'Additive manufacturing' in India

- Establishment of 3D printing Manufacturing Lab at National Institute of Electronics & Information Technology, Aurangabad. The Institute also offers a certificate course in 3D Printing.
- Under Atal Innovation Mission (AIM), Atal Tinkering Labs have been set up, with do-it-yourself (DIY) kits on latest technologies like 3D Printers, Robotics, Internet of Things (IOT), miniaturized electronics.

**Q.138) With reference to carbon pool, consider the following statements:**

1. Carbon pools are reservoirs of carbon that have the capacity to both take in and release carbon.
2. Earth's crust is a significant example of carbon pool.

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

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

**Q.138) Solution (c)**

Carbon pools are reservoirs of carbon that have the capacity to both take in and release carbon. The amount of carbon in these carbon pools is measured in gigatonnes (GtC): 1 gigatonne, or 1 trillion kilograms of carbon.

Significant carbon pools on earth are found in the earth's crust, oceans, atmosphere and land-based ecosystems. Soils contain roughly 2,344 Gt of organic carbon, making this the largest terrestrial pool.

**Q.139) With reference to the ecological benefits of millets, consider the following statements:**

1. Millets purify and replenish groundwater
2. Millet crops sequester carbon from the atmosphere.
3. Millets are drought-tolerant, and heat-resistant crops.

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

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only

**Q.139) Solution (d)**

Millets are group of small grained cereal food crops which are highly tolerant to drought and other extreme weather conditions and are grown with low chemical inputs such as fertilizers and pesticides.

Most of millet crops are native of India and are popularly known as Nutri-cereals as they provide most of the nutrients required for normal functioning of human body.

Millets are classified into Major Millets and Minor Millets based on their grain size. Pseudo millets are so called because they are not part of the Poaceae botanical family, to which 'true' grains belong, however they are nutritionally similar and used in similar ways to 'true' grains.

Ecological benefits of Millets:

- Millet crops sequester carbon from the atmosphere while paddy fields emit methane, a greenhouse gas.
- Millets are less water intensive. E.g., One rice plant requires nearly 2.5 times the amount of water required by a single millet plant of most varieties.
- They are hardy, drought-tolerant, and heat-resistant crops that generally do not succumb to pests and diseases.
- Millets can grow in areas with less than 350 mm of rainfall and the cultivation cycle completed within 70-100 days.
- They can grow on low fertility soil and many of them are also grown to reclaim soils.
- Millets are called 'Famine reserves' as they have a short growing season of 65 days and can keep well for two years or beyond.

India is the largest producer of millets in the world with a 41.0% global market share. India produced 11.5 million tonnes of millets in 2020.

United Nations General Assembly has declared 2023 as the International Year of Millets.

**Q.140) Which among the following species of sea turtles are found in India?**

1. Green
2. Hawksbill
3. Loggerhead
4. Leatherback
5. Olive ridley

**Choose the correct answer from the codes given below:**

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

**Q.140) Solution (d)**

The Indian coastal waters supports five species of sea turtles found worldwide. These are the Olive ridley (*Lepidochelys olivacea*), Green (*Chelonia mydas*), Hawksbill (*Eretmochelys imbricata*), Leatherback (*Dermochelys coriacea*) and Loggerhead (*Caretta caretta*).

These five species of sea turtles that occur in Indian coastal waters are protected under Schedule I of the Wildlife (Protection) Act, 1972.

India is home to the largest known nesting population of olive ridley turtles. Except Loggerhead turtles, the remaining four species (Leatherback, Hawksbill, Green and Olive ridley turtles) nest along the Indian coastline and islands of India.

About 40,000 to 11,00,000 turtles nest every year on the beaches of India. Number of turtles nesting varies between years and the success of sporadic nests have been observed to decline due to predations and habitat degradation.

Numerous direct and indirect pressures arising from various factors adversely impact marine turtle populations and their habitat. This also includes natural disasters such as tsunamis, cyclones, hurricanes and storms

Marine turtles have a major influence on the structure and function of marine biodiversity and play an important role in shaping the behavior and life history traits of prey species and predators that is critical for the sustainability of fisheries in the region.

Factors like climate change, unsustainable resource use, marine litter and pollution affect marine turtles and their habitats.

Marine turtles play a variety of ecological roles for maintaining healthy marine habitats like controlling prey populations, supporting coastal vegetation through their hatchlings etc.



Their presence is an indicator of healthy marine ecosystems and provide a source of revenue for local communities through tourism.

Marine turtles thus present themselves as a key indicator of healthy marine habitats and an opportunity for conservation of associated species.

**Q.141) With reference to “Lagrangian points” in Space, consider the following statements:**

1. At these points in space the combined gravitational forces of two large celestial bodies is equal to the centrifugal force felt by a much smaller third body
2. These points are an ideal location where a spacecraft may be parked to make observations.
3. Aditya-L1 mission of ISRO is planned to be placed at the Lagrangian point.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.141) Solution (d)**

Lagrange points are positions in space where objects sent there tend to stay put. At Lagrange points, the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them. These points in space can be used by spacecraft to reduce fuel consumption needed to remain in position.

These are the 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. These can be used by spacecraft to reduce fuel consumption needed to remain in position.

There are five special points where a small mass can orbit in a constant pattern with two larger masses. These are L1, L2, L3, L4 and L5. The Lagrange Points are positions where the gravitational pull of two large masses precisely equals the centripetal force required for a small object to move with them.

The L1 point of the Earth-Sun system affords an uninterrupted view of the sun. Aditya L1 Mission of ISRO which aims to do coronal and near UV studies of the Sun is planned to be placed at Lagrange point L1.

**Q.142) What is the aim of KAPILA campaign launched by the Government of India?**

- a) Providing grants to students belonging to rural areas for pursuing higher education in Science, Technology, Engineering and Mathematics



- b) Creating Intellectual Property Literacy and patent awareness
- c) Mitigating gender disparity in science and engineering research
- d) Promoting applications of nano-technology in manufacturing sector

**Q.142) Solution (b)**

The Government has launched the Kalam Program for Intellectual Property Literacy and Awareness (KAPILA) Campaign for creating Intellectual Property Literacy and patent awareness.

The objectives of the scheme include creating awareness regarding:

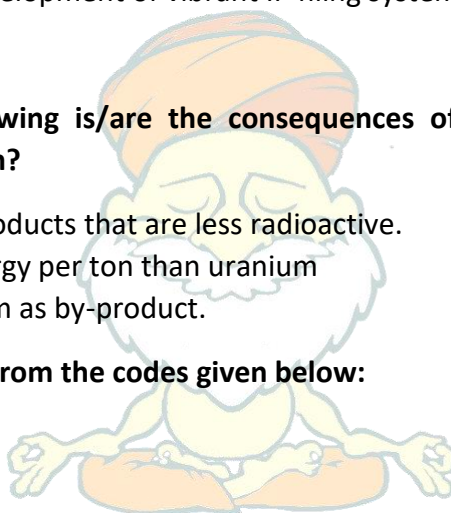
- Intellectual Property Rights (IPR) in Higher Education Institutions (HEIs),
- Enabling of IP protection of inventions originating from faculty and students of HEIs,
- Development of Credit Course on IPR,
- Training program on IPR for faculty and students of HEIs and
- Sensitization and development of vibrant IP filing system.

**Q.143) Which of the following is/are the consequences of using Thorium in Nuclear Reactors instead of Uranium?**

1. It produces waste products that are less radioactive.
2. Generates more energy per ton than uranium
3. It produces plutonium as by-product.

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3



**Q.143) Solution (a)**

Thorium is a basic element of nature, like Iron and Uranium. Like Uranium, its properties allow it to be used to fuel a nuclear chain reaction that can run a power plant and make electricity. Thorium-based nuclear power generation is fueled primarily by the nuclear fission of the isotope uranium-233 produced from the fertile element thorium. A thorium fuel cycle can offer several potential advantages over a uranium fuel cycle.

The advantages of using Thorium to fuel nuclear reactor are:

- It is more abundant in nature than uranium.
- It not fissile on its own, which means reactions can be stopped when necessary.
- It produces waste products that are less radioactive, and generates more energy per ton.

- Thorium reactors do not produce plutonium, which is what needed to make a nuke.
- Most of the world's thorium exists as the useful isotope, which means it does not require enrichment.
- India is a home to a quarter of the world's known Thorium reserves and notably lacking in uranium resources.
- India has projected meeting as much as 30% of its electrical demands through thorium by 2050.

Possible disadvantages of thorium nuclear power are:

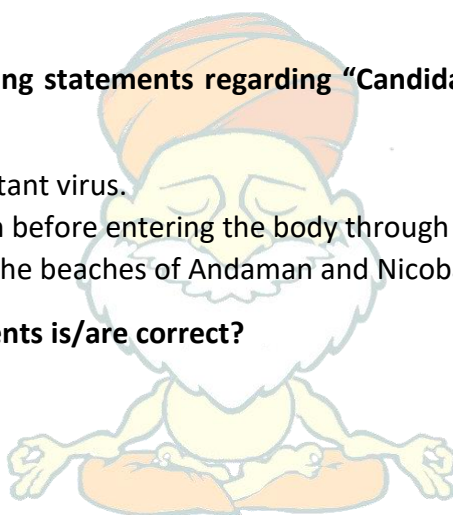
- Thorium fuel is a bit harder to prepare. Thorium dioxide melts at 550 degrees higher temperatures than traditional Uranium dioxide, so very high temperatures are required to produce high-quality solid fuel.
- There is a higher cost of fuel fabrication and reprocessing than in plants using traditional solid fuel rods.

**Q.144) Consider the following statements regarding "Candida Auris", seen sometimes in news:**

1. It is a multidrug-resistant virus.
2. It survives on the skin before entering the body through wounds.
3. It has been found in the beaches of Andaman and Nicobar islands.

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

- a) 1 and 2 only
- b) 2 only
- c) 1 and 3 only
- d) 2 and 3 only



**Q.144) Solution (d)**

Candida Auris is a multidrug-resistant fungus that has become a 'superbug' as it is able to resist main anti-fungal treatments.

The infections caused by this "superbug" can show "no symptoms before turning into a fever and chills". These symptoms won't go away despite the use of medicines and can lead to death, the Sun reported.

C. auris survives on the skin before entering the body through wounds. Once in the bloodstream, it causes severe illness and can lead to sepsis -- a condition that kills up to 11 million people a year globally.

Increased temperatures due to climate change may have caused *C. auris* to adapt to higher temperatures in the wild, and thus allowed the fungus to make the jump to humans, whose normal body temperature is typically too hot for most fungi to survive.

Researchers have found traces of *Candida Auris* on remote beaches of Andaman and Nicobar Islands that can potentially bring next pandemic.

**Q.145) With reference to the K-family of Missiles in India, consider the following statements:**

1. It is a family of submarine-launched ballistic missiles.
2. These are faster, lighter and stealthier than their Agni missile counterparts.
3. It significantly increases the first strike capability of India.

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

- a) 1 only
- b) 1 and 2 only
- c) 3 only
- d) 2 and 3 only

**Q.145) Solution (b)**

The K family of missiles are primarily Submarine Launched Ballistic Missiles (SLBMs), which have been indigenously developed by Defence Research and Development Organisation (DRDO) and are named after Dr A. P. J. Abdul Kalam.

Because these missiles are to be launched from submarines, they are lighter, smaller and stealthier than their land-based counterparts, the Agni series of missiles which are medium and intercontinental range nuclear capable ballistic missiles.

The missile has a range of up to 3,500 km and is capable of carrying a nuclear/conventional payload of more than 2 tonnes. It is powered by solid rocket propellants. It has been designed to be fired from a depth of 50 meters.

**Strategic Importance:**

- The capability of being able to launch nuclear weapons submarine platforms has great strategic importance in context of achieving a nuclear triad, especially in the light of 'no first use' policy of India.
- The sea-based underwater nuclear capable assets significantly increases the "second strike capability" of India and thus boosts its nuclear deterrence.
- These submarines can not only survive a first strike by the adversary but also can launch a strike in retaliation thus achieving Credible Nuclear Deterrence.

- The 2016 commissioned nuclear powered Arihant submarine and its class members which in the pipeline, are the assets capable of launching missiles with nuclear warheads.
- The development of these capabilities is important in light of India's relations with the two neighbours China and Pakistan.

**Q.146) With reference to the defence sector of India, Maareech is:**

- a) Advanced Torpedo Defence System
- b) Multi-barrel unguided rocket launch system
- c) Medium-altitude long-endurance unmanned aerial vehicle
- d) Fire-and-forget anti-tank guided missile

**Q.146) Solution (a)**

Maareech

- It is an Advanced Torpedo Defence System (ATDS) that is capable of being fired from all frontline ships. Torpedo is an underwater ranged weapon launched above or below the water surface, self-propelled towards a target, and with an explosive warhead designed to detonate either on contact with or in proximity to the target.
- It has been designed and developed indigenously by DRDO.
- It is capable of detecting, locating and neutralizing incoming torpedoes.
- It applies counter-measures to protect the naval platform against attack.
- The decoy helps in exhausting the energy of the torpedo by running the later through long and ineffective course and prevents them from homing in to the targeted platform with its advanced counter-measures capabilities.
- Mareech system has been deployed on all the frontline warships of Indian Navy ships.

**Q.147) With reference to the lithium triangle region, consider the following statements:**

1. Chile, Argentina, and Bolivia makes up the lithium triangle region of the world.
2. India's lithium-ion battery demand is fulfilled by imports from the lithium triangle region.

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

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

**Q.147) Solution (a)**

Lithium is a key element for new technologies and finds its use in ceramics, glass, telecom and aerospace industries. It is used in Lithium ion batteries, lubricating grease, high energy additive to rocket propellants, and optical modulators for mobile phones.

Latin America has the famous lithium triangle region. These regions comprise of lithium deposits under the salt flats of northwest Argentina, northern Chile, and southwest Bolivia. They hold about 80% of the explored lithium of the world and most of the production comes from these countries.

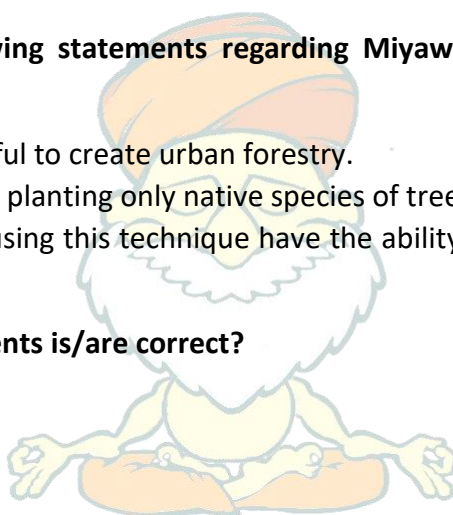
India currently imports most of the Lithium needed. According to data tabled in the Parliament in February 2020, the import of Lithium-ion batteries quadrupled to 712 million batteries in 2018 from 175 million in 2016. China, Hong Kong and Vietnam were the leading sources of imports.

**Q.148) Consider the following statements regarding Miyawaki Afforestation Technique, seen sometimes in news:**

1. This technique is useful to create urban forestry.
2. This method includes planting only native species of trees.
3. The forests created using this technique have the ability to bring rain in the drought prone regions.

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

- a) 1 only
- b) 1 and 2 only
- c) 2 and 3 only
- d) 3 only



**Q.148) Solution (b)**

Miyawaki is a Japanese technique of growing dense plantations in a short time. The method is being extensively used in and around Bengaluru by activists, corporate firms as part of their corporate social responsibility (CSR) activities, and even individuals. A dense plantation can be grown from scratch in a span of two years using the method.

This method includes planting trees (only native species) as close as possible in the same area which not only saves space, but the planted saplings also support each other in growth and block sunlight reaching the ground, thereby preventing the growth of weed. The native trees of the region are identified and divided into four layers — shrub, sub-tree, tree, and canopy.

The approach is supposed to ensure that plant growth is 10 times faster and the resulting plantation is 30 times denser than usual.

Concerns:

- Forests developed using this technique lack some qualities of natural forests, such as medicinal properties and the ability to bring rain.
- Forests can only be grown at smaller spaces in or near cities.
- Several environmentalists have questioned the efficacy of the method that accelerates the growth of trees and claims to match a forest's complex ecosystem (as it is not a good idea to force plants to photosynthesize fast).

**Q.149) With reference to the technology of bio-restoration, consider the following statements:**

1. It means reviving native ecosystem in degraded areas while maintaining diversity of original flora and fauna through regeneration.
2. The aim of this technique is to bring down regeneration period to four-five years.

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

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

**Q.149) Solution (c)**

Ecological restoration means reviving native ecosystem in degraded areas while maintaining diversity of original flora and fauna through regeneration but bringing down the regeneration period to 4 to 5 years. Natural regeneration takes longer time.

Restoration process begins with stabilising entire site by planting native salt tolerant grasses. It involves the use of growth-promoting bacteria.

The technology for ecological restoration (Bio-restoration) has been developed to revive the mangroves degraded due to rising sea levels, climate change and human intrusion in the Sunderbans, West Bengal. The transplantation of propagated mangroves started in 2014, initially at a moderately degraded patch and then at severely degraded zones.

The Sundarbans is a protected wetland under the Ramsar Convention and is also a Unesco World Heritage site. Small coastal patches of mangroves are highly vulnerable and fragmentation of the ecosystem is creating barriers to species movement and dispersal.

**Q.150) With reference to Project RE-HAB, consider the following statements:**

1. It is launched in Wayanad Wildlife Sanctuary.
2. It is a sub-mission of National Honey Mission.

3. This project is aimed towards reducing Human-Elephant conflict by installing bee boxes across elephant paths.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.150) Solution (b)**

Khadi and Village Industries Commission (KVIC) has launched a project of creating “bee-fences” to mitigate human – elephant conflicts in the country.

The objective of Project RE-HAB (Reducing Elephant – Human Attacks using Bees) is to thwart elephant attacks in human habitations using honey bees and thus reduce fatalities of humans as well as retaliatory deaths of elephants in the hands of humans.

Project RE-HAB is a sub-mission of KVIC's National Honey Mission.

While the Honey Mission is a programme to increase the bee population, honey production and beekeepers' income by setting up apiaries, Project RE-HAB uses bee boxes as a fence to prevent the attack of elephants.

Nearly 500 people die every year due to elephant attacks in India. This is nearly 10 times more than the fatalities caused by big cats across the country. From 2015 to 2020, nearly 2500 people have lost their lives in elephant attacks. Out of this, nearly 170 human fatalities have been reported in Karnataka alone. On the contrary, nearly one-fifth of this number, i.e. around 500 elephants has also died in retaliation by humans in the last 5 years.

A pilot project has been launched at 4 locations around village Chelur in Kodagu district of Karnataka during March 2021. These spots are located on the periphery of Nagarhole National Park and Tiger Reserve and are known to be human-elephant conflict zones. The total cost of the project is just Rs 15 lakh.

**Q.151) Consider the following statements:**

- 1. Largest source of atmospheric ammonia is burning of fossil fuels.
- 2. Atmospheric ammonia plays a key role formation of secondary aerosols.
- 3. Peninsular plateau of India is one of the largest ammonia hotspots of the world.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only



d) 1, 2 and 3

**Q.151) Solution (b)**

Atmospheric ammonia ( $\text{NH}_3$ ) is an alkaline gas and a prominent constituent of the nitrogen cycle that adversely affects ecosystems at higher concentrations. It is a pollutant, which influences all three spheres such as haze formation in the atmosphere, soil acidification in the lithosphere, and eutrophication in water bodies.

The largest source of  $\text{NH}_3$  emissions is agriculture, including animal husbandry and  $\text{NH}_3$ -based fertilizer applications. Other sources of  $\text{NH}_3$  include industrial processes, vehicular emissions and volatilization from soils and oceans.

Atmospheric  $\text{NH}_3$  reacts with sulfur ( $\text{SO}_x$ ) and nitrogen ( $\text{NO}_x$ ) oxides to form aerosols, which eventually affect human health and climate.

Intense agriculture and numerous fertilizer plants make the Indo-Gangetic Plain (IGP) as one of the largest  $\text{NH}_3$  hotspots of the world.

**Q.152) Which of the following statements is/are correct regarding “brown carbon tarballs”, sometimes seen in news?**

1. Brown carbon tarballs are formed due to burning of biomass or fossil fuels that deposit on snow.
2. Brown carbon tarballs reduce the process of glacial melting.

**Choose the correct answer from the codes given below:**

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

**Q.152) Solution (a)**

Tarballs are small light-absorbing, carbonaceous particles formed due to burning of biomass or fossil fuels that deposit on snow and ice.

They are formed from brown carbon, emitted during the burning of fossil fuels.

The median sizes of externally mixed tarballs and internally mixed tarballs were 213 and 348 nanometre respectively.

Primary brown carbon (BrC) co-emitted with black carbon (BC) from biomass burning is an important light absorbing carbonaceous aerosol.

The black carbon from the Indo-Gangetic Plain can reach the Himalaya region and influence glacial melting and climatic change.

A study revealed that a dense array of active fire spots corresponding to large-scale wheat-residue burning on the Indo-Gangetic Plain occurred along the pathways of Himalaya. The percentage of the tarballs increased on days of higher levels of pollution and could contribute to the hastening of glacial melt and global warming.

**Q.153) First World Solar Technology Summit was convened by:**

- a) United Nations Framework Convention on Climate Change
- b) United Nations Environment Programme
- c) International Solar Alliance
- d) International Energy Agency

**Q.153) Solution (c)**

First World Solar Technology Summit (WSTS) was organized by the International Solar Alliance (ISA) on a virtual platform.

The objective of the ISA First World Solar Technology Summit (WSTS) was to bring the spotlight on state-of-the-art technologies as well as next-generation technologies which will provide impetus to the growth and propagation of Solar Energy globally.

The Summit would provide a global platform for stakeholders to engage on innovations in technology that will catapult the world towards a high Solar growth trajectory.

**Q.154) With reference to the Climate Investment Fund (CIF), consider the following statements:**

1. CIFs are implemented by the Multilateral Development Banks to bridge the financing and learning gap between international climate change agreements.
2. The International Monetary Fund is the Trustee of the CIFs.
3. Strategic Climate Fund is part of CIF.

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

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.154) Solution (c)**

The Climate Investment Funds (CIF) is one of the world's largest multilateral funds working to pilot and scale climate solutions in developing countries.

Established at the request of the G8 and G20 in 2008, CIF administers a collection of programs that help resource-strapped nations fight the impacts of climate change and accelerate the shift to a low-carbon economy.

Through contributions from 14 donor countries, CIF is supporting more than 350 projects in 72 low and middle-income countries on the frontlines of the climate crisis.

CIF works in partnership with governments, the private sector, civil society, local communities, and six major multilateral development banks (MDBs) to develop innovative climate solutions.

The World Bank is the Trustee of the CIFs.

It include a "sunset clause" to ensure that the Fund's activities do not prejudice the outcome on the UNFCCC negotiations.

CIFs consist of two distinct funds:

- Clean Technology Fund
- Strategic Climate Fund

The CTF promotes scaled-up financing for demonstration, deployment and transfer of low carbon technologies with a significant potential for long-term greenhouse gas emissions savings.

**Q.155) Which of the following is/are the ecological benefits of Biochar?**

1. Increase in the soil fertility of acidic soils
2. Increase in water retention of soils
3. Protects against soil-borne diseases

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.155) Solution (d)**

Biochar is charcoal that is produced by pyrolysis of biomass in the absence of oxygen. Biochar is a stable solid that is rich in carbon and can endure in soil for thousands of years.

Like most charcoal, biochar is made from biomass via pyrolysis (decomposition brought about by high temperatures).

Biochar may increase the following:

- Soil fertility of acidic soils (low pH soils),
- Agricultural productivity,
- Protection against some foliar and soil-borne diseases.
- Soil's water-holding capacity,
- Nutrient supply and retention

**Q.156) Consider the following statements:**

1. Coal gasification is the process of converting coal into syngas.
2. Prime constituent of syngas is methane.
3. The process of coal gasification could significantly reduce LNG import of India.

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

- a) 1 and 2 only
- b) 2 only
- c) 3 only
- d) 1 and 3 only

**Q.156) Solution (d)**

Coal gasification is the process of converting coal into synthesis gas (also called syngas).

Syngas is 30 to 60% carbon monoxide (CO), 25 to 30% hydrogen (H<sub>2</sub>), 0 to 5% methane (CH<sub>4</sub>), 5 to 15% carbon dioxide (CO<sub>2</sub>), plus a lesser or greater amount of water vapour, smaller amounts of the sulfur compounds.

Syngas can be used in a variety of applications such as in the production of electricity and making chemical products, such as fertilisers.

According to the International Energy Agency's Energy Technology Systems Analysis Programme (ETSAP), the coal gasification process holds good potential in the future, with coal being the most abundantly available fossil fuel across the world, and that even low-grade coal can be used in the process.

According to the Ministry of Chemicals and Fertilisers, urea is currently produced using pooled natural gas, which comprises of both domestic natural gas and imported Liquefied Natural Gas (LNG). The usage of locally available coal for making fertilisers would help reduce the import of LNG.

**Q.157) Which of the following organizations are part of Partnership for Action on Green Economy (PAGE)?**

1. ILO
2. WB

3. UNIDO
4. UNITAR

**Choose the correct answer from the codes given below:**

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

**Q.157) Solution (c)**

Partnership for Action on Green Economy (PAGE):

PAGE provides integrated and holistic support to countries on eradicating poverty, increasing jobs and social equity, strengthening livelihoods and environmental stewardship and sustaining growth.

The programme is adaptive and aligns with national priorities to offer tailored and effective support to transform economies to advance the 2030 Agenda and Paris Agreement on Climate Change.

It is a joint collaboration between five United Nations agencies —

- the UN Environment Programme (UNEP),
- the International Labour Organization (ILO),
- the United Nations Development Programme (UNDP),
- the United Nations Industrial Development Organization (UNIDO), and
- the United Nations Institute for Training and Research (UNITAR)

PAGE seeks to work collaboratively, employing shared knowledge between UN agencies and country offices, funding partners and partner countries, to leverage collective strength, avoid duplication, and accelerate progress towards widespread inclusive, green and sustainable development.

**Q.158) Eight beaches in India have been given Blue Flag certification. In this context consider the following statements:**

1. Blue flag certification is given to the beaches to signify that marine pests like jellyfish are present on the beach.
2. Blue flag certification is given by International Seabed Authority.

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

- a) 1 only
- b) 2 only
- c) Both 1 and 2

d) Neither 1 nor 2

**Q.158) Solution (d)**

The 'Blue Flag' is a certification that can be obtained by a beach, marina, or sustainable boating tourism operator, and serves as an eco-label. The certification is awarded by the Denmark-based non-profit Foundation for Environmental Education, which sets stringent environmental, educational, safety-related and access-related criteria that applicants must meet and maintain. It is awarded annually to beaches and marinas in FEE member countries.

The Blue Flag programme was started in France in 1985 and in areas out of Europe in 2001. The programme promotes sustainable development in freshwater and marine areas through four main criteria:

- water quality
- environmental management
- environmental education
- safety

Forty-seven countries currently participate in the program, and 4,573 beaches, marinas, and boats have this certification.

The Indian beaches selected for the certification are: Kappad (Kerala), Shivrajpur (Gujarat), Ghoghla (Diu), Kasarkod and Padubidri (Karnataka), Rushikonda (Andhra Pradesh), Golden (Odisha) and Radhanagar (Andaman & Nicobar Islands).

**Q.159) Buldhana Pattern, seen sometimes in news, is:**

- a) Method of water conservation
- b) Traditional agricultural practise
- c) Method of tree cropping
- d) Lift Irrigation System

**Q.159) Solution (a)**

The Buldhana pattern is a framework for water conservation used in Buldhana district in Vidharbha region of Maharashtra.

It is based on the synchronization of national highway construction and water conservation.

This leads to the increase in capacity of water storage across the water-bodies and it came to be known as Buldana Pattern.

Creation of State Water Grid and adopting water Conservations works under this pattern will increase the agriculture production.

With this activity 225 lakh cubic metre of soil was used in National Highway construction and the resultant widening / deepening resulted in increase of 22,500 Thousand Cubic Metre (TMC) of water storage capacity with no cost to state government.

Buldhana Pattern' of water conservation' has won national recognition. NITI Aayog is in the process of formulating National Policy on water conversation based on it.

**Q.160) Which of the following pairs is/are correctly matched?**

S. No.	Ramsar Site	Location
1.	Kabartal Wetland	Madhya Pradesh
2.	Asan Conservation Reserve	Uttarakhand
3.	Tso Kar Wetland Complex	Ladakh

**Choose the correct answer from the codes given below:**

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1 and 3 only
- d) 1, 2 and 3

**Q.160) Solution (b)**

Kabartal Wetland:

- Kabartal Wetland, also known as Kanwar Jheel, covers 2,620 hectares of the Indo-Gangetic plains Bihar.
- The Wetland is an important stopover along the Central Asian Flyway, with 58 migratory waterbirds using it to rest and refuel.
- It is also a valuable site for fish biodiversity with over 50 species documented.
- Five critically endangered species inhabit the site, including three vultures – the red-headed vulture (*Sarcogyps calvus*), white-rumped vulture (*Gyps bengalensis*) and Indian vulture (*Gyps indicus*) – and two waterbirds, the sociable lapwing (*Vanellus gregarius*) and Baer's pochard (*Aythya baeri*).

Asan Conservation Reserve:

- The Asan Conservation Reserve is a 444-hectare stretch of the Asan River running down to its confluence with the Yamuna River in Dehradun district of Uttarakhand.
- The damming of the River by the Asan Barrage in 1967 resulted in siltation above the dam wall, which helped to create some of the Site's bird-friendly habitats.



- These habitats support 330 species of birds including the critically endangered red-headed vulture (*Sarcogyps calvus*), white-rumped vulture (*Gyps bengalensis*) and Baer's pochard (*Aythya baeri*).
- More than 1% of the biogeographical populations of two waterbird species have been recorded, these being red-crested pochard (*Netta rufina*) and ruddy shelduck (*Tadorna ferruginea*).

Tso Kar Wetland Complex:

- This high-altitude wetland complex is found at more than 4,500 metres above sea level in the Changthang region of Ladakh.
- The complex includes two connected lakes, the freshwater Startsapuk Tso and the larger hypersaline Tso Kar; it presents a notable example of two such lakes existing in close proximity.
- Inhabiting the Site are numerous threatened species including the endangered saker falcon (*Falco cherrug*) and Asiatic wild dog or dhole (*Cuon alpinus laniger*), and the vulnerable snow leopard (*Panthera uncia*).
- The Site also acts as an important stopover ground for migratory birds along the Central Asian Flyway and is one of the most important breeding areas in India for the black-necked crane (*Grus nigricollis*).

